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OPEN HEARING: SOCIAL MEDIA INFLUENCE IN THE 2016 U.S. ELECTION

HEARING

BEFORE THE

SELECT COMMITTEE ON INTELLIGENCE

OF THE

UNITED STATES SENATE

ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

WEDNESDAY, NOVEMBER 1, 2017

Printed for the use of the Select Committee on Intelligence

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OPEN HEARING: SOCIAL MEDIA INFLUENCE IN THE 2016 U.S. ELECTION

WEDNESDAY, NOVEMBER 1, 2017

U.S. SENATE,
SELECT COMMITTEE ON INTELLIGENCE,
Washington, DC.

The Committee met, pursuant to notice, at 9:34 a.m. in Room SH–216, Hart Senate Office Building, Hon. Richard Burr (Chairman of the Committee) presiding.

Committee Members Present: Senators Burr, Warner, Risch, Rubio, Collins, Blunt, Lankford, Cotton, Cornyn, Feinstein, Wyden, Heinrich, King, Manchin, Harris, and Reed.

OPENING STATEMENT OF HON. RICHARD BURR, CHAIRMAN, A U.S. SENATOR FROM NORTH CAROLINA

Chairman BURR. I'd like to call the hearing to order. Good morning.

I'd like to welcome our witnesses today. Before I introduce them, I want to say, on behalf of the full Committee, that our hearts and our prayers go out to the individuals in New York, the families and the friends of those who were affected by a senseless terror act. To most on this Committee, we've come to expect this. We spend countless hours working through the threats that exist to this country and around the world, and it's sad that we've come to the point where, really, nothing can happen that surprises us.

But it's the responsibility of this Committee to work hand-in-hand with our intelligence community to help to keep America safe by providing the tools that they need to accomplish their mission. We will continue to do that.

As is the case that we're here today, and I welcome our witnesses, Colin Stretch, Vice President and General Counsel at Facebook; Sean Edgett, General Counsel at Twitter; and Kent Walker, Senior Vice President, General Counsel at Google.

For several months now, the media has been fixated on the role that social media platforms played in spreading disinformation and discord during the 2016 elections. This is an opportunity for each of you to tell your respective stories and, if necessary, correct the record. My sense is that not all aspects of those stories have been told accurately. I'll note for the record that this Committee is now having its seventeenth open hearing this year, and the twelfth at which we'll be discussing Russia and Russia's activities.

Today, I'm hopeful we can provide the American people with an informed and credible assessment of how foreign actors used your

platforms to circulate lies and to agitate unrest during last year's elections.

I'm also hopeful you'll share with us what your companies are doing to make it harder for foreign actors to use your platforms' automated accounts and falsified stories to influence sentiment in the United States.

Very clearly, this kind of national security vulnerability represents an unacceptable risk, and your companies have a responsibility to reduce that vulnerability. While we're on the topic of responsibility, I want to use this forum to push back on some narratives that have sprung up around the subject. A lot of folks, including many in the media, have tried to reduce this entire conversation to one premise; foreign actors conducted a surgical, executed covert operation to help elect a United States president.

I'm here to tell you this story does not simplify that easily. It is shortsighted and dangerous to selectively focus on one piece of information and think that that somehow tells the whole story.

We've heard from the media how a series of, I quote, "Russian-linked Facebook ads were specifically aimed at Michigan and Wisconsin during the lead-up to last year's presidential election," unquote, and that, quote, "some of those ads targeted specific demographic groups in two states," unquote. The narrative here is that ads linked to Russia were targeted at pivotal states and directly influenced the election's outcome.

What you haven't heard is that almost five times more ads were targeted at the State of Maryland than of Wisconsin, Maryland, which is targeted by 262 ads in comparison to Wisconsin's 55 ads, and Maryland was not up for grabs. It was a State the Democrat candidate carried by 26 percent; or that 35 of the 55 ads targeted at Wisconsin ran prior to the Wisconsin primary, before there was an identified Republican candidate; and moreover, that not one of those 55 ads mentioned President Donald Trump by name; or that the key election State of Pennsylvania had fewer ads targeted at it than Washington, D.C., where 87 percent of the electorate voted for Hillary Clinton; or that the three most heavily targeted states in America—Maryland, Missouri, and New York—were all determined by at least 18-point margin, and two of them won by Hillary Clinton.

One point the media has gotten correct is that more of these geographically targeted ads ran in 2015 than 2016—again, before President Trump was identified as the Republican candidate for president. But some of the context surrounding the more than $100,000 worth of divisive ads on hot-button issues purchased by Russian actors is missing. To add some detail here where the media has failed to do it and put the $100,000 into a frame of reference, the total ad spend for the State of Wisconsin was $1,979, with all but $54 being spent before the primary—again, before the emergence of a Republican candidate. The ad spend in the State of Michigan was $823; Pennsylvania, $300.

To believe the narrative, you have to accept that these sophisticated, well-resourced Russian actors studied our process, assessed what states would be critical to the election result, then snuck and invested all of $300 to execute their plan in Pennsylvania—$300. More than five times as much money was spent on advertising in

California, a State that hasn't voted Republican in presidential elections since 1988.

Even with the benefit of numbers and what can be calculated and measured, this is an incredibly complex story. We can look at the amount of money spent, the number of ads purchased, and draw conclusions about priorities. We can look at the divisive content of the ads and the pages that they directed people towards, the number of tweets and retweets, and the manipulated search results, and draw inferences about the intent of the information operation. What we cannot do, however, is calculate the impact that foreign meddling in social media had on this election, nor can we assume that it must be the explanation for an election outcome that many didn't expect.

I understand the urge to make this story simple. It's human nature to make the complex manageable, find explanations, and interpret things in ways that conform to your conclusions. But that's biased. Pointing to a State and saying that no ads ran there after the election doesn't prove intent, or even motive. It just shows that no ads ran there after the election.

This subject is complicated. There's a whole new vocabulary that comes with this stuff. Impressions are different than views. Views are different than clicks. But there's one thing that I'm certain of and it's this: Given the complexity of what we've seen, if anyone tells you they've got this all figured out, they're kidding themselves. And we can't afford to kid ourselves about what happened last year and continues to happen today.

That complexity, I'll note, is exactly why we depend on you for expert insight and reliable information. Sixty percent of the U.S. population uses Facebook. A foreign power using that platform to influence how Americans see and think about one another is as much a public policy issue as it is a national security concern. Crafting an elegant policy solution that is effective, but not overly burdensome, demands good faith and partnership between companies and this Committee.

Just recently, on the basis of a more complete and sophisticated analysis, the original estimate that 10 million Americans were exposed to Russian-origin content on Facebook was increased to 126 million. That tells me that your companies are just beginning to come to grips with the scale and the depth of the problem.

That's encouraging, but know this: we do better when you do better. I'd urge you to keep that in mind and to work with us proactively to find the right solution to a very constant and complaining challenge.

I'll take a moment here to stress what this hearing is and is not about. This isn't about relitigating the 2016 U.S. presidential election. This isn't about who won or who lost. This is about national security. This is about corporate responsibility, and this is about the deliberative and multifaceted manipulation of the American people by agents of a hostile foreign power.

I'll say it again: agents of a hostile foreign power reached into the United States, using our own social media platforms, and conducted an information operation intended to divide our society along issues like race, immigration and Second Amendment rights. What's even more galling is that, to tear us apart, they're using so-

cial media platforms Americans invented, in connection with the First Amendment freedoms that define an open and democratic society.

While it's shocking to think that foreign actors use the social networking and communications mediums that are so central to our lives today in an effort to interfere with the core of our democracy, what is even more troubling is the likelihood that these platforms are still being used today to spread lies, provoke conflict and drive Americans apart.

Your three companies have developed platforms that have tremendous reach and, therefore, tremendous influence. That reach and influence is enabled by the enormous amount of data you collect on your users and their activities. The American people now need to understand how Russia used that information and what you're doing to protect them. Your actions need to catch up to your responsibilities.

We have a lot to get to this morning. I'm going to stop here. Again, I want to thank each of our briefers—our witnesses today, and I turn to the vice chairman for any comments he might have.

OPENING STATEMENT OF HON. MARK R. WARNER, A U.S. SENATOR FROM VIRGINIA

Vice Chairman WARNER. Well, thank you, Mr. Chairman, and let me also express our concerned thoughts about the tragedy yesterday in New York.

Let me get right at it. In the age of social media, you can't afford to waste too much time or, for that matter, too many characters, in getting the point across. So I'll get straight to the bottom line: Russian operatives are attempting to infiltrate and manipulate American social media to hijack the national conversation and to make Americans angry; to set us against ourselves, and, at their most basic, to undermine our democracy. They did it during the 2016 U.S. presidential campaign. They are still doing it now. And not one of us is doing enough to stop it. That's why we're here today.

In many ways, the threat is not new. Russians have been conducting information warfare for decades. But what is new is the advent of social media tools with the power to magnify propaganda and fake news on a scale that was unimaginable back in the days of the Berlin Wall.

Today's tools in many ways seem almost purpose-built for Russian disinformation techniques. Russia's playbook is simple, but formidable. It works like this.

First, disinformation agents set up thousands of fake accounts, groups and pages across a wide array of platforms. These fake accounts populate content on Facebook, Instagram, Twitter, YouTube, Reddit, LinkedIn, and many other platforms.

Each of these fake accounts spends literally months developing networks of real people to follow and like their content, boosted by tools like paid ads and automated bots. Most of the real-life followers have no idea that they are caught up in these webs. These networks are later utilized to push an array of disinformation, including stolen e-mails, state-led propaganda like RT News and Sputnik, fake news, and divisive content.

The goal is pretty simple. It's to get this so-called news into the news feeds of many potentially receptive Americans and to covertly and subtly push those Americans in the directions the Kremlin wants to go.

As someone who deeply respects the tech industry and who was involved in that industry for more than 20 years, it's taken me quite a bit of time—and I'm still learning—to truly understand the nature of this threat. Even I struggle to keep up with the language and the mechanics, the difference between bots, trolls, and fake accounts; how they generate likes, tweets, and shares; and how all these players and actions are combined into an online ecosystem.

What is clear, however, is that this playbook offers a tremendous bang for the disinformation buck. With just a small amount of money, adversaries use hackers to steal and weaponize data, trolls to craft disinformation, fake accounts to build networks, bots to drive traffic, and ads to target new audiences. They can force propaganda into the mainstream and wreak havoc on our online discourse. And if you look back at the results, it's a pretty good return on investment.

So where do we go from here? I believe it will take all of us—you, some of the platform companies, the United States government, and the American people—to deal with this new and evolving threat.

The social media and innovative tools each of you have developed have changed our world for the better. You've transformed the way we do everything from shopping for groceries to growing small businesses.

But Russia's actions are further exposing the dark underbelly of the ecosystem you have created, and there is no doubt that their successful campaign will be replicated by other adversaries—both nation-states and terrorists—that wish to do harm to democracies around the globe. This is not a unique American phenomenon.

As such, each of you here today needs to commit more resources to identifying bad actors and, when possible, preventing them from abusing our social media ecosystem. Thanks in part to pressure from this Committee, each company has uncovered, I believe, only some of the evidence of the ways Russians exploited their platforms during the 2016 election.

For Facebook, much of the attention has been focused on the paid ads that Russian trolls targeted to Americans. However, these ads are just the tip of a very large iceberg. The real story is the amount of misinformation and divisive content that was pushed for free on Russian-backed pages, which was then spread widely on news feeds of tens of millions of Americans.

According to the data Facebook has provided, 120 Russian-backed pages built a network of over 3.3 million people. From these now-suspended pages, 80,000 organic unpaid posts reached an estimated 126 million real people—more than a third of the population.

This is an astonishing reach from just one group in St. Petersburg. And I doubt that the so-called Internet Research Agency in St. Petersburg represents the only Russian trolls out there.

Facebook has more work to do to see how deep this goes, including into the reach that we've just found in the last 48 hours of in-

formation you've provided, of IRA-backed Instagram posts, which, again, if we just take for an example, 80,000 posts from IRA-based trolls on Facebook, 120,000 pieces of content on Instagram, and we don't even have the data on how many—how much that content reached.

The anonymity provided by Twitter and the speed by which it shares news makes it an ideal tool to spread disinformation. According to one study, during the 2016 campaign, junk news actually outperformed real news in some battleground states, leading up to Election Day. Another study found that bots generated one out of every five political messages posted on Twitter over the entire presidential campaign.

I'm concerned, sir, that Twitter seems to be vastly underestimating the number of fake accounts and bots pushing disinformation. Independent researchers, people who've testified before this Committee, have estimated that up to 15 percent of active Twitter accounts, or potentially 45 million-plus accounts, are fake or automated.

Despite evidence of significant incursion and outreach from researchers, Twitter has to date only uncovered a small piece of that activity, although I will acknowledge that in the last few days your numbers have gone from about 200 accounts to over 2,700 accounts. And again, I believe there's more to be done.

Google search algorithms continue to have problems in surfacing fake news or propaganda. Though we can't necessarily attribute to Russian efforts, false stories and unsubstantiated rumors were elevated on Google Search during the recent mass shootings in Las Vegas.

Meanwhile, YouTube has become RT's go-to platform. Google has now uncovered 1,100 videos associated with this Russian campaign. Much more of your content was likely spread through other platforms.

But it's not just the platforms that need to do more. The United States government has thus far proven incapable of meeting this 21st-century challenge. Unfortunately, I believe this effort is suffering in part because of lack of leadership at the top. We have a President who remains unwilling to acknowledge the threat that Russia poses to our democracy. President Trump should stop actively delegitimizing American journalism and acknowledge and address this very real threat posed by Russian propaganda.

I believe that Congress, too, must do more. We need to recognize that current law was not built to address these threats. I partnered with Senators Klobuchar and McCain on what I believe is the most light-touch legislative approach, which I hope all my colleagues on this panel will review. The Honest Ads Act is a national security bill intended to protect our elections from the foreign interference we all want to avoid.

Finally, but perhaps most importantly, the American people also need to be aware of what is happening to our news feeds. We all need to take a more discerning approach to what we are reading and sharing and who we're connecting with online. We need to recognize the person at the other end of that Facebook or Twitter argument may not be a real person at all.

The fact is that this Russian weapon has already proved its success and cost-effectiveness. We can be assured that other adversaries, including foreign intelligence operatives and potentially terrorist organizations, have read this playbook and are already taking action. It's why we, collectively, must act.

To our witnesses today, I hope you will detail what we saw in the last election and, most importantly, tell us what steps you will undertake for us to get ready for the next one. We welcome your participation and encourage your commitment to addressing this shared responsibility.

Thank you, Mr. Chairman.

Chairman BURR. Thank, Senator Warner.

I'd like to notify Members we will have seven-minute rounds today by seniority.

Gentlemen, if I could ask you to please stand and raise your right hand. Do you solemnly swear to tell the truth, the whole truth, and nothing but the truth?

Mr. STRETCH. Yes.

Mr. WALKER. I do.

Mr. EDGETT. Yes.

Chairman BURR. Please be seated.

Mr. Stretch, we're going to recognize you, then Mr. Edgett, then Mr. Walker. Mr. Stretch, the floor is yours.

STATEMENT OF COLIN STRETCH, VICE PRESIDENT AND GENERAL COUNSEL, FACEBOOK

Mr. STRETCH. Chairman Burr, Vice Chairman Warner and distinguished Members of the Committee, thank you for this opportunity to appear before you today. My name is Colin Stretch and since July 2013 I've served as the General Counsel of Facebook. We appreciate this Committee's hard work to investigate Russian interference in the 2016 election.

At Facebook, our mission is to create technology that gives people the power to build community and bring the world closer together. We are proud that each of you uses Facebook to connect with your constituents, and we understand that the people you represent expect authentic experiences when they come to our platform to share and connect.

We also believe that we have an important role to play in the democratic process and a responsibility to protect it on our platform. That's why we take what's happened on Facebook so seriously.

The foreign interference we saw during the 2016 election is reprehensible. That foreign actors hiding behind fake accounts abused our platform and other internet services to try to sow division and discord and to try to undermine our election process is directly contrary to our values and everything we stand for. Our goal at Facebook is to bring people closer together. These foreign actors sought to drive people apart.

In our investigation, which continues to this day, we have found that these actors used fake accounts to place ads on Facebook and Instagram that reached millions of Americans over a two-year period, and that those ads were used to promote pages which in turn

posted more content. People shared these posts, spreading them still further.

Many of these ads and posts are inflammatory. Some are downright offensive. We know that much of this content is particularly hurtful to members of the Facebook community that engaged with this content believing it was authentic. People should believe content on Facebook is authentic, and should not have to worry that they are being exploited in a cynical effort to prey on painful fault lines in our society in order to inflame discourse in this country.

In aggregate, the ads and posts we are here today to discuss were a very small fraction of the overall content on Facebook, but any amount is too much. All of these accounts and pages violated our policies, and we removed them.

Going forward, we are making significant investments. We're hiring more ad reviewers, doubling or more our security engineering efforts, putting in place tighter ad content restrictions, launching new tools to improve ad transparency, and requiring documentation from political ad buyers.

We're building artificial intelligence to help locate more banned content and bad actors. We're working more closely with industry to share information on how to identify and prevent threats, so that we can all respond faster and more effectively. And we're expanding our efforts to work more closely with law enforcement.

We know bad actors aren't going to stop their efforts. We know we'll all have to keep learning and improving to stay ahead of them. We also know we can't do this alone. That's why I want to thank you for this investigation. We look forward to the conclusions you will ultimately share with the American public. And I look forward to your questions.

[The prepared statement of Mr. Stretch follows:]

HEARING BEFORE THE UNITED STATES SENATE SELECT COMMITTEE ON INTELLIGENCE

November 1, 2016

Testimony of Colin Stretch
General Counsel, Facebook

I. INTRODUCTION

Chairman Burr, Vice Chairman Warner, and distinguished members of the Committee, thank you for this opportunity to appear before you today. My name is Colin Stretch, and since July 2013, I've served as the General Counsel of Facebook. We appreciate this Committee's hard work to investigate Russian interference in the 2016 election.

At Facebook, our mission is to create technology that gives people the power to build community and bring the world closer together. We don't take for granted that each one of you uses Facebook to connect with your constituents, and that the people you represent expect authentic experiences when they come to our platform to share.

We also believe we have an important role to play in the democratic process—and a responsibility to protect it on our platform. That's why we take what's happened on Facebook so seriously. The foreign interference we saw is reprehensible and outrageous and opened a new battleground for our company, our industry, and our society. That foreign actors, hiding behind fake accounts, abused our platform and other internet services to try to sow division and discord—and to try to undermine our election process—is an assault on democracy, and it violates all of our values.

In our investigation, which continues to this day, we've found that these actors used fake accounts to place ads on Facebook and Instagram that reached millions of Americans over a two-year period, and that those ads were used to promote Pages, which in turn posted more content. People shared these posts, spreading them further. Many of these ads and posts are inflammatory. Some are downright offensive.

In aggregate, these ads and posts were a very small fraction of the overall content on Facebook—but any amount is too much. All of these accounts and Pages violated our policies, and we removed them.

Going forward, we're making some very significant investments—we're hiring more ad reviewers, doubling or more our security engineering efforts, putting in place tighter ad content restrictions, launching new tools to improve ad transparency, and requiring documentation from political ad buyers. We're building artificial intelligence to help locate more banned content, and bad actors. We're working more closely with industry to share information on how to identify and prevent threats so that we can all respond faster and more effectively. And we are expanding our efforts to work more closely with law enforcement.

I'm here today to share with you what we know so far about what happened—and what we're doing about it. At the outset, let me explain how our service works and why people choose to use it.

II. FIGHTING ELECTION INTERFERENCE ON FACEBOOK

A. Understanding what you see on Facebook

1. The News Feed Experience: A Personalized Collection of Stories. When people come to Facebook to share with their friends and discover new things, they see a personalized homepage we call News Feed. News Feed is a constantly updating, highly personalized list of stories, including status updates, photos, videos, links, and activity from the people and things you're connected to on Facebook. The goal of News Feed is to show people the stories that are most relevant to them. The average person has thousands of things on any given day that they could read in their News Feed, so we use personalized ranking to determine the order of stories we show them. Each person's News Feed is unique. It's shaped by the friends they add; the people, topics, and news sources they follow; the groups they join; and other signals like their past interactions. On average, a person in the US is served roughly 220 stories in News Feed each day. Over the time period in question, from 2015 to 2017, Americans using Facebook were exposed to, or "served," a total of over 33 trillion stories in their News Feeds.

2. Advertising and Pages as Sources of Stories in News Feed. News Feed is also a place where people see ads on Facebook. To advertise in News Feed, a person must first set up a Facebook account—using their real identity—and then create a Facebook Page. Facebook Pages represent a wide range of people, places, and things, including causes, that people are interested in. Any user may create a Page to express support for or interest in a topic, but only official representatives can create a Page on behalf of an organization, business, brand, or public figure. It is against our terms for Pages to contain false, misleading, fraudulent, or deceptive claims or content. Facebook marks some official Pages—such as for a public figure, media company, or brand—with a "verified" badge to let people know they're authentic. All Pages must comply with our Community Standards and ensure that all the stories they post or share respect our policies prohibiting hate speech, violence, and sexual content, among other restrictions. People can like or follow a Page to get updates, such as posts, photos, or videos, in their News Feed. The average person in the US likes 178 Pages. People do not necessarily see every update from each of the Pages they are connected to. Our News Feed ranking determines how relevant we think a story from a Page will be to each person. We make it easy for people to override our recommendations by giving them additional controls over whether they see a Page's updates higher in their News Feed or not at all. For context, from 2015 to 2017, people in the United States saw 11.1 trillion posts from Pages on Facebook.

3. Advertising to Promote Pages. Page administrators can create ads to promote their Page and show their posts to more people. The vast majority of our advertisers are small- and medium-sized businesses that use our self-service tools to create ads to reach their customers. Advertisers choose the audience they want to reach based on demographics, interests, behaviors or contact information. They can choose from different ad formats, upload images or video, and write the text they want people to see. Advertisers can serve ads on our platform for as little as $0.50 per day using a credit card or other payment method. By using these tools, advertisers agree to our

Self-Serve Ad Terms. Before ads appear on Facebook or Instagram, they go through our ad review process that includes automated checks of an ad's images, text, targeting and positioning, in addition to the content on the ad's landing page. People on Facebook can also report ads, find more information about why they are being shown a particular ad, and update their ad preferences to influence the type of ads they see.

B. Promoting Authentic Conversation

Our authenticity policy is the cornerstone of how we prevent abuse on our platform, and was the basis of our internal investigation and what we found.

From the beginning, we have always believed that Facebook is a place for authentic dialogue, and that the best way to ensure authenticity is to require people to use the names they are known by. Fake accounts undermine this objective, and are closely related to the creation and spread of inauthentic communication such as spam—as well as used to carry out disinformation campaigns like the one associated with the Internet Research Agency (IRA).

We build and update technical systems every day to better identify and remove inauthentic accounts, which also helps reduce the distribution of material that can be spread by accounts that violate our policies. Each day, we block millions of fake accounts at registration. Our systems examine thousands of account attributes and focus on detecting behaviors that are very difficult for bad actors to fake, including their connections to others on our platform. By constantly improving our techniques, we also aim to reduce the incentives for bad actors who rely on distribution to make their efforts worthwhile.

Protecting authenticity is an ongoing challenge. As our tools and security efforts evolve, so will the techniques of those who want to evade our authenticity requirements. As in other areas of cybersecurity, our security and operations teams need to continually adapt.

C. Protecting the Security of the 2016 Election and Learning Lessons Quickly

1. The Evolution of Facebook's Security Protections. From its earliest days, Facebook has always been focused on security. These efforts are continuous and involve regular contact with law enforcement authorities in the United States and around the world. Elections are particularly sensitive events for our security operations, and as the role our service plays in promoting political dialogue and debate has grown, so has the attention of our security team.

As your investigation has revealed, our country now faces a new type of national cyber-security threat—one that will require a new level of investment and cooperation across our society. At Facebook, we're prepared to do our part. At each step of this process, we have spoken out about threats to internet platforms, shared our findings, and provided information to investigators. As we learn more, we will continue to identify and implement improvements to our security systems, and work more closely with other technology companies to share information on how to identify and prevent threats and how to respond faster and more effectively.

2. Security Leading Up to the 2016 Election.

a. Fighting Hacking and Malware. For years, we had been aware of other types of activity that

appeared to come from Russian sources—largely traditional security threats such as attacking people's accounts or using social media platforms to spread stolen information. What we saw early in the 2016 campaign cycle followed this pattern. Our security team that focuses on threat intelligence—which investigates advanced security threats as part of our overall information security organization—was, from the outset, alert to the possibility of Russian activity. In several instances before November 8, 2016, this team detected and mitigated threats from actors with ties to Russia and reported them to US law enforcement officials. This included activity from a cluster of accounts we had assessed to belong to a group ("APT28") that the US government has publicly linked to Russian military intelligence services. This activity, which was aimed at employees of major US political parties, fell into the normal categories of offensive cyber activities we monitor for. We warned the targets who were at highest risk, and were later in contact with law enforcement authorities about this activity.

Later in the summer we also started to see a new kind of behavior from APT28-related accounts—namely, the creation of fake personas that were then used to seed stolen information to journalists. These fake personas were organized under the banner of an organization that called itself DC Leaks. This activity violated our policies, and we removed the DC Leaks accounts.

b. Understanding Fake Accounts and Fake News. After the election, when the public discussion of "fake news" rapidly accelerated, we continued to investigate and learn more about the new threat of using fake accounts to amplify divisive material and deceptively influence civic discourse. We shared what we learned with government officials and others in the tech industry. And in April 2017, we shared our findings with the public by publishing a white paper that described the activity we detected and the initial techniques we used to combat it.

As with all security threats, we have also been applying what we learned in order to do better in the future. We use a variety of technologies and techniques to detect and shut down fake accounts, and in October 2016, for example, we disabled about 5.8 million fake accounts in the United States. At the time, our automated tooling did not yet reflect our knowledge of fake accounts focused on social or political issues. But we incorporated what we learned from the 2016 elections into our detection systems, and as a result of these improvements, we disabled more than 30,000 accounts in advance of the French election. This same technology helped us disable tens of thousands more accounts before the German elections in September. In other words, we believe that we're already doing better at detecting these forms of abuse, although we know that people who want to abuse our platform will get better too and so we must stay vigilant.

3. Investigating the Role of Ads and Foreign Interference. After the 2016 election, we learned from press accounts and statements by congressional leaders that Russian actors might have tried to interfere in the election by exploiting Facebook's ad tools. This is not something we had seen before, and so we started an investigation that continues to this day. We found that fake accounts associated with the IRA spent approximately $100,000 on more than 3,000 Facebook and Instagram ads between June 2015 and August 2017. Our analysis also showed that these accounts used these ads to promote the roughly 120 Facebook Pages they had set up, which in turn posted more than 80,000 pieces of content between January 2015 and August 2017. The Facebook accounts that appeared tied to the IRA violated our policies because they came from a

set of coordinated, inauthentic accounts. We shut these accounts down and began trying to understand how they misused our platform.

a. Advertising by Accounts Associated with the IRA. Below is an overview of what we've learned so far about the IRA's ads:

- **Impressions (an "impression" is how we count the number of times something is on screen, for example this can be the number of times something was on screen in a person's News Feed):**
  - 44% of total ad impressions were before the US election on November 8, 2016.
  - 56% of total ad impressions were after the election.
- **Reach (the number of people who saw a story at least once):**
  - We estimate 11.4 million people in the US saw at least one of these ads between 2015 and 2017.
- **Ads with zero impressions:**
  - Roughly 25% of the ads were never shown to anyone. That's because advertising auctions are designed so that ads reach people based on relevance, and certain ads may not reach anyone as a result.
- **Amount spent on ads:**
  - For 50% of the ads, less than $3 was spent.
  - For 99% of the ads, less than $1,000 was spent.
  - Many of the ads were paid for in Russian currency, though currency alone is a weak signal for suspicious activity.
- **Content of ads:**
  - Most of the ads appear to focus on divisive social and political messages across the ideological spectrum, touching on topics from LGBT matters to race issues to immigration to gun rights.
  - A number of the ads encourage people to follow Pages on these issues, which in turn produced posts on similarly charged subjects.

b. Content Posted by Pages Associated with the IRA. We estimate that roughly 29 million people were served content in their News Feeds directly from the IRA's 80,000 posts over the two years. Posts from these Pages were also shared, liked, and followed by people on Facebook, and, as a result, three times more people may have been exposed to a story that originated from the Russian operation. Our best estimate is that approximately 126 million people may have been served content from a Page associated with the IRA at some point during the two-year period. This equals about four-thousandths of one percent (0.004%) of content in News Feed, or approximately 1 out of 23,000 pieces of content.

Though the volume of these stories was a tiny fraction of the overall content on Facebook, **any amount is too much**. Those accounts and Pages violated Facebook's policies—which is why we

removed them, as we do with all fake or malicious activity we find. We also deleted roughly 170 Instagram accounts that posted about 120,000 pieces of content.

Our review of this activity is ongoing. Many of the ads and posts we've seen so far are deeply disturbing—seemingly intended to amplify societal divisions and pit groups of people against each other. They would be controversial even if they came from authentic accounts in the United States. But coming from foreign actors using fake accounts they are simply unacceptable.

That's why we've given the ads and posts to Congress—because we want to do our part to help investigators gain a deeper understanding of foreign efforts to interfere in the US political system and explain those activities to the public. These actions run counter to Facebook's mission of building community and everything we stand for. And we are determined to do everything we can to address this new threat.

D. Mobilizing to Address the New Threat

We are taking steps to enhance trust in the authenticity of activity on our platform, including increasing ads transparency, implementing a more robust ads review process, imposing tighter content restrictions, and exploring how to add additional authenticity safeguards.

1. Promoting Authenticity and Preventing Fake Accounts. We maintain a calendar of upcoming elections and use internal and external resources to best predict the threat level to each. We take preventative measures based on our information, including working with election officials where appropriate. Within this framework, we set up direct communication channels to escalate issues quickly. These efforts complement our civic engagement work, which includes voter education. In October 2017, for example, we launched a Canadian Election Integrity Initiative to help candidates guard against hackers and help educate voters on how to spot false news.

Going forward, we're also requiring political advertisers to provide more documentation to verify their identities and disclose when they're running election ads. Potential advertisers will have to confirm the business or organization they represent before they can buy ads. Their accounts and their ads will be marked as political, and they will have to show details, including who paid for the ads. We'll start doing this with federal elections in the US and then move onto other elections in the US and other countries. For political advertisers that don't proactively identify themselves, we're building machine learning tools that will help us find them and require them to verify their identity.

Authenticity is important for Pages as well as ads. We'll soon test ways for people to verify that the people and organizations behind political and issue-based Pages are who they say they are.

2. Partnering with Industry on Standards. We have been working with many others in the technology industry, including with Google and Twitter, on a range of elements related to this investigation. Our companies have a long history of working together on other issues such as child safety and counter-terrorism.

We are also reaching out to leaders in our industry and governments around the world to share information on bad actors and threats so that we can make sure they stay off all platforms. We

are trying to make this an industry standard practice.

3. Strengthening Our Advertising Policies. We know that some of you and other members of Congress are exploring new legislative approaches to political advertising—and that's a conversation we welcome. We are already working with some of you on how best to put new requirements into law. But we aren't waiting for legislation. Instead we're taking steps where we can on our own, to improve our own approach to transparency, ad review, and authenticity requirements.

a. Providing Transparency. We believe that when you see an ad, you should know who ran it to be able to understand what other ads they're running—which is why we show you the Page name for any ads that run in your News Feed.

To provide even greater transparency for people and accountability for advertisers, we're now building new tools that will allow you to see the other ads a Page is running as well—including ads that aren't targeted to you directly. We hope that this will establish a new standard for our industry in ad transparency. We try to catch material that shouldn't be on Facebook before it's even posted—but because this is not always possible, we also take action when people report ads that violate our policies. We're grateful to our community for this support, and hope that more transparency will mean more people can report violating ads.

b. Enforcing Our Policies. We rely on both automated and manual ad review, and we're now taking steps to strengthen both. Reviewing ads means assessing not just what's in an ad but also the context in which it was bought and the intended audience—so we're changing our ads review system to pay more attention to these signals. We're also adding more than 1,000 people to our global ads review teams over the next year and investing more in machine learning to better understand when to flag and take down ads. Enforcement is never perfect, but we will get better at finding and removing improper ads.

c. Restricting Ad Content. We hold people on Facebook to our Community Standards, and we hold advertisers to even stricter guidelines. Our ads policies already prohibit shocking content, direct threats and the promotion of the sale or use of weapons. Going forward, we are expanding these policies to prevent ads that use even more subtle expressions of violence.

III. CONCLUSION

Any attempt at deceptive interference using our platform is unacceptable, and runs counter to everything we are working toward. What happened in the 2016 election cycle was an affront to us, and, more importantly, to the people who come to Facebook every day to have authentic conversations and to share. We are committed to learning from these events, and to improving. We know we have a responsibility to do our part—and to do better. We look forward to working with everyone on this Committee, in the government, and across the tech industry and civil society, to address this important national security matter so that we can prevent similar abuse from happening again.

Chairman BURR. Mr. Edgett, the floor is yours.

STATEMENT OF SEAN EDGETT, GENERAL COUNSEL, TWITTER

Mr. EDGETT. Chairman Burr, Vice Chairman Warner and Members of this Committee, Twitter understands the importance of the Committee's inquiry into Russia's interference in the 2016 election, and we appreciate the opportunity to appear here today. The events underlying this hearing have been deeply concerning to our company and the broader Twitter community. We are committed to providing a service that fosters and facilitates free and open democratic debate and that promotes positive change in the world.

We are troubled by reports that the power of Twitter was misused by a foreign actor for the purpose of influencing the U.S. presidential election and undermining public faith in the democratic process. The abuse of our platform to attempt state-sponsored manipulation of elections is a new challenge for us and one we are determined to meet. Today we intend to show the Committee how serious we are about addressing this new threat by addressing the work we are doing to understand what happened and to ensure that it does not happen again.

At the time of the 2016 election, we observed and acted on instances of automated and malicious activity. As we learned more about the scope of the broader problem, we resolved to strengthen our systems, going forward. Elections continue all the time, so our first priority was to do all we could to block and remove malicious activity from interfering with our users' experience. We created dedicated teams within Twitter to enhance the quality of information our users see and to block malicious activity whenever and wherever we find it.

Those teams continue to work every day to ensure Twitter remains a safe, open, transparent and positive platform. We have also launched a retrospective review to find Russian efforts to influence the 2016 election through automation, coordinated activity, and advertising.

While that review is still underway, we have made the decision to review and share what we know today, in the interest of transparency and out of appreciation for the urgency of this matter. We do so recognizing that our findings may be supplemented as we continue to work with the Committee staff and other companies, discover more facts, and gain a greater understanding of these events.

My written testimony details the methodology and current findings of our retrospective review in detail. We studied tweets from the period September 1st to November 15th, 2016. During that time, we did find automated and coordinated activity of interest. We determined that the number of accounts we could link to Russia and that were tweeting election-related content was comparatively small: about one one-hundredth of a percent of total Twitter accounts at the time we studied.

One-third of one percent of the election-related tweets people saw came from Russian-linked automated accounts. We did, however, observe instances where Russian-linked activity was more pronounced, and have uncovered more accounts linked to the Russian-based Internet Research Agency as a result of our review.

We have also determined that advertising by Russia Today in seven small accounts was related to the election and violated either the policies in effect at the time or that have since been implemented. We have banned all of those users as advertisers, and we will donate that revenue to academic research into the use of Twitter during elections and for civic engagement.

We are making meaningful improvements based on our findings. Last week, we announced industry-leading changes to our advertising policies that will help protect our platform from unwanted content.

We are also enhancing our safety systems, sharpening our tools for stopping malicious activity, and increasing transparency to promote public understanding of all of these areas. Our work on these challenges will continue for as long as malicious actors seek to abuse our system and will need to evolve to stay ahead of new tactics.

We have heard concerns about Russia actors' use of Twitter to disrupt the 2016 election and about our commitment to addressing that issue. Twitter believes that any activity of that kind, regardless of magnitude, is unacceptable, and we agree that we must do better to prevent it. We hope that our appearance today and the description of the work we have undertaken demonstrates our commitment to working with you, our industry partners, and other stakeholders to ensure that the experience of 2016 never happens again.

Cooperation to combat this challenge is essential. We cannot defeat this evolving, shared threat alone. As with most technology-based threats, the best approach is to combine information and ideas to increase our collective knowledge. Working with the broader community, we will continue to test, to learn, to share, and to improve so that our product remains effective and safe.

I look forward to answering your questions.

[The prepared statement of Mr. Edgett follows:]

United States Senate Select Committee on Intelligence

Testimony of Sean J. Edgett
Acting General Counsel, Twitter, Inc.

November 1, 2017

Chairman Burr, Ranking Member Warner, and Members of the Committee:

Twitter understands the importance of the Committee's inquiry into Russia's interference in the 2016 election, and we appreciate the opportunity to appear here today.

The events underlying this hearing have been deeply concerning to our company and the broader Twitter community. We are committed to providing a service that fosters and facilitates free and open democratic debate and that promotes positive change in the world. We take seriously reports that the power of our service was misused by a foreign actor for the purpose of influencing the U.S. presidential election and undermining public faith in the democratic process.

Twitter is familiar with problems of spam and automation, including how they can be used to amplify messages. The abuse of those methods by sophisticated foreign actors to attempt state-sponsored manipulation of elections is a new challenge for us—and one that we are determined to meet. Today, we intend to demonstrate the seriousness of our commitment to addressing this new threat, both through the effort that we are devoting to uncovering what happened in 2016 and by taking steps to prevent it from happening again.

We begin by explaining the values that shape Twitter and that we aspire as a community to promote and embody. We then describe our response to reports about the role of automation in the 2016 election and on social media more generally. As we discuss, that response includes the creation of a dedicated team within Twitter to enhance the quality of the information our users see and to block malicious activity whenever and wherever we find it. In addition, we have launched a retrospective analysis of activity on our system that indicates Russian efforts to influence the 2016 election through automation, coordinated activity, and advertising. Although the work of that review continues, we share what we know, today, in the interests of transparency and out of appreciation for the urgency of this matter. We do so recognizing that our findings may be supplemented as we work with Committee staff and other companies, discover more facts, and gain a greater understanding of these events. Indeed, what happened on Twitter is only one part of the story, and the Committee is best positioned to see how the various pieces fit together. We look forward to continued partnership, information sharing, and feedback.

We also detail the steps we are taking to ensure that Twitter remains a safe, open, transparent, and positive platform for our users. Those changes include enhanced safety policies, better tools and resources for detecting and stopping malicious activity, tighter advertising standards, and increased transparency to promote public understanding of all of these areas. Our work on these challenges will continue for as long as malicious actors seek to abuse our system, and will need to evolve to stay ahead of new tactics.

We are resolved to continue this work in coordination with the government and our industry peers. Twitter believes that this hearing is an important step toward furthering our shared understanding of how social media platforms, working hand-in-hand with the public and private sectors, can prevent this type of abuse both generally and, of critical importance, in the context of the electoral process.

I. Twitter's Values

Twitter was founded upon and remains committed to a core set of values that have guided us as we respond to the new threat that brings us here today.

Among those values are defending and respecting the user's voice—a two-part commitment to freedom of expression and privacy. Twitter has a history of facilitating civic engagement and political freedom, and we intend for Twitter to remain a vital avenue for free expression here and abroad. But we cannot foster free expression without ensuring trust in our platform. We are determined to take the actions necessary to prevent the manipulation of Twitter, and we can and must make sure Twitter is a safe place.

Keeping Twitter safe includes maintaining the quality of information on our platform. Our users look to us for useful, timely, and appropriate information. To preserve that experience, we are always working to ensure that we surface for our users the highest quality and most relevant content first. While Twitter's open and real-time environment is a powerful antidote to the abusive spreading of false information, we do not rest on user interaction alone. We are taking active steps to stop malicious accounts and Tweets from spreading, and we are determined that our strategies will keep ahead of the tactics of bad actors.

Twitter is founded on a commitment to transparency. Since 2012, we have published the Twitter Transparency Report on a semiannual basis, providing the public with key metrics about requests from governments and certain private actors for user information, content removal, copyright violations, and most recently, Terms of Service ("TOS") violations. We are also committed to open communication about how we enforce our TOS and the Twitter Rules, and about how we protect the privacy of our users.

Following through on those commitments takes both resolve and resources. And the fight against malicious activity and abuse goes beyond any single election or event. We work every day to give everyone the power to create and share ideas and information instantly, without barriers.

II. Background on Twitter's Operation

Understanding the steps we are taking to address election-related abuse of our platform requires an explanation of certain fundamentals of Twitter's operation. We therefore turn now to a description of the way our users interact with our system, how we approach automated content, and the basics of advertising on Twitter.

A. User Interaction

Twitter has 330 million monthly active users around the world, 67 million of which are located in the United States. Users engage with our platform in a variety of ways. Users choose what content they primarily see by following (and unfollowing) other user accounts. Users generate content on the platform by Tweeting original content, including text, hashtags, photos, GIFs, and videos. They may also reply to Tweets, Retweet content already posted on the platform, and like Tweets and Retweets; the metric we use to describe such activity is "engagement"—the different ways in which users are engaged with the content they are viewing. Users can also exchange messages with users and accounts they follow (or, if their privacy settings permit, with any other user) through direct messaging ("DM").

The volume of activity on our system is enormous: Our users generate thousands of Tweets per second, hundreds of thousands of Tweets per minute, hundreds of millions of Tweets per day, and hundreds of billions of Tweets every year.

Another metric we use is how many times a specific piece of content such as a Tweet is viewed. That metric—which we refer to as "impressions"—does not require any additional engagement by the user; viewing content generates an impression, although there is no guarantee that a user has actually read the Tweet. Impressions are not "unique," so multiple impressions may be created by one account, by a single person using multiple accounts, or by many accounts.

A third important concept is "trends." Trends are words, phrases, or hashtags that may relate to an event or other topic (*e.g.*, #CommitteeHearing). Twitter detects trends through an advanced algorithm that picks up on topics about which activity is growing quickly and thus showing a new or heightened interest among our users. Trends thus do not measure the aggregate popularity of a topic, but rather the velocity of Tweets with related content. The trends that a user sees may depend on a number of factors, including their location and their interests. If a user clicks on a trend, the user can see Tweets that contain that hashtag.

B. Malicious Automation and Responsive Measures

Automation refers to a process that generates user activity—Tweets, likes, or following behavior—without ongoing human input. Automated activity may be designed to occur on a schedule, or it may be designed to respond to certain signals or events. Accounts that rely on automation are sometimes also referred to as "bots."

Automation is not categorically prohibited on Twitter; in fact, it often serves a useful and important purpose. Automation is essential for certain informational content, particularly when time is of the essence, including for law enforcement or public safety notifications. Examples include Amber Alerts, earthquake and other storm warnings, and notices to "shelter in place" during active emergency situations. Automation is also used to provide customer service for a range of companies. For example, as of April 11, 2017, users are able to Tweet @TwitterSupport to request assistance from Twitter. If a user reports a forgotten password or has a question about our rules, the initial triage of those messages is performed by our automated system—a Twitter-developed program to assist users in troubleshooting account issues.

But automation can also be used for malicious purposes, most notably in generating spam—unwanted content consisting of multiple postings either from the same account or from multiple coordinated accounts. While "spam" is frequently viewed as having a commercial element since it is a typical vector for spreading advertising, Twitter's Rules take an expansive view of spam because it negatively impacts the user experience. Examples of spam violations on Twitter include automatically Retweeting content to reach as many users as possible, automatically Tweeting about topics on Twitter in an attempt to manipulate trends, generating multiple Tweets with hashtags unrelated to the topics of those hashtags, repeatedly following and unfollowing accounts to tempt other users to follow reciprocally, tweeting duplicate replies and mentions, and generating large volumes of unsolicited mentions.

Our systems are built to detect automated and spam accounts across their lifecycles, including detection at the account creation and login phase and detection based on unusual activity (*e.g.*, patterns of Tweets, likes, and follows). Our ability to detect such activity on our platform is bolstered by internal, manual reviews conducted by Twitter employees. Those efforts are further supplemented by user reports, which we rely on not only to address the content at issue but also to calibrate our detection tools to identify similar content as spam.

Once our systems detect an account as generating automated content or spam, we can take action against that account at either the account level or the Tweet level. Depending on the mode of detection, we have varying levels of confidence about our determination that an account is violating our rules. We have a range of options for enforcement, and generally, the higher our confidence that an account is violating our rules, the stricter our enforcement action will be, with immediate suspension as the harshest penalty. If we are not sufficiently confident to suspend an account on the basis of a given detection technique, we may challenge the account to verify a phone number or to otherwise prove human operation, or we may flag the account for review by Twitter personnel. Until the user completes the challenge, or until the review by our teams has been completed, the account is temporarily suspended; the user cannot produce new content (or perform actions like Retweets or likes), and the account's contents are hidden from other Twitter users.

We also have the capability to detect suspicious activity at the Tweet level and, if certain criteria are met, to internally tag that Tweet as spam, automated, or otherwise suspicious. Tweets that have been assigned those designations are hidden from searches, do not count toward generating trends, and generally will not appear in feeds unless a user follows that account. Typically, users whose Tweets are designated as spam are also put through the challenges described above and are suspended if they cannot pass.

For safety-related TOS violations, we have a number of enforcement options. For example, we can stop the spread of malicious content by categorizing a Tweet as "restricted pending deletion," which requires a user to delete the Tweet before the user is permitted to continue using the account and engaging with the platform. So long as the Tweet is restricted—and until the user deletes the Tweet—the Tweet remains inaccessible to and hidden from all Twitter users. The user is blocked from Tweeting further unless and until he or she deletes the restricted Tweet. This mechanism is a common enforcement approach to addressing less severe content violations of our TOS outside the spam context; it also promotes education among our

users. More serious violations, such as posting child sexual exploitation or promoting terrorism, result in immediate suspension and may prompt interaction with law enforcement.

C. Advertising Basics

Advertising on Twitter generally takes the form of promoted Tweets, which advertisers purchase to reach new groups of users or spark engagement from their existing followers. Promoted Tweets are clearly labeled as "promoted" when an advertiser pays for their placement on Twitter. In every other respect, promoted Tweets look and act just like regular Tweets and can be Retweeted, replied to, and liked.

Advertisers can post promoted Tweets through a self-service model on the Twitter platform or through account managers, who manage relationships with advertising partners. When purchasing a promoted Tweet, an advertiser can target its audience based on information such as interests, geography, gender, device type, or other specific characteristics. For most campaigns, advertisers pay only when users engage with the promoted Tweet, such as following the advertiser; liking, replying to, or clicking on the Tweet; watching a Tweet's video; or taking some other action.

Because promoted Tweets are presented to our users from accounts they have not yet chosen to follow, Twitter applies to those Tweets a robust set of policies that prohibit, among other things, ads for illegal goods and services, ads making misleading or deceptive claims, ads for drugs or drug paraphernalia, ads containing hate content, sensitive topics, and violence, and ads containing offensive or inflammatory content.

Twitter relies on two methods to prevent prohibited promoted content from appearing on the platform: a proactive method and a reactive method. Proactively, Twitter relies on custom-built algorithms and models for detecting Tweets or accounts that might violate its advertising policies. Reactively, Twitter takes user feedback through a "Report Ad" process, which flags an ad for manual human review. Once our teams have reviewed the content, typically one of three decisions will be made: if the content complies with our policy, we may approve it; if the content/account violates the policy, we may stop the particular Tweet from being promoted to users; or, if Twitter deems the account to be in repeated violation of our policies at the Tweet level, we may revoke an account's advertising privileges (also known as off-boarding the advertiser).

III. Malicious Automation in the 2016 Election: Real-Time Observations and Response

Although Twitter has been fighting the problem of spam and malicious automation for many years, in the period preceding the 2016 election we observed new ways in which accounts were abusing automation to propagate misinformation on our platform. Among other things, we noticed accounts that Tweeted false information about voting in the 2016 election, automated accounts that Tweeted about trending hashtags, and users who abused their access to the platform we provide developers.

At the time, we understood these to be isolated incidents, rather than manifestations of a larger, coordinated effort at misinformation on our platform. Once we understood the systemic

nature of the problem in the aftermath of the election, we launched a dedicated initiative to research and combat that new threat.

A. Malicious Automation and Misinformation Detected in 2016

We detected examples of automated activity and deliberate misinformation in 2016, including in the run-up to the 2016 election, that in retrospect appear to be signals of the broader automation problem that came into focus after the election had concluded.

On December 2, 2016, for example, we learned of @PatrioticPepe, an account that automatically replied to all Tweets from @realDonaldTrump with spam content. Those automatic replies were enabled through an application that had been created using our Application Programming Interface ("API"). Twitter provides access to the API for developers who want to design Twitter-compatible applications and innovate using Twitter data. Some of the most creative uses of our platform originate with applications built on our API, but we know that a large quantity of automated spam on our platform is also generated and disseminated through such applications. We noticed an upward swing in such activity during the period leading up to the election, and @PatrioticPepe was one such example. On the same day we identified @PatrioticPepe, we suspended the API credentials associated with that user for violation of our automation rules. On average, we take similar actions against violative applications more than 7,000 times per week.

Another example of aberrant activity we identified and addressed during this period involved voter suppression efforts. In particular, Twitter identified, and has since provided to the Committee, examples of Tweets with images in English and Spanish that encouraged Clinton supporters to vote online, vote by phone, or vote by text.

In response to the attempted "vote-by-text" effort and similar voter suppression attempts, Twitter restricted as inaccessible, pending deletion, 918 Tweets from 529 users who proliferated that content. Twitter also permanently suspended 106 accounts that were collectively responsible for 734 "vote-by-text" Tweets. Twitter identified, but did not take action against, an additional 286 Tweets of the relevant content from 239 Twitter accounts, because we determined that those accounts were seeking to refute the "text-to-vote" message and alert other users that the information was false and misleading. Notably, those refuting Retweets generated significantly greater engagement across the platform compared to the Tweets spreading the misinformation—8 times as many impressions, engagement by 10 times as many users, and twice as many replies.

Before the election, we also detected and took action on activity relating to hashtags that have since been reported as manifestations of efforts to interfere with the 2016 election. For example, our automated spam detection systems helped mitigate the impact of automated Tweets promoting the #PodestaEmails hashtag, which originated with Wikileaks' publication of thousands of emails from the Clinton campaign chairman John Podesta's Gmail account. The core of the hashtag was propagated by Wikileaks, whose account sent out a series of 118 original Tweets containing variants on the hashtag #PodestaEmails referencing the daily installments of the emails released on the Wikileaks website. In the two months preceding the election, around 57,000 users posted approximately 426,000 unique Tweets containing variations of the

#PodestaEmails hashtag. Approximately one quarter (25%) of those Tweets received internal tags from our automation detection systems that hid them from searches. As described in greater detail below, our systems detected and hid just under half (48%) of the Tweets relating to variants of another notable hashtag, #DNCLeak, which concerned the disclosure of leaked emails from the Democratic National Committee. These steps were part of our general efforts at the time to fight automation and spam on our platform across all areas.

B. Information Quality Initiative

After the election, we followed with great concern the reports that malicious actors had used automated activity and promoted deliberate falsehoods on social media as part of a coordinated misinformation campaign. Along with other platforms that were focused on the problem, we realized that the instances our automated systems had detected in 2016 were not isolated but instead represented a broader pattern of conduct that we needed to address in a more comprehensive way.

Recognizing that elections continue and that the health and safety of our platform was a top priority, our first task was to prevent similar abuse in the future. We responded by launching an initiative to combat the problem of malicious automation and disinformation going forward. The objective of that effort, called the Information Quality initiative, is to enhance the strategies we use to detect and deny bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

Since the 2016 election, we have made significant improvements to reduce external attempts to manipulate content visibility. These improvements were driven by investments into methods to detect malicious automation through abuse of our API, limit the ability of malicious actors to create new accounts in bulk, detect coordinated malicious activity across clusters of accounts, and better enforce policies against abusive third-party applications.

Our efforts have produced clear results in terms of our ability to detect and block such content. With our current capabilities, we detect and block approximately 450,000 suspicious logins each day that we believe to be generated through automation. In October 2017, our systems identified and challenged an average of 4 million suspicious accounts globally per week, including over three million challenged upon signup, before they ever had an impact on the platform—more than double our rate of detection at this time last year.

We also recognized the need to address more systematically spam generated by third-party applications, and we have invested in the technology and human resources required to do so. Our efforts have been successful. Since June 2017, we have suspended more than 117,000 malicious applications for abusing our API. Those applications are collectively responsible for more than 1.5 billion Tweets posted in 2017.

We have developed new techniques for identifying patterns of activity inconsistent with legitimate use of our platform (such as near-instantaneous replies to Tweets, non-random Tweet timing, and coordinated engagement), and we are currently implementing these detections across our platform. We have improved our phone verification process and introduced new challenges, including reCAPTCHAs (utilizing an advanced risk-analysis engine developed by Google), to

give us additional tools to validate that a human is in control of an account. We have enhanced our capabilities to link together accounts that were formed by the same person or that are working in concert. And we are improving how we detect when accounts may have been hacked or compromised.

In the coming year, we plan to build upon our 2017 improvements, specifically including efforts to invest even further in machine-learning capabilities that help us detect and mitigate the effect on users of fake, coordinated, and automated account activity. Our engineers and product specialists continue this work every day, further refining our systems so that we capture and address as much malicious content as possible. We are committed to continuing to invest all necessary resources into making sure that our platform remains safe for our users.

We also actively engage with civil society and journalistic organizations on the issue of misinformation. Enhancing media literacy is critical to ensuring that voters can discern which sources of information have integrity and which may be suspect. We are creating a dedicated media literacy program to demonstrate how Twitter can be an effective tool in media literacy education. Moreover, we engage in collaborations and trainings with NGOs, such as Committee to Protect Journalists, Reporters without Borders, and Reporters Committee for Freedom of the Press. We do so in order to ensure that journalists and journalistic organizations are familiar with how to utilize Twitter effectively and to convey timely information around our policies and practices.

IV. Retrospective Reviews of Malicious Activity in the 2016 Election

In addition to the forward-looking efforts we launched in the immediate aftermath of the election, we have initiated a focused, retrospective review of malicious Russian activity specifically in connection with last year's presidential election. Those reviews cover the core Twitter product as well as the advertising product. They draw on all parts of the company and involve a significant commitment of resources and time. We are reporting on our progress today and commit to providing updates to the Committee as our work continues.

A. Malicious Automated and Human-Coordinated Activity

For our review of Twitter's core product, we analyzed election-related activity from the period preceding and including the election (September 1, 2016 to November 15, 2016) in order to identify content that appears to have originated from automated accounts or from human-coordinated activity associated with Russia. We then assessed the results to discern trends, evaluate our existing detection systems, and identify areas for improvement and enhancement of our detection tools.

1. Methodology

We took a broad approach for purposes of our review of what constitutes an election-related Tweet, relying on annotations derived from a variety of information sources, including Twitter handles, hashtags, and Tweets about significant events. For example, Tweets mentioning @HillaryClinton and @realDonaldTrump received an election-related annotation, as did Tweets that included #primaries and #feelthebern. In total, we included more than 189 million Tweets

annotated in this way out of the total corpus of more than 16 billion unique Tweets posted during this time period (excluding Retweets).

To ensure that we captured all relevant automated accounts in our review, Twitter analyzed the data not only using the detection tools that existed at the time the activity occurred, but also using newly developed and more robust detection tools that have been implemented since then. We compared the results to determine whether our new detection tools are able to capture automated activity that our 2016 techniques could not. These analyses do not attempt to differentiate between "good" and "bad" automation; they rely on objective, measurable signals, such as the timing of Tweets and engagements, to classify a given action as automated.

We took a similarly expansive approach to defining what qualifies as a Russian-linked account. Because there is no single characteristic that reliably determines geographic origin or affiliation, we relied on a number of criteria, including whether the account was created in Russia, whether the user registered the account with a Russian phone carrier or a Russian email address, whether the user's display name contains Cyrillic characters, whether the user frequently Tweets in Russian, and whether the user has logged in from any Russian IP address, even a single time. We considered an account to be Russian-linked if it had even one of the relevant criteria.

Despite the breadth of our approach, there are technological limits to what we can determine based on the information we can detect regarding a user's origin. In the course of our analysis—and based in part on work conducted by our Information Quality team—we observed that a high concentration of automated engagement and content originated from data centers and users accessing Twitter via Virtual Private Networks ("VPNs") and proxy servers. In fact, nearly 12% of Tweets created during the election originated with accounts that had an indeterminate location. Use of such facilities obscures the actual origin of traffic. Although our conclusions are thus necessarily contingent on the limitations we face, and although we recognize that there may be other methods for analyzing the data, we believe our approach is the most effective way to capture an accurate understanding of activity on our system.

2. Analysis and Key Findings

We began our review with a universe of over 16 billion Tweets—the total volume of original Tweets on our platform during the relevant period. Applying the methodology described above, and using detection tools we currently have in place, we identified 36,746 accounts that generated automated, election-related content and had at least one of the characteristics we used to associate an account with Russia.

During the relevant period, those accounts generated approximately 1.4 million automated, election-related Tweets, which collectively received approximately 288 million impressions.

Because of the scale on which Twitter operates, it is important to place those numbers in context:

- The 36,746 automated accounts that we identified as Russian-linked and tweeting election-related content represent approximately one one-hundredth of a percent (0.012%) of the total accounts on Twitter at the time.

- The 1.4 million election-related Tweets that we identified through our retrospective review as generated by Russian-linked, automated accounts constituted less than three quarters of a percent (0.74%) of the overall election-related Tweets on Twitter at the time. *See* Appendix 1.

- Those 1.4 million Tweets received only one-third of a percent (0.33%) of impressions on election-related Tweets. In the aggregate, automated, Russian-linked, election-related Tweets consistently underperformed in terms of impressions relative to their volume on the platform. *See* Appendix 2.

In 2016, we detected and labeled some, but not all, of those Tweets using our then-existing anti-automation tools. Specifically, in real, time we detected and labeled as automated over half of the Tweets (791,000) from approximately half of the accounts (18,064), representing 0.42% of overall election-related Tweets and 0.14% of election-related Tweet impressions.

Thus, based on our analysis of the data, we determined that the number of accounts we could link to Russia and that were Tweeting election-related content was small in comparison to the total number of accounts on our platform during the relevant time period. Similarly, the volume of automated, election-related Tweets that originated from those accounts was small in comparison to the overall volume of election-related activity on our platform. And those Tweets generated significantly fewer impressions as compared to a typical election-related Tweet.

3. Level of Engagement

In an effort to better understand the impact of Russian-linked accounts on broader conversations on Twitter, we examined those accounts' volume of engagements with election-related content.

We first reviewed the accounts' engagement with Tweets from @HillaryClinton and @realDonaldTrump. Our data showed that, during the relevant time period, a total of 1,625 @HillaryClinton Tweets were Retweeted approximately 8.3 million times. Of those Retweets, 32,254—or 0.39%—were from Russian-linked automated accounts. Tweets from @HillaryClinton received approximately 18 million likes during this period; 111,326—or 0.62%—were from Russian-linked automated accounts. The volume of engagements with @realDonaldTrump Tweets from Russian-linked automated accounts was higher, but still relatively small. The 851 Tweets from the @realDonaldTrump account during this period were Retweeted more than 11 million times; 416,632—or 3.66%—of those Retweets were from Russian-linked, automated accounts. Those Tweets received approximately 27 million likes across our platform; 480,346—or 1.8%—of those likes came from Russian-linked automated accounts.

We also reviewed engagement between automated or Russia-linked accounts and the @Wikileaks, @DCLeaks_, and @GUCCIFER_2 accounts. The amount of automated engagement with these accounts ranged from 47% to 72% of Retweets and 36% to 63% of likes during this time—substantially higher than the average level of automated engagement, including with other high-profile accounts. The volume of automated engagements from Russian-linked accounts was lower overall. Our data show that, during the relevant time period, a total of 1,010 @Wikileaks tweets were retweeted approximately 5.1 million times. Of these retweets, 155,933—or 2.98%—were from Russian-linked automated accounts. The 27 tweets from @DCLeaks_ during this time period were Retweeted approximately 4,700 times, of which 1.38% were from Russian-linked automated accounts. The 23 tweets from @GUCCIFER_2 during this time period were Retweeted approximately 18,000 times, of which 1.57% were from Russia-linked automated accounts.

We next examined activity surrounding hashtags that have been reported as potentially connected to Russian interference efforts. We noted above that, with respect to two such hashtags—#PodestaEmails and #DNCLeak—our automated systems detected, labeled, and hid a portion of related Tweets at the time they were created. The insights from our retrospective review have allowed us to draw additional conclusions about the activity around those hashtags.

We found that slightly under 4% of Tweets containing #PodestaEmails came from accounts with potential links to Russia, and that those Tweets accounted for less than 20% of impressions within the first seven days of posting. Approximately 75% of impressions on the trending topic were views by U.S.-based users. A significant portion of these impressions, however, are attributable to a handful of high-profile accounts, primarily @Wikileaks. At least one heavily-retweeted Tweet came from another potentially Russia-linked account that showed signs of automation.

With respect to #DNCLeak, approximately 23,000 users posted around 140,000 unique Tweets with that hashtag in the relevant period. Of those Tweets, roughly 2% were from potentially Russian-linked accounts. As noted above, our automated systems at the time detected, labeled, and hid just under half (48%) of all the original Tweets with #DNCLeak. Of the total Tweets with the hashtag, 0.84% were hidden and also originated from accounts that met at least one of the criteria for a Russian-linked account. Those Tweets received 0.21% of overall Tweet impressions. We learned that a small number of Tweets from several large accounts were principally responsible for the propagation of this trend. In fact, two of the ten most-viewed Tweets with #DNCLeak were posted by @Wikileaks, an account with millions of followers.

4. Human-Coordinated Russian-Linked Accounts

We separately analyzed the accounts that we have thus far identified through information obtained from third-party sources as linked to the Internet Research Agency ("IRA"). We have so far identified 2,752 such accounts. Those 2,752 accounts include the 201 accounts that we previously identified to the Committee. In responding to the Committee and through our cooperation with its requests, we have since linked the 201 accounts to other efforts to locate IRA-linked accounts from third-party information. We discovered that we had found some of the 201 accounts as early as 2015, and many had already been suspended as part of these previous efforts. Our retrospective work, guided by information provided by investigators and

others, has thus allowed us to connect the 201 accounts to broader Russian election-focused efforts, including the full set of accounts that we now believe at this point are associated with the IRA. This is an active area of inquiry, and we will update the Committee as we continue the analysis.

The 2,752 IRA-linked accounts exhibited a range of behaviors, including automation. Of the roughly 131,000 Tweets posted by those accounts during the relevant time period, approximately 9% were election-related, and many of their Tweets—over 47%—were automated.

While automation may have increased the volume of content created by these accounts, IRA-linked accounts exhibited non-automated patterns of activity that attempted more overt forms of broadcasting their message. Some of those accounts represented themselves as news outlets, members of activist organizations, or politically-engaged Americans. We have seen evidence of the accounts actively reaching out to journalists and prominent individuals (without the use of automation) through mentions. Some of the accounts appear to have attempted to organize rallies and demonstrations, and several engaged in abusive behavior and harassment. All 2,752 accounts have been suspended, and we have taken steps to block future registrations related to these accounts.

B. Advertising Review

In the second component of our retrospective review, we focused on determining whether or how malicious Russian actors may have sought to abuse our platform using advertising.

1. Methodology

To evaluate the scope and impact of election-related advertisements, we used a custom-built machine-learning model that we refined over a number of iterations to maximize accuracy. That model was designed to detect all election-related content in the universe of English-language promoted Tweets that appeared on our system in 2016.

Our model yielded 6,493 accounts. We then divided those accounts into three categories of high, medium, and low interest based on a number of factors: the number of promoted Tweets the account had purchased in 2016, the percentage of promoted Tweets from the whole that our model suggested were election-related (a concept known as "election density"), whether the account had Russian-specific characteristics, and whether the account had non-Russian international characteristics.

For the purpose of this review, we deemed an account to be Russian-linked if any of the following criteria were present: (1) the account had a Russian email address, mobile number, credit card, or login IP; (2) Russia was the declared country on the account; or (3) Russian language or Cyrillic characters appeared in the account information or name. (As in the core-product review, here too, we encountered technological challenges associated with VPNs, data centers, and proxy servers that do not allow us to identify location.) We treated as election-related any promoted Tweets that referred to any candidates (directly or indirectly), political parties, notable debate topics, the 2016 election generally, events associated with the election, or any political figures in the United States.

Experienced advertising policy content reviewers then engaged in a manual evaluation of each account to determine whether they had promoted violative content in 2016. While we reviewed every account, the level of review corresponded to the category in which the account belonged. For high-interest accounts (197), we reviewed 100% percent of the account's promoted content, as well as information about the account itself, including location and past advertising activity. For other types of accounts, we adjusted our level of manual review according to the interest category of the account. For the medium interest accounts (1,830), we reviewed approximately three quarters of the promoted content associated with the account, together with the account information. For the low interest accounts (4,466), we reviewed about one quarter of the promoted content, together with other account information. For each Tweet our reviewers examined, the reviewers evaluated its contents, including any attached media, geographical and keyword targeting, and account-level details, such as profile, avatar, and non-promoted Tweets. Reviewers looked at the Russian signals connected to any account, regardless of its interest category.

Finally, we tested our results against accounts we knew to be Russian, such as Russia Today accounts, to ensure that our methodology was sound. As we did with the retrospective review of election-related Tweets, we evaluated the advertising data both using the policies in place at the time and using our new policies that we have since introduced. That permitted us to compare what we would have detected and stopped promoting during the relevant time period had the more recent improvements been in place.

2. Analysis and Key Findings

We identified nine accounts that had at least one of the criteria for a Russian-linked account and promoted election-related content Tweets that, based on our manual review, violated existing or recently implemented ads policies, such as those prohibiting inflammatory or low-quality content.

Two of those accounts were @RT_COM and @RT_America. Those two accounts represented the vast majority of the promoted Tweets, spend and impressions for the suspect group identified in our review. Together, the two accounts spent $516,900 in advertising in 2016, with $234,600 of that amount devoted to ads that were served to users in the U.S. During that period, the two accounts promoted 1,912 Tweets and generated approximately 192 million impressions across all ad campaigns, with approximately 53.5 million representing impressions generated by U.S.-based users.

On Thursday, October 26, 2017, Twitter announced that it would no longer accept advertisements from RT and will donate the $1.9 million that RT had spent globally on advertising on Twitter to academic research into elections and civil engagement.

The remaining seven accounts that our review identified represented small, apparently unconnected actors. Those accounts spent a combined total of $2,282 on advertising through Twitter in 2016, with $1,184 of this amount spent on ads that were served to users in the U.S. Our available impressions data indicates that in 2016, those accounts ran 404 promoted Tweets and generated a total of 2.29 million impressions across all ad campaigns. Approximately

222,000 of those impressions were generated by U.S.-based users. We have since off-boarded these advertisers.

V. Post-Election Improvements and Next Steps

While Russian, election-related malicious activity on our platform appears to have been small in comparison to overall activity, we find any such activity unacceptable. Our review has prompted us to commit ourselves to further enhancing our policies and to tightening our systems to make them as safe as possible. Over the coming months, we will be focusing on a series of improvements both to our user safety rules and our advertising policies that we believe will advance the progress we have already made this year.

A. Enhancements to User Safety and Prevention of Abuse

In 2017, Twitter prioritized work to promote safety and fight abuse across much of the platform. Our engineering, product, policy, and user operations teams worked with urgency to make important and overdue changes designed to shift the burden of reporting online abuse away from the victim and to enable Twitter proactively to identify and act on such content.

As a result of that focus, we have:

- Improved Twitter's detection of new accounts created by users who have been permanently banned;
- Introduced safer search, which is activated by default and limits potentially sensitive and abusive content from search results;
- Limited the visibility and reach of abusive and low-quality Tweets;
- Provided additional user controls both to limit notifications from accounts without verified email or phone numbers and/or profile photos and to allow more options to block and mute; and
- Launched new forms of enforcement to interrupt abuse while it is happening.

While we have made progress on many of our goals, our CEO recently acknowledged that much work remains and that we recognize the need for greater openness about the work we are doing. We are therefore increasing our efforts on safety. Consistent with our commitment to transparency—and to offer full visibility to the Committee, the public, and the Twitter community—on October 19, 2017, we published a calendar of our immediate plans. That calendar identifies dates for upcoming changes to the Twitter Rules that we plan to make in the next three months. These changes will enhance our ability to remove non-consensual nudity, glorification of acts of violence, use of hate symbols in account profiles, and various changes to user-reported Twitter Rules violations. *See* https://blog.twitter.com/official/en_us/topics/company/2017/safetycalendar.html. We plan to offer periodic, real-time updates about our progress.

We are implementing these safety measures alongside the enhanced techniques and tools that the Information Quality initiative has generated for stopping malicious automated content. As described above, we have recently made enhancements to our enforcement mechanisms for detecting automated suspicious activity and have more improvements planned for the coming weeks and months. One of our key initiatives has been to shorten the amount of time that suspicious accounts remain visible on our platform while pending verification—from 35 days to two weeks—with unverified accounts being suspended after that time. While these suspicious accounts cannot Tweet while they are pending verification, we want to further reduce their visibility. We will also introduce new and escalating enforcement mechanisms for suspicious logins, Tweets, and engagements, leveraging our improved detection methods from the past year. Such changes are not meant to be definitive solutions, but they will further limit the reach of malicious actors on the platform and ensure that users have less exposure to harmful or malicious content.

These new threats to our system require us to continually reevaluate how to counter them. As the role of social media in foreign disinformation campaigns comes into focus, it has become clearer that attempts to abuse technology and manipulate public discourse on social media and the Internet through automation and otherwise will not be limited to one election—or indeed to elections at all. We will provide updates on our progress to Congress and to the American people in real time.

B. Enhancements to Advertising Policy

Last week, we announced a new policy to increase transparency regarding advertising on Twitter. We will soon launch an industry-leading transparency center that will provide the public with more detail than ever before about social media and online advertisers. The enhancements include the ability to see what advertisements are currently running on Twitter, how long the advertisements have been running, and all creative pieces associated with an advertising campaign.

Users will also have greater insight into and control over their experience with advertising on Twitter. Individual users will be able to see all advertisements that have been targeted to them, and all advertisements that the user is eligible to see based on a campaign's targeting. We will also make it possible for users to provide negative feedback regarding an advertisement, whether or not the user has been targeted by the campaign.

Our new policy also changes how Twitter treats electioneering advertisements, or advertisements that clearly identify a candidate or party associated with a candidate for any elected office. Electioneering advertisers will be required to identify themselves to Twitter, and they will be subject to stricter requirements for targeting and harsher penalties for violations of our policies. Any campaign that an electioneering advertiser runs will be clearly marked on the platform to allow users to easily identify it. In addition to the information provided about all advertisements on Twitter, this disclosure will include current and historical spending by an electioneering advertiser, the identity of the organization funding the campaign, and targeting demographics used by the advertiser, such as age, gender, or geographic location.

We recognize that not all political advertising is electioneering advertising. While there is not yet a clear industry definition for issue-based advertisements, we will work with our industry peers and with policymakers to clearly define them and develop policies to treat them similarly to electioneering advertisements.

* * *

We have heard the concerns about Twitter's role in Russian efforts to disrupt the 2016 election and about our commitment to addressing this issue. Twitter believes that any activity of that kind—regardless of magnitude—is intolerable, and we agree that we must do better to prevent it. We hope that our appearance today and the description of the work we have undertaken demonstrates our commitment to working with you, our industry partners, and other stakeholders to ensure that the experience of 2016 never happens again.

Indeed, cooperation to combat this challenge is essential. We cannot defeat this novel, shared threat alone. As with most technology-based threats, the best approach is to share information and ideas to increase our collective knowledge. Working with the broader community, we will continue to test, to learn, to share, and to improve, so that our product remains effective and safe.

We look forward to answering your questions and working with you in the coming months.

APPENDIX 1

Original Tweets
From Sophisticated Non-Moderated Twitter Users
Russian Automated/Automated Accounts Spread Disruption
of Original Election-Related Tweets
Original Tweets
Blocked Tweets
1.9M
0.74%
of Original Election-Related Tweets
Were Blocked or Deleted
within Two Weeks of Posting

APPENDIX 2

Impressions
on Election-Related Tweets*
Election Uncertainty
0.74%
Election Uncertainty
0.33%

Chairman BURR. Thank you, Mr. Edgett.

Mr. Walker, the floor is yours.

STATEMENT OF KENT WALKER, SENIOR VICE PRESIDENT AND GENERAL COUNSEL, GOOGLE

Mr. WALKER. Thank you very much, Chairman Burr, Vice Chairman Warner, Members of the Committee, for the opportunity to speak with you today. My name is Kent Walker. I'm Senior Vice President and General Counsel at Google. I oversee our legal, our policy, our trust and safety, and our Google.org teams. I've worked at the intersection of technology, security, and the law for over 25 years, starting my career as an assistant U.S. attorney for the U.S. Department of Justice focused on technology crimes.

Let me start my conversation with you today by joining your earlier comments, acknowledging the victims and families of the awful attack in New York yesterday. As a New York employer, we know how strong and tough New Yorkers are and we look forward to do anything we can to help.

Turning to the issues before the Committee today, Google believes that we have a responsibility to prevent the misuse of our platforms, and we take that very seriously. Google was founded with the mission of organizing the world's information and making it universally accessible and useful. The abuse of the tools and platforms we build is antithetical to that mission.

Google is deeply concerned about attempts to undermine the democratic elections. We are committed to working with Congress, law enforcement, others in our industry, and the NGO community to strengthen protections around elections, to ensure the security of users, and to help combat disinformation. We recognize the importance of this Committee's mandate, and we appreciate the opportunity to share information and talk about solutions.

Of course, disinformation and propaganda campaigns aren't new and have involved many types of media and publications over the years. And for many years, we've seen attempts to interfere with our online platforms. We take these threats very seriously. We've built industry-leading security systems, and we've put those tools into our consumer products as well.

Back in 2007, we launched the first version of our Safe Browsing tool, which helps protect users from phishing, malware, and other attacks. Today, Safe Browsing is used on more than 3 billion devices worldwide.

If we suspect that users are subject to government-sponsored attacks, we warn them about that. And last month, we launched our Advanced Protection Program, which helps protect those at greatest risk of attack, like journalists, business leaders, and politicians.

We face motivated and resourceful attackers, and we are continually evolving our tools to stay ahead of ever-changing threats. Our tools don't just protect our physical and network security, but they also detect and prevent attempts to manipulate our systems. On Google News, for example, we use fact-check labels to help users spot fake news. For Google search, we have updated our quality guidelines and evaluations to help surface more authoritative content from the web. We've updated our advertising guidelines as well to prohibit ads on sites that misrepresent themselves.

And on YouTube, we employ a sophisticated spam and security breach detection system, designed to detect anomalous behavior and catch people trying to inflate view counts of videos or numbers of subscribers. And as threats evolve, we will continually adapt in order to understand and prevent new attempts to misuse our platforms.

With respect to the Committee's work on the 2016 election, we've looked across our products to understand whether government-backed entities were using our products to disseminate information in order to interfere with the U.S. election. While we did find some deceptive activities on our platform associated with suspected government-backed accounts, that activity appears to have been relatively limited. Of course, any activity like this is more than we would like to see. We've provided the relevant information to the Committee, have issued a public summary of the results of our review, and we will continue to cooperate with the Committee's investigation.

Going forward, we will continue to expand our use of cutting-edge technology to protect our users and will continue working with governments to ensure that our platforms aren't abused. We will also be making political advertising more transparent, easier for users to understand, and even more secure. In 2018, we'll release a transparency report showing data about who is buying election ads on our platform and how much money is being spent. We'll pair that transparency report with a database, available for public research, of election and ad content across our ads products.

We're also going to make it easier for users to understand who bought the election ads they see on our networks. Going forward, users will be able to easily find the name of any advertiser running an election ad on Search, YouTube, or the Google Display Network through an icon on the ad. We'll continue enhancing our existing safeguards to ensure that we permit only U.S. nationals to buy U.S. election ads.

We already tightly restrict which advertisers can serve ads to audiences based on political leanings. Moving forward, we'll go further by verifying the identity of anyone who wants to run an election ad or use our political interest-based tools, and confirming that that person is permitted to run that ad.

We certainly can't do this alone. We'll continue to work with other companies to better protect the collective digital ecosystem. And even as we take our own steps, we remain open to working on legislation that promotes electoral transparency.

Moreover, our commitment to addressing these issues extends beyond our services. We've offered in-person briefings and introduced a suite of digital tools designed to help election websites and political campaigns protect themselves from phishing, unauthorized account access, and other digital attacks. We're also increasing our long-standing support for the bipartisan Defending Digital Democracy Project.

Let me conclude by recognizing the importance of the work of this Committee. Our users, advertisers, and creators must be able to trust in their security and safety. We share the goal of identifying bad actors who attempted to interfere with our systems and abuse the electoral process.

We look forward to continued cooperation both with the Members of this Committee and with our fellow companies to provide access to tools that help citizens express themselves, while avoiding abuses that undercut the integrity of elections.

Thank you again for the opportunity to tell you about our ongoing efforts. We look forward to our continuing work with Congress on these important issues, and we are happy to answer any questions you might have.

[The prepared statement of Mr. Walker follows:]

Google

Written Testimony of Kent Walker
Senior Vice President and General Counsel, Google
Senate Select Committee on Intelligence
Hearing on "Social Media Influence in the 2016 US Elections"
Written Congressional Testimony
November 1, 2017

Chairman Burr, Vice-Chair Warner, and members of the Committee, thank you for the opportunity to appear before you this morning.

My name is Kent Walker. I am Senior Vice President and General Counsel at Google and I lead our Legal, Policy, Trust and Safety, and Philanthropy teams. I've worked at the intersection of technology, security, and the law for over 25 years, including a tour early in my career as an Assistant US Attorney at the Department of Justice focusing on technology crimes.

We believe that we have a responsibility to prevent the misuse of our platforms and we take that very seriously. Google was founded with a mission to organize the world's information and make it universally accessible and useful. The abuse of the tools and platforms we build is antithetical to that mission.

Google is deeply concerned about attempts to undermine democratic elections. We are committed to working with Congress, law enforcement, others in our industry, and the NGO community to strengthen protections around elections, ensure the security of users, and help combat disinformation.

We are dealing with difficult questions that balance free expression issues, unprecedented access to information, and the need to provide high quality content to our users. There are no easy answers here, but we are deeply committed to getting this right. We recognize the importance of this Committee's mandate, and we welcome the opportunity to share information and talk about solutions.

Of course disinformation and propaganda campaigns aren't new, and have involved many different types of media and publications. When it comes to online platforms, for many years we have seen nation states and criminals attempt to breach our firewalls, game our search results, and interfere with our platforms. These attempts range from large-scale threats, such as distributed denial of service attacks, which we are able to identify and thwart quickly, all the way down to small-scale, extremely targeted attacks, such as attempts to gain access to email accounts of high-profile individuals.

We take these threats very seriously. We serve billions of users every day, so our solutions need to work at scale. We've built industry-leading security systems and we've put these tools into our consumer products. Back in 2007, we launched the first version of our Safe Browsing tool, which helps protect users from phishing, malware, and other attack vectors. Today, Safe Browsing is used on more than three billion devices worldwide. If we suspect that users are subject to government-sponsored attacks we warn them. And last month, we launched our Advanced Protection Program, which integrates physical security keys to protect those at greatest risk of attack, like journalists, business leaders, and politicians. We face motivated and resourceful attackers, and we are continually evolving our tools to stay ahead of ever-changing threats.

Our tools don't just protect our physical and network security, but also detect and prevent artificially boosting content, spam, and other attempts to manipulate our systems. On Google News, for example, we label links so users can see if the content is locally sourced, an OpEd, or an in-depth piece. For Google Search, we have updated our quality guidelines and evaluations to help identify misleading information, helping surface more authoritative content from the web. We have updated our advertising guidelines to prohibit ads on sites that misrepresent themselves. And on YouTube we employ a sophisticated spam and security-breach detection system to detect anomalous behavior and catch people trying to inflate view counts of videos or numbers of subscribers.

We have deployed our most advanced technologies to increase security and fight manipulation, but we realize that no system is going to be 100% perfect. It is hard to rapidly identify all untruthful content at massive scale, and harder yet to understand the motives and potential connections of the people posting that content. But we have made substantial progress

in preventing and detecting abuse, and we are seeing continued success in stopping bad actors attempting to game them. And as threats evolve, we will continue to adapt in order to understand and prevent new attempts to misuse our platforms.

With respect to the Committee's work on the 2016 election, we have looked across our products to understand whether individuals apparently connected to government-backed entities were using those products to disseminate information with the purpose of interfering with the US election. We based this review on research into misinformation campaigns from Alphabet's Jigsaw group, our information security team's own methods, and leads provided by other companies.

While we did find activity associated with suspected government-backed accounts, that activity appears to have been limited on our platforms. Of course, any activity like this is more than we would like to see. We have provided the relevant information to the Committee, have issued a public summary of the results of our review, and will continue to cooperate with the Committee's investigation.

Starting with our ads products, we found two accounts that appear to be associated with this effort. These accounts spent approximately $4700 dollars in connection with the 2016 presidential election, representing less than 0.0002 percent of the total amount spent on that race. We believe that the activity we found was limited because of various safeguards that we had in place in advance of the 2016 election, and the fact that Google's products didn't lend themselves to the kind of micro-targeting or viral dissemination that these actors seemed to prefer.

As part of our investigation, we also looked at our other services. Let me share a few key points. On YouTube, we did find 18 channels on YouTube with roughly 1,100 videos, a total of 43 hours of content, uploaded by individuals who we suspect are associated with this effort and which contained political content. That compares with the 400 million hours of YouTube content uploaded every minute, and the over one billion hours of YouTube content watched every day. These videos generally had very low view counts; only around 3% percent had more than 5,000 views. The videos were not targeted to any particular sector of the US population as

that's not feasible on YouTube. Additionally, we found a limited number of Gmail accounts that appear to have been primarily used to to set up accounts on social media platforms.

We continue to expand our use of cutting-edge technology to protect our users and will continue working with governments to ensure that our platforms aren't used for nefarious purposes.

We will also be making political advertising more transparent, easier for users to understand, and even more secure.

- In 2018 we'll release a transparency report for election ads, sharing data about who is buying election ads on our platforms and how much money is being spent. We'll pair our transparency report with a database of election ad creatives from across our ads products. And we will make the database available for public research.

- We're also going to make it easier for users to understand who bought the election ads they see on our networks. Going forward, users will be able to find the name of any advertiser running an election ad on Search, YouTube, and the Google Display Network with one click on an icon above the ad.

- We will continue enhancing our existing safeguards to ensure that we only permit US nationals to buy US election ads. We already tightly restrict which advertisers can serve ads to audiences based on their political leanings. Moving forward, we'll go further by verifying the identity of anyone who wants to run an election ad or use our political-interest-based tools and confirming that person is permitted to run that ad.

We certainly can't do this alone. Combating disinformation campaigns requires efforts from across the industry. We'll continue to work with other companies to better protect the collective digital ecosystem, and, even as we take our own steps, we are open to working with governments on legislation that promotes electoral transparency.

Our commitment to addressing these issues extends beyond our services. Google has supported significant outreach to increase security for candidates and campaigns across the

United States, France, Germany, and other countries. We've offered in-person briefings and introduced a suite of digital tools designed to help election websites and political campaigns protect themselves from phishing, unauthorized account access, and other digital attacks. We've partnered with the National Cyber Security Alliance to fund and advise on security training programs that focus specifically on elected officials, campaigns, and staff members. We are also increasing our long-standing support for the bipartisan Defending Digital Democracy Project at the Belfer Center for Science and International Affairs at Harvard Kennedy School.

Let me conclude by recognizing the importance of the work of this Committee. Our users, advertisers, and creators must be able to trust in their security and safety. We share the goal of identifying bad actors who have attempted to interfere with our systems and abuse the electoral process. We look forward to continued cooperation, both with the members of this Committee and with our fellow companies, to both provide access to tools that help citizens express themselves while avoiding abuses that undercut the integrity of elections.

Thank you for the opportunity to tell you about our ongoing efforts in this space. We look forward to continuing to work with Congress on these important issues, and I'm happy to answer any questions you might have.

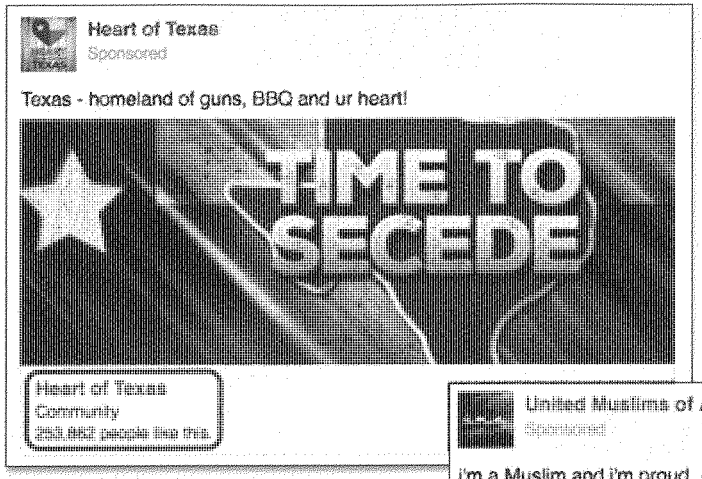
Chairman BURR. Mr. Walker, thank you for your testimony.

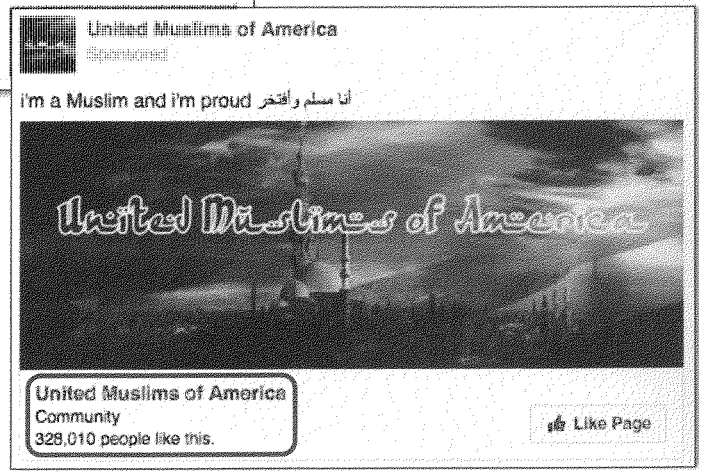
The Chair would recognize himself and share with Members that I'm going to talk about one specific ad that—it's not going to count to my seven minutes, and the Vice Chairman is going to do the same at the beginning of his, to sort of set the stage for much of what we'll talk about today.

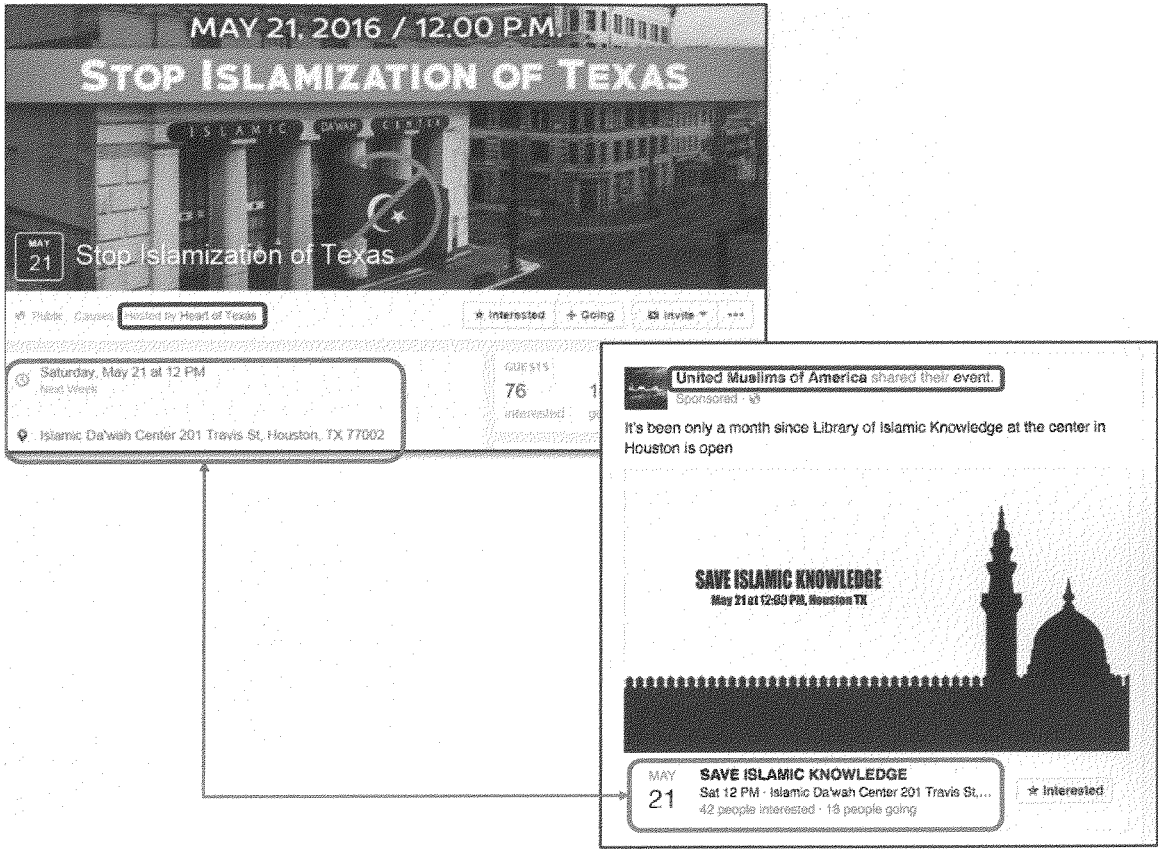
As an example, I'd like to highlight one specific case with real-world implications involving two different Facebook groups, both of which are associated with the Russian Internet Research Agency.

You'll see the first board that is up.

[The material referred to follows:]


Heart of Texas
Sponsored
Texas - homeland of guns, BBQ and ur heart!
TIME TO SECEDE
Heart of Texas
Community
253,882 people like this.


United Muslims of America
Sponsored
i'm a Muslim and i'm proud أنا مسلم وأفتخر
United Muslims of America
United Muslims of America
Community
328,010 people like this.
Like Page


MAY 21, 2016 / 12.00 P.M.
STOP ISLAMIZATION OF TEXAS
MAY
21
Stop Islamization of Texas
Public · Causes
Hosted by Heart of Texas
Interested
Going
Invite
Saturday, May 21 at 12 PM
Next Week
Islamic Da'wah Center 201 Travis St, Houston, TX 77002
GUESTS
76
United Muslims of America shared their event.
Sponsored
It's been only a month since Library of Islamic Knowledge at the center in Houston is open
SAVE ISLAMIC KNOWLEDGE
May 21 at 12:00 PM, Houston TX
MAY
21
SAVE ISLAMIC KNOWLEDGE
Sat 12 PM · Islamic Da'wah Center 201 Travis St,...
42 people interested · 13 people going
Interested

Leading to May 21, 2016

The first group's called "The Heart of Texas," with over 250,000 followers. This account promoted pro-Texas causes and included posts many would characterize as anti-immigration or anti-Muslim. The tagline for this group, as referenced in the top left-hand corner of the first chart, is "Texas: homeland of guns, barbecue, and your heart," with the words "time to secede" emboldened on the Texas flag.

Turning to the second group, which is in the bottom right-hand, it's called "The United Muslims of America," with over 328,000 followers. This account claimed to be pro-Islamic themes. The tagline for this group, as referenced in the bottom-right corner of the first chart, is "I'm a Muslim and I'm proud."

So, if I could have the second board up. The Heart of Texas group created a public event on Facebook, to occur at noon, May 21st, 2016, at the Islamic Center in Houston, Texas, to stop, quote, "to stop the Islamization of Texas," unquote. The same group then placed an advertisement on Facebook to promote their event, with over 12,000 people viewed.

The United Muslims of America subsequently created an event on Facebook to occur at noon, May 21st, 2016, at the Islamic Center in Houston, Texas, to, I quote, "save Islamic knowledge"—same time, same place as the Heart of Texas event. The group then placed an advertisement, targeting people in Houston, Texas, area to promote their event to support the Islamic Center. More than 2,700 people viewed this ad.

If I could have the third board.

On May 21st, 2016, local news captured the events as they unfolded, reporting on the protest stage by the Heart of Texas group and resulting counter-protest. The pictures you see on the third board are from the streets in front of the Islamic Center in Houston, Texas.

What neither side could have known is that Russia trolls were encouraging both sides to battle in the streets and create division between real Americans. Ironically, one person who attended stated, "The Heart of Texas promoted this event, but we didn't see one of them." We now know why. It's hard to attend an event in Houston, Texas, when you're trolling from a site in St. Petersburg, Russia. Establishing these two competing groups, paying for the ads, and causing this disruptive event in Houston cost Russia about $200.

Mr. Stretch, you commented yesterday that your company's goal is bringing people together. In this case, people were bought together to foment conflict, and Facebook enabled that event to happen. I would say that Facebook has failed their goal. From a computer in St. Petersburg, Russia, these operators can create and promote events anywhere in the United States and attempt to tear apart our society. I'm certain that our adversaries are learning from the Russian activities and even watching us today. Simply put, you must do better to protect the American people and, frankly, all of your users from this kind of manipulation.

My time can start now. I have one simple question, yes or no from each of you. I'll start with Mr. Stretch and work my way to your left.

The Federal Election Campaign Act prohibits any foreign national from spending funds in connection with any Federal, State, or local elections in the United States. Doesn't this law prohibit your publication of this content?

Mr. Stretch.

Mr. STRETCH. Prohibit publication of the content we've seen?

Chairman BURR. Does FEC law apply to Facebook?

Mr. STRETCH. Certainly, FEC law, yes, applies to——

Chairman BURR. Prohibits foreign dollars influencing an election?

Mr. STRETCH. It prohibits foreign actors from using really any medium, including Facebook, to influence a foreign—a U.S. election.

Chairman BURR. So FEC law applies to Facebook?

Mr. STRETCH. Yes, it does.

Chairman BURR. Mr. Edgett.

Mr. EDGETT. It applies to Twitter as well.

Chairman BURR. It applies Twitter.

Mr. Walker.

Mr. WALKER. Yes, sir.

Chairman BURR. Great.

The prevalence of social media use among military members, who spend so much time outside the country, deployed away from friends, away from family, seems a likely target for foreign intelligence agencies who want to collect details on U.S. force movements, deployments, and other sensitive insight. Do you monitor your platforms for indications that your users in the U.S. military are targeted in any way?

Mr. Stretch.

Mr. STRETCH. Senator, yes, and I would say that that sort of—that sort of security work really falls into the traditional cybersecurity work that we've long been focused on. We've had a threat intelligence team for years now that has been focused on tracking foreign actors, and it's exactly that sort of threat that we believe has historically been an area of focus for our adversaries, and likewise an area of focus for us on the defensive side.

Chairman BURR. Mr. Edgett.

Mr. EDGETT. Similar to Mr. Stretch, we've been focused on that type of threat for years. We're also focused on education on the other side and helping law enforcement and military personnel understand how to use Twitter and both its benefits and its risks.

Chairman BURR. Mr. Walker.

Mr. WALKER. We've been looking at cyber espionage for some years, and so this is all in focus. Because we're not a social network, we may not have as much visibility as to whether individual users of our service are veterans or not, but that would certainly be an area of concern.

Chairman BURR. These questions are for Facebook, Mr. Stretch. In a blog published September 6th, 2017, Alex Stamos, Facebook's Chief Security Officer, wrote that the company had discovered about 3,000 political ads that were paid for through 470 fake accounts and pages that likely operated out of Russia. Facebook shut down these accounts on the grounds that they were inauthentic.

Had these accounts not violated Facebook's prohibition against fake accounts, would they have been shut down?

Mr. STRETCH. Senator, many of them would have, because many of them violated other policies related to the type of content that's permitted on the platform. The authenticity issue is the key.

Referring to the content you surfaced earlier, it pains us as a company, it pains me personally, to see that we were—that our platform was abused in this way. People in this country care deeply in—about issues of public concern, and it's one of the strengths of our country that people are so willing to speak freely about them. The fact that foreign actors were able to use our platform to exploit that openness is a deeply painful lesson for us, and one we're focused on learning from going forward.

Chairman BURR. Does it trouble you that it took this Committee to get you to look at the authentic nature of the users and the content?

Mr. STRETCH. Senator, we are certainly troubled—I'd say more than troubled—by the evidence of abuse of our platform during 2016, and we're certainly grateful for the Committee's investigation and the attention you're bringing to this issue. We think it's very important.

We do believe that it's a larger issue than any one company, and we believe that, going forward, there are opportunities, not just for us to do better, but for us to work together to make sure we're all addressing this threat appropriately.

Chairman BURR. What characteristics would indicate that an account or a page is likely operated out of Russia?

Mr. STRETCH. There are a number of characteristics that can signal potential location. The most obvious one that is typically the most reliable is location information that's transmitted by the user's browser when they access Facebook. It's also the most easily manipulable.

There are many other signals that similarly will suggest location, but, because of the way the internet is architected, can also be faked. Our job is to look not just for the signals that are in plain sight, but understand how they can be manipulated, and look for patterns of activity that reveal efforts to abuse our platform that are shrouded, both geographically and in other ways.

Chairman BURR. Mr. Edgett, your vice president at Twitter stated that Twitter's expanding its team and resources and building new tools and processes to combat automated Twitter accounts, or bots. What is Twitter's process for identifying a bot?

Mr. EDGETT. We have a lot of data behind sort of the things you see on Twitter that looks at the activity of an account—and remember, there are hundreds of millions of accounts—the activity of an account as it relates to other accounts. So as you or I, Senator, tweet, our activity looks pretty normal. As an automated account tweets thousands of times an hour, or logs in thousands of times a day, that looks pretty suspicious.

So our technology is looking for that anomaly that differentiates sort of normal accounts from automated accounts. But spammers and bad actors are getting better at making themselves look more real.

Chairman BURR. So what percentage of accounts on Twitter are actually bots and not real people?

Mr. EDGETT. So we do a monthly audit of this and investigation, and determined that for years less than 5 percent of our accounts are false accounts or spam.

Chairman BURR. What happens to accounts on Twitter that are suspended by Twitter? Is there an indefinite status?

Mr. EDGETT. Once we suspend an account, they're—especially an automated account—they're typically permanently banned from the platform. And we also do work to link those accounts with new accounts that may pop up. So the more we investigate and look into this and build the web of information around the signals we're seeing from these accounts, the better we get at linking those accounts and stopping them before they get on the platform.

Chairman BURR. My time has expired, but I'm going to ask you to submit in writing for the record Twitter's assessment of why independent assessments of the number of bots on Twitter constantly, consistently, are higher than the 5 percent that you've stated today, if you would provide that for the record.

Mr. EDGETT. Happy to provide that for the record and address it today.

Chairman BURR. Thank you.

Vice Chairman.

Vice Chairman WARNER. Thank you, Mr. Chairman.

I also want to demonstrate, but I'd also—as we're getting ready—we have had testimony before this Committee from a representative of NATO that fake and bot accounts on Twitter are more in the 12 percent to 15 percent account. A vast number of research studies—you know, 320 million active Twitter accounts—even if you assume 10 percent, you're still talking 30-plus million potential accounts that could be misused and abused.

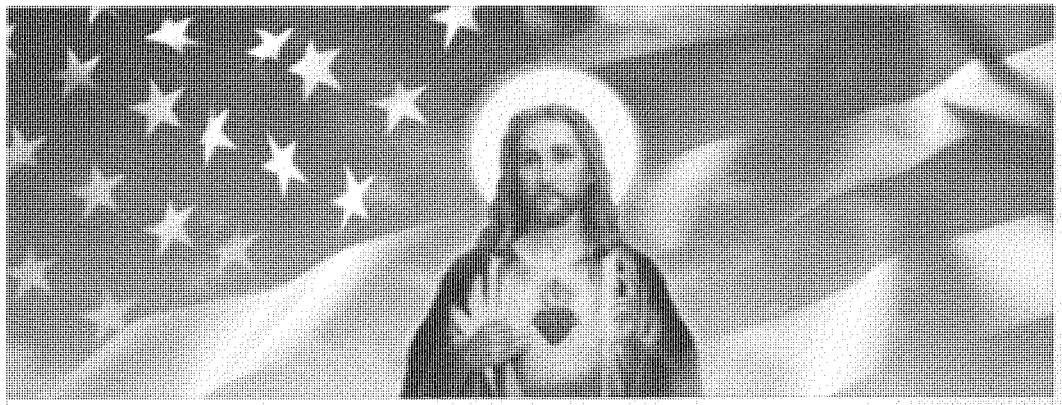
If we could put up the chart here, this is another example of how people are kind of lured in.

[The material referred to follows:]

Suggested Page

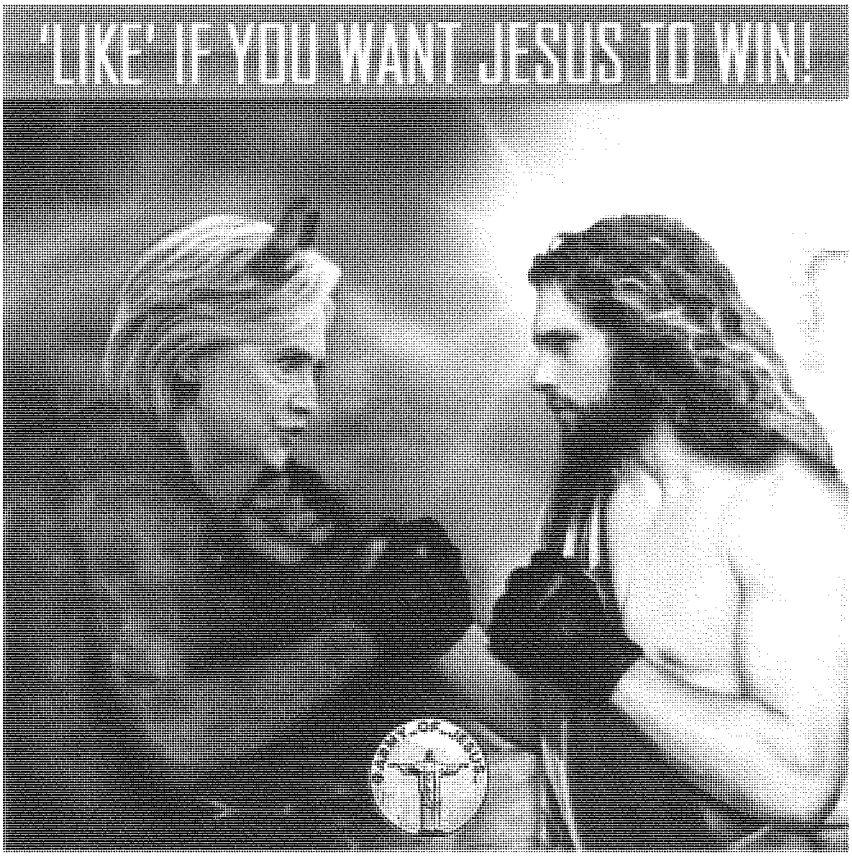
Army of Jesus
Sponsored

Let's stand united to defend our faith as an army of Jesus!



Army of Jesus
Community
217,226 people like this.

Like Page


'LIKE' IF YOU WANT JESUS TO WIN!

Vice Chairman WARNER. The first ad is an ad that is pretty benign. It's obviously targeted towards Christians. It's a—it's an "Army of Jesus" Facebook ad, 217,000 followers. You like that page, and here's what happens: you would get a series of, for the most part, relatively benign Bible quotes or other items. This ad appeared in October of 2016.

Late October, early November, suddenly, this benign site, in addition to your Bible quotes, suddenly we're getting these other posts, not paid ads, but posts from this organization. This message, obviously the bottom one would've gone to the 217,000 followers. We have no idea how many times it was liked or shared with other individuals.

Again, we've got two different examples of the type of tools, how people are lured in, and then once they're lured into what they think is a pro-Texas or pro-Muslim or here pro-Jesus account—and then they are manipulated by foreign actors and foreign agents.

Go ahead and start my time.

First of all, I hear all your words, but I have more than a little bit of frustration that many of us on this Committee have been raising this issue since the beginning of this year, and our claims were frankly blown off by the leaderships of your companies, dismissed, said, there's no possibility, nothing like this happening, nothing to see here.

It bothers me, if you're really committed to trying to work with us to resolve this, that it took until this Committee continually went at you, and it was July and early August when you made your first presentations. And, candidly, your first presentations were less than sufficient and showed in my mind a lack of resources, a lack of commitment, and a lack of genuine effort.

Candidly, your companies know more about Americans in many ways than the United States government does. And the idea that you had no idea any of this was happening strains your credibility.

So my first question is this, and I want a yes or no answer, not a filibuster. Will you commit to continue to work with this Committee to provide additional information and additional documents as needed as we continue to explore this challenge and threat on a going-forward basis?

We go right down the line. Mr. Stretch.

Mr. STRETCH. Yes.

Vice Chairman WARNER. Mr. Edgett.

Mr. EDGETT. Absolutely.

Vice Chairman WARNER. Mr. Walker.

Mr. WALKER. Absolutely.

Vice Chairman WARNER. Next, one of the things that I continue—again, and I will commend you here—that from the first our friends at Facebook, you identified 470 accounts, 3,000 ads. And most of the work, at least it appears to me, from at least Twitter and Facebook, has all been derivative of that initial data dump.

And again, this is a yes or no question: Do you believe that any of your companies have identified the full scope of Russian active measures on your platform? Yes or no?

Mr. STRETCH. Senator, our investigation continues. So I would have to say no, certainly not with certainty.

Vice Chairman WARNER. Mr. Edgett.

Mr. EDGETT. No, and we're still working on this.

Vice Chairman WARNER. Mr. Walker.

Mr. WALKER. I believe we haven't done a comprehensive investigation, but, as Mr. Stretch says, these are ongoing issues, and we continue to investigate.

Vice Chairman WARNER. Let me start again with Facebook here. You've identified 470 accounts from one troll farm in St. Petersburg. There have been plenty of press reports of other troll farms in Russia. There have been reports of other activities that were Russian-controlled in Central Europe and Eastern Europe. In meetings with your leadership, as you became more aware of this problem, you aggressively promoted the fact, for example, that you took down 30,000 accounts around the French elections. Now, you say not all of those were Russian-related.

Have you gone back and cross-checked those Russian-related accounts that you took down in France to see if any of those accounts were active in the American election?

Mr. STRETCH. Senator, the 30,000 accounts that we took down in——

Vice Chairman WARNER. The accounts that were related to Russian accounts that you took down. Your leadership in fact bragged about how proactive you were in the French election process. Did you check those accounts to see if any of them were active in the American elections?

Mr. STRETCH. Senator, the system that ran to take down those accounts, which were fake accounts of, really, all type and for any purpose, has—is now active worldwide——

Vice Chairman WARNER. Have you——

Mr. STRETCH [continuing]. And has been operated——

Vice Chairman WARNER. Just please answer my question. Have you reviewed the accounts you took down in France that were Russian-related to see if they had played any role in the American election?

Mr. STRETCH. Senator, I apologize. I'm trying to answer the question.

Vice Chairman WARNER. Well, the answer is yes or no. I don't want a long explanation. I want to know if you have done this. I've been signaling this to you for some time. We wanted to make sure that you would review those accounts. We wanted to make sure—the 470 accounts that paid for the 3,000 ads, you said these were all accounts, except for one, that were paid for in rubles. Did you even run those accounts to see if any of those accounts were paid for with dollars or euros or other currencies?

Mr. STRETCH. Senator, those—let me try to state it——

Vice Chairman WARNER. Yes or no?

Mr. STRETCH. So we have, and we continue——

Vice Chairman WARNER. Mr. Stretch, yes or no?

Mr. STRETCH. Yes, we are looking and have looked at every possible indication of Russian activity in the 2016 election, and the investigation continues.

Vice Chairman WARNER. Sir——

Mr. STRETCH. That includes any evidence we've identified from those 30,000 accounts, as well as a number of——

Vice Chairman WARNER. All those accounts have been run, that database has been run, to see if any of those accounts were active in the United States?

Mr. STRETCH. I will have to come back to you on that, Senator.

Vice Chairman WARNER. Sir, we've had this hearing scheduled for months. I find your answer very, very disappointing.

On the question of—we just discovered, and I appreciate this, you had 80,000 views in terms of Russian—views on Facebook. We now discovered in the last 48 hours 120,000 Russian-based posts on Instagram. Have you done any of the similar analysis on those 120,000 posts? We know the 80,000 ended up reaching 126 million Americans. Have you done that same analysis on the 120,000 posts on Instagram?

Mr. STRETCH. Yes, Senator, we have.

Vice Chairman WARNER. And how many Americans did those touch?

Mr. STRETCH. The data on Instagram is not as complete, but the data that we do have indicates that, beginning in October of 2016, those Instagram posts reached an additional 16 million people, in addition to the 126 million people that we identify——

Vice Chairman WARNER. So now we're seeing the Russian activities roughly at 150 million-plus Americans, without knowing how many times they were re-shared.

Mr. STRETCH. If I can add that the time period prior to October 16th, where our data is less reliable, would yield an incremental 4 million. So all told, that gets you to approximately a little less than 150 million. That's correct, Senator.

Vice Chairman WARNER. Mr. Edgett, on the Twitter account, you—there was one activity—and this was not something that happened during 2016. Again, I agree with the Chairman. We're not here to relitigate 2016. But there was a fake Tennessee Republican account, TEN–GOP. The irony was this account had 154,000 followers; the real Tennessee GOP party had 13,000—13,400 followers, I believe, based on your numbers.

I find very interesting, there have been some people who have said, "Well, people should be able spot these fake accounts." Well, if they're able to spot these fake accounts, you had the President's communications director retweeting this account, Kellyanne Conway. You had the President's son, Donald Trump, Jr., retweeting this account.

My question is, why did it take so long to take this down when the Tennessee Republican party was asking you repeatedly?

Mr. EDGETT. Yeah, that—and that was an absolute miss, and we've gotten better since. We've refined our policies around impersonation and parody accounts——

Vice Chairman WARNER. Let me just close with this. My time's about up.

Mr. EDGETT. Sure.

Vice Chairman WARNER. We've looked on this subject, on political information and disinformation. But the same way that these bots and trolls and click farms and fake pages, groups, algorithm gaming can be used in politics, these same tools can and have been used, I believe, to assist financial frauds around stock schemes. I think there is a lot of this activity in broad-based digital adver-

tising. I think we've seen some of this in schemes to sell counterfeit prescription drugs, as well as the ability to encourage folks to download malware. I believe this is a real challenge, and to get this right we're going to need your ongoing cooperation.

Thank you, Mr. Chairman.

Chairman BURR. Senator Risch.

Senator RISCH. Thank you.

Gentlemen, thank you for coming today. By now it's probably pretty obvious to everyone that this Committee has spent lots and lots and lots of time on this, both as it relates to the election and on these kinds of things not related to the political process here in the country. But we have spent a lot of time, and I think have been able to reach some conclusions on this.

No-one's exempt. I come from a State that's a lot smaller, Idaho. They tried to do exactly in Idaho exactly what was done in Texas, where they tried to promote a meeting where they had two conflicting sides, and no one showed up. So there was no success.

In Idaho, just like Texas, it had absolutely nothing to do with the 2016 presidential election. It was simply a cultural type of acrimony that they were attempting to promote.

The Chairman talked about the news reports that allege that the Russians used social media to promote a particular candidate, and may even, some of those, suggest that it changed the result of the election. But this whole thing goes a lot deeper than that. One of the things we've discovered—and I think you probably are aware of this—that you can't look at those ads and say, "Okay, they were all promoting one particular candidate." There were ads going both ways, for and against both candidates, by the Russians. I'm going to get back to that in just a second.

But the other thing that I think that we've come to a conclusion on, and very early, is that the U.S. isn't the only country suffering from this. The Europeans, France, Austria, Germany, just among others, have suffered from the exact same thing, and that is Russian attempted interference with their domestic affairs.

I put a section in the sanctions bill, the Iran, Russia, North Korea sanctions bill, that requires the Executive Branch to do a study on this, on the effect in Europe, because they were much more overt in Europe than they were here—most of the work they did here was covert—and probably because in European countries there is actually a fair amount of Russian sympathy where they can mobilize these people, not so much here in the United States. Obviously some, but not nearly, what is there.

So I want to come at this from a different perspective. The 2016 elections got a lot of the politicians riled up because it went after the political process. But my conclusion is, and I think most people here would agree with me, that—and indeed, Senator Warner referred to this—that this is a lot deeper than just the elections.

There are a lot of things that the Russians are trying to do, and not just inject themselves into the electoral process. It seems to me that, after you step back and look at this and say, "What's going on here? What is the motivation? What are they doing?" I always look at something from an objective standpoint—"What is their objective? What are they trying to accomplish?" And you walk away

from it just shaking your head, because we Americans don't think the same way they think about promoting our country.

So the conclusion I've reached is that the Russians are doing what they've done all along, long before your technology even existed, and that is trying to sow discord, simply trying to sow discord.

My question to each of you is: have you tried to analyze what the Russians were trying to accomplish here, not only in the 2016 elections, but in these other kinds of ads, with the discord? What are your personal views on that, whether they've—what they're trying to accomplish?

Mr. Stretch.

Mr. STRETCH. Senator, it's very difficult for us to ascribe motive. It's I think why this Committee's work is so important. We've tried to provide you as much information as we can, and we hope that, with your visibility into other sources of information, you will be able to help the American people have a better assessment of what the motive is. We think that'll help all of us do better to prevent this sort of activity in the future.

Senator RISCH. Would you agree with me that the motive isn't obvious here, given the difference in the way they handle these things?

Mr. STRETCH. Yes, I would agree with that.

Senator RISCH. Mr. Edgett.

Mr. EDGETT. I would agree with that, as well. I mean, based on what we've seen, the advertisements from Russia Today, the types of content that was being put out by the IRA, also the automated account content, looks as if it's merely focused on divisiveness. But we're still investigating this issue, and look forward to working with this Committee to help put the whole picture together.

Senator RISCH. Mr. Walker.

Mr. WALKER. The large majority of the material we saw was in the socially divisive side, rather than direct electoral advocacy, yes.

Senator RISCH. And that has really been the focus of the media, that, oh, this was all about the 2016 election. You agree with me that this is much broader than that and is, as you say, divisive—aimed at divisiveness, or aimed at discord? Would you all agree with that?

Mr. EDGETT. Yes, and that's a problem we're trying to tackle every day.

Senator RISCH. Mr. Stretch, do you agree with that?

Mr. STRETCH. Yes, I would agree and note that the time period in question and the activity we saw even continued after the election.

Senator RISCH. Mr. Walker.

Mr. WALKER. That seems reasonable, hard for us to know and, again, ultimately for the Committee to decide.

Senator RISCH. I appreciate that. And as I said, my view of this is this a whole lot broader than simply the 2016 election.

Mr. Walker, I have a specific question for you. I think I heard you say that you're enacting a policy where only a U.S. national can buy an election ad. Is that correct?

Mr. WALKER. That's correct.

Senator RISCH. Okay. What about other countries? Obviously, you operate in places other than the United States. Can a U.S. national buy an ad, for instance, for a French or German or Austrian campaign?

Mr. WALKER. I haven't studied the laws of individual countries, but we are not confining our work to the U.S. We are looking at other elections around the world to make sure that we do whatever we can to minimize electoral inference.

Senator RISCH. So what you're going to do is try to confine people to their own elections in their own countries? Is that pretty much your objective?

Mr. WALKER. Certainly that's the case for the United States, and any other country around the world where that's the law that's true, yes.

Senator RISCH. I think that's going to be a big challenge for you, but good luck, and I wish you well in that endeavor.

Thank you, Mr. Chairman.

Chairman BURR. Senator Feinstein.

Senator FEINSTEIN. Thanks, Mr. Chairman.

I sat in the Judiciary hearing yesterday. It was a subcommittee hearing, but was able to ask some questions. And I want to just make a personal comment, because I've been very proud, and I know Senator Harris is as well, to represent this tech community from California. But I must say, I don't think you get it—I think the fact that you're general counsels, you defend your company—that what we're talking about is a cataclysmic change. What we're talking about is the beginning of cyber warfare. What we're talking about is a major foreign power with the sophistication and ability to involve themselves in a presidential election and sow conflict and discontent all over this country.

We are not going to go away, gentlemen, and this is a very big deal. I went home last night with profound disappointment. I asked specific questions. I got vague answers, and that just won't do.

You have a huge problem on your hands, and the United States is going to be the first of the countries to bring it your attention, and others are going to follow, I'm sure, because you bear this responsibility. You've created these platforms and now they are being misused, and you have to be the ones to do something about it, or we will.

And this Committee is Intelligence. It's different from yesterday, so they're privy to different facts, and they're very potent facts.

Let me go back to a couple of questions that I asked yesterday. Mr. Edgett, yesterday, you testified that Twitter only began to remove voter suppression posts that told people they could vote by texting or tweeting after you found out about them from other Twitter users.

These were illegal tweets. Waiting for users to alert Twitter isn't sufficient. I'll give you another chance. What is Twitter doing to proactively identify illegal voter suppression tweets?

Mr. EDGETT. Thank you for letting me address that. We're constantly improving, not only on our technology around automated accounts that are trying to amplify these types of messages——

Senator FEINSTEIN. That's not enough.

Mr. EDGETT [continuing]. But also on putting people and technology on the content and the behavior and trying to make our workflows, our reporting flows, more efficient and using artificial intelligence to prioritize things like the illegal voter suppression ads and other things that we see on the platform, and taking those down faster.

We are getting better, but this is a problem that we are focused on getting better at every day.

Senator FEINSTEIN. Well, you have to find a way to prevent them from going up.

Mr. EDGETT. That's right. And that's why we tend to——

Senator FEINSTEIN. That's the problem.

Mr. EDGETT. Right. That's why we tend to focus on behavior behind the accounts, to know before the content goes up. We've seen—we've seen great strides in other areas not related to that, and so we're trying to take that same solution to this problem set.

Senator FEINSTEIN. Mr. Walker, I asked your colleague yesterday why Google didn't immediately revoke Russia Today's preferred status after the intelligence community determined and publicly stated that RT was a part of the Russian government's efforts to interfere in our election.

Mr. Salgado told me that RT only lost its preferred status because of a, quote, "drop in viewership," end quote, not because it was part of the Kremlin's propaganda machine. This response was deeply troubling, and frankly, did not answer my question. So here it is again. Why didn't Google take any action regarding RT after the intelligence community assessment came out in January of 2017?

Mr. WALKER. Let me start by——

Senator FEINSTEIN. I'm sorry, your mic isn't on.

Mr. WALKER. Senator, let me start by responding to your initial comments to assure you we take this and have taken this issue very seriously. The question of cyber espionage is one that we have been working on for some years, publicly and privately, working with other companies and working on our own to identify some of these threats. This is one manifestation of that, but not the only one.

With regard to RT, we recognize the concerns that have been expressed about RT and concerns about its slanted coverage. This is of course a question that goes beyond the internet. RT is covered—its channel is on major cable television stations, on satellite television stations. Its advertising appears in newspapers, magazines, airports. It's run in hotels in pretty much every city in the United States.

We have carefully reviewed the content of RT to see that it complies with the policies that we have against hate speech, incitement to violence, et cetera. So far, we have not found violations, but we continue to look.

Beyond that, we think that the key to this area is transparency—that Americans should have access to information from a wide variety of perspectives, but they should know what they're getting. And so we already on Google provide information about the government-funded nature of RT. We're looking at ways to expand that to YouTube and potentially other platforms.

Senator FEINSTEIN. Well, as you might guess, I'm really not satisfied with that. That's been the trend of the testimony all along. I think we're in a different day now. We're at the beginning of what could be cyber war. And you all, as a policy matter, have to really take a look at that and what role you play.

I think my time is almost up. Let me try one more. A British report recently concluded that social media platforms such as Facebook, Twitter, and YouTube failed to remove extremist material posted by banned jihadist and neo-Nazi groups, even when that material was reported. The source for this is the British Parliament Home Affairs Select Committee.

Last night, we saw a horrific attack on innocent people in New York by an individual who may have been radicalized online. We know one person, who is Anwar al-Awlaki, with 75,000 hits, the major radicalizer in the United States on the internet.

I'm working on legislation to require tech companies to report known terrorist activity on their platforms to law enforcement and to provide law enforcement with civil injunction authority.

So thank you, Mr. Chairman.

Chairman BURR. Thank you, Senator Feinstein.

Senator Rubio.

Senator RUBIO. Thank you.

Thank you all for being here.

Mr. Stretch, I want to ask you—and it relates to all this in the following way, but let me work there. Guo Wengui is a whistleblower and a critic of the Chinese government, and his Facebook account was blocked, and Facebook has informed us and has said publicly that he violated terms of service. I think he published personal identifying information about individuals, and that violated the terms of service, so—and I understand that argument.

My question—so what I want to be clear is, was there any pressure from the Chinese government to block his account?

Mr. STRETCH. No, Senator. We reviewed a report on that account and analyzed it through regular channels using our regular procedures. The blocking was not of the account in its entirety, but I believe was of specific posts that violated our policy.

Senator RUBIO. But you can testify today that you did not come under pressure from the Chinese government or any of its representatives, or people working for them, to block his account or to the block whatever it is you blocked?

Mr. STRETCH. I want to make sure I'm being precise and clear. We did receive a report from representatives of the Chinese government about the account. We analyzed that report as we would any other and took action solely based on our policies.

Senator RUBIO. Facebook is not allowed to operate in China. Is that correct?

Mr. STRETCH. Yes, that's correct. Our consumer services are blocked in China, that's correct.

Senator RUBIO. Okay. There have been press reports that Facebook may have potentially developed software to suppress posts from appearing in people's news feeds in specific geographic areas. And the speculation is it's being done for the purposes of getting into the Chinese market.

Is that accurate? Has Facebook developed software to suppress posts from appearing in people's news feeds in specific geographic areas?

Mr. STRETCH. Senator, as you know, we are—we are blocked in China, so any software we have is certainly not operative there. We do have many instances where we have content reported to us from foreign governments that is illegal under the laws of those governments. So a great example of this is Holocaust denial in Germany, for example. And our position with respect to reports like that is, if there is content that's visible in a country that violates local law and we're on specific notice of that content, we deploy what we call geoblocking, or I.P. blocking, so that the content will not be visible in that country, but remains available on the service.

Senator RUBIO. So, for example, if criticizing a government is illegal in that country, you have the capability to block them from criticizing the government and thereby gaining entry into that country and being allowed to operate?

Mr. STRETCH. We have the capability to ensure that our service complies with local law, that's accurate. We take a very nuanced approach to reports of illegal content. We believe our mission is to enable people to share and connect, and we believe that political expression is at the core of what we provide. And so——

Senator RUBIO. What if that political expression is illegal in the country?

Mr. STRETCH. So, in the vast majority of cases where we are on notice of locally illegal content, it has nothing to do with political expression. It's things like blasphemy in parts of the world that are—that prohibit blasphemy.

Senator RUBIO. We could probably do a whole hearing on that topic. But here's why that's related to what we're talking about today: terms of service is the reason why he was knocked off. All of your companies have terms of service.

Is a foreign influence campaign a violation of the terms of service of any of the three companies represented here today? If you can prove that someone is doing it on behalf of a foreign government, seeking to interfere in an election, does that violate your terms of service?

[Pause.]

Any of you? Any of the three companies, in terms of being able to operate or post things, and particularly Twitter and Facebook?

Mr. EDGETT. Generally, it would violate a number—we don't have state-sponsored manipulation of elections as one of our rules. But generally the other types of rules, like inflammatory ads content, would take down most of these, these posts. So we don't outright ban it, but——

Senator RUBIO. Well, let me ask you this. I've read that you can buy a bot army from between $45 to $100. Is buying and—if you can prove that someone's bought up and put together a bot army, would that be a violation of terms of service?

Mr. EDGETT. Those would violate our terms of service around the use of automated accounts, and those are the things that we're catching every day. We're blocking 450,000 suspicious logins a day. We're challenging 4 million accounts every week, to make sure that

they're actually real people. But we have—we have terms of service around——

Senator RUBIO. I didn't get an answer on the face—is that a violation of terms of service, to buy for a foreign influence campaign or to put together a bunch of fake ads and put them together?

Mr. STRETCH. That campaign violates our terms and our policies in a number of ways. And we do not permit automated means for accessing the site, so using the bots likewise would be a violation.

Senator RUBIO. Okay. If someone goes on and posts the Social Security number and date of birth of an individual, that's a violation of terms of service, correct?

Mr. STRETCH. For Facebook it is, yes.

Senator RUBIO. I would imagine for all the platforms.

Mr. EDGETT. It is.

Senator RUBIO. What about if someone goes online and posts classified information, illegally obtained, that threatens the lives of individuals or methods, or potentially disrupts the ability to disrupt a plot that can endanger the lives of people? Is posting that online or posting that in one of your platforms a violation of terms of service? It happens sometimes. I don't know if you're aware of it.

Mr. EDGETT. We work with law enforcement all the time on matters like that, and balance free speech rights, obviously, with those of—obviously, an imminent threat, we would—we would take very seriously and act on right away.

Senator RUBIO. I guess my point is, personal identifying information is illegal to post it, right? It threatens someone's identity. It's also illegal to steal and reveal classified information. And I'm just curious if that's also a violation of terms of service, since in fact it could have real-life implications on individuals who could be compromised because of that release.

Do we have any evidence that Russian accounts uploaded U.S. voter registration data and used it in conjunction with custom audiences to target specific voters by name? Do any of you have any information that registered voter data was uploaded and used to customize advertising or messaging to individual voters?

Mr. EDGETT. We haven't seen evidence of that.

Mr. STRETCH. The same is true for Facebook.

Senator RUBIO. And my last question is—the scope of this was not limited to 2016 or even the presidential race. As an example, I think, with the help of some of the companies here, we've identified Being Patriotic, LGBT United, United Muslims of America, Stop A.I., Heart of Texas; all were used to attack my campaign during the primary. What's interesting, though, is on the 3rd of July and on the 8th of August, after the primary but when I chose to run for reelection, one of those, LGBT United, attacked again.

So my point being these operations, while we're talking about the 2016 presidential race, they're not limited to 2016, and they were not limited to the presidential race, and they continue to this day. They are much more widespread than one election. It is about our general political climate. Is that correct?

Mr. STRETCH. I would certainly agree with that statement, Senator.

Senator RUBIO. Okay. Thank you.

Chairman BURR. Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman.

With the current fascist leadership of Russia enthusiastically undermining our democracy, America must defend the values that made us great and aggressively confront this espionage and the enemies that sponsor it. The tools of the espionage range from political ads, to issue ads, sock puppets to fictional news stories, and from rallies, to protests, to marches, all presented under false pretenses.

While the Supreme Court has ruled that Congress may place some limits on strictly political advertising, the other activities I just mentioned are beyond the reach of government and government regulation in a free society.

To fight back against this espionage, Americans have to rely on our marketplace of ideas and the institutions that support it. Gentlemen, today you three represent those institutions.

Now, you've discussed your response to these attacks, but it is self-evident, in relation to the power your platforms now have, in the past election you failed. And this is especially troubling because the same Federal law that allowed your companies to grow and thrive, the Section 230 law, gives you absolute legal protection to take action against those who abuse your platforms to damage our democracy.

The same algorithms that power your companies can be used to identify the behavior indicative of these attacks, including fake accounts and fake news stories, and identify the source of money purchasing your ads.

Now, I'm of the view ads are a small part of a much bigger problem. Fake users posting stories on Facebook, videos on YouTube, links on Twitter can be used by foreign and domestic enemies to undermine our society. You need to stop paying lip service to shutting down bad actors using these accounts. You've got the power and Congress has given you the legal protection to actually act and deal with this.

So I want to start with a couple of quick yes or no questions and just go right down the row for the three of you. Mr. Walker, are you satisfied with your platform's response to foreign interference in the 2016 election? Yes or no? Just yes or no.

Mr. WALKER. We—we are constantly doing better.

Senator WYDEN. Is the answer no?

Mr. WALKER. We could have done more, but I think we are doing more today and have done more since the election.

Senator WYDEN. I'll take that as a no.

Mr. Edgett.

Mr. EDGETT. No, we need to do more.

Senator WYDEN. Mr. Stretch.

Mr. STRETCH. The same is true.

Senator WYDEN. Okay.

Do you all have—and we'll start with you, Mr. Walker—the technical ability and resources to better respond to future misinformation campaigns? Yes or no?

Mr. WALKER. Yes. The safe harbors and the Good Samaritan laws are important underpinnings for all of this. And we are doing more, we have done more to combat fake news——

Senator WYDEN. Mr. Edgett, yes or no?

Mr. WALKER. Yes.

Mr. EDGETT. Yes.

Senator WYDEN. Mr. Stretch.

Mr. STRETCH. Yes, and I would add, though, that I do believe we need information-sharing among industry, as well as working with the government, to enable us to do this effectively.

Senator WYDEN. All right.

Gentlemen, specifically now describe the changes you're going to pursue that respond to not just the ads, but the sock puppets, the hoaxes, and the confidence operations? We'd like to walk out of here knowing the changes you're going to support going forward.

Mr. Walker.

Mr. WALKER. Sure. Let me give you four on the ad side and three on the non-ad side.

Senator WYDEN. Quickly.

Mr. WALKER. Absolutely. The transparency report that we talked about for ads; an archive of content that—of all ads' content that's available; icons that make information on the site available to users as to who sponsors an ad; and enhanced verification techniques.

When it comes to non-ads material, fake news, we're improving our algorithms, our rater guidelines, and the signals we use. We're using fake news fact-check labels to improve users' ability to evaluate fake news, and we're looking at our ads policies to improve and toughen rules against sites that misrepresent their nature.

Senator WYDEN. Mr. Edgett.

Mr. EDGETT. Coming out of the 2016 election and early this year, our CEO asked our entire engineering product and design teams, which make up a large majority of the company, to tackle the problem of safety, abuse, and misinformation on our platform, and to drop everything else that we're doing and to figure this out. We formed we call an information quality team.

Senator WYDEN. Those are three sentences. What are the changes?

Mr. EDGETT. Yes. We formed an information quality team focused on looking at both behavior and content and seeing how we could stop bad actors from using automated activity to amplify their message. We have just announced new transparency rules around not just political ads, but all advertisements, to educate not just American citizens, but our worldwide users.

We are also continuing to collaborate with law enforcement and committees like this to make sure we're putting the right——

Senator WYDEN. I know very few specifics from that answer.

Mr. Stretch.

Mr. STRETCH. Senator, let me try four things.

First, today there are 10,000 people working at Facebook on safety and security across our security product and community operations teams. By the end of 2018, there will be more than 20,000.

Second, we announced last week a series of ad transparency steps, drawing on the ideas in the Honest Ads Act that Senator Warner talked about earlier, that will bring much greater visibility to advertising generally and particularly to political advertising.

Third, we are tightening our ad policies to limit divisiveness and to limit violence in the use of our ad tools.

And fourth, we're standing up an organization to enable better industry sharing of threat information and also to help us work better with law enforcement so that we can share information and expertise in order to address this threat going forward.

Senator WYDEN. My last question is, it's not clear that you all or the public understand the degree of this sophisticated and manipulative intelligence operation. The Russians created Facebook pages, posted YouTube videos, all trying to appeal to specific audiences.

Some of the content wasn't fake. It was intended to gather an audience and gain trust. It told people that they were already receptive to that, after gaining that trust, you could execute the espionage, for example, by gathering liberals and then discouraging them from voters.

Mr. Stretch, I'd like you to confirm that this technique was used in the election.

Mr. STRETCH. Senator, we've provided all the information we can about the content that we've identified on the system. I think to make the sort of assessment you're describing really requires this Committee's work to look at all of the online and offline activity that would be necessary to effectuate a campaign like that.

Senator WYDEN. My time has expired. We have specific cases that that was used. I would like in writing, within a week, what you're doing about it.

Thank you, Mr. Chairman.

Chairman BURR. Senator Collins.

Senator COLLINS. Thank you, Mr. Chairman.

It is very clear that Russian activities on your social media platforms go far beyond the paid political ads that appeared last year. The primary purpose of Russia's active measures is to exploit and to aggravate the divisions in American society and to undermine public confidence in our democratic institutions. And those efforts have not stopped. They continue to this very day. As Senator Risch has pointed out, no area of the country is immune.

So let me give you an example, and we've passed it out to you, by describing three unpaid posts from Facebook pages created by the Russians that refer to the governor of Maine, Paul LePage.

[The material referred to follows:]

Posts on Russian-Linked Facebook Pages Referenced by Senator Collins

Facebook Page: Williams & Kalvin
Date Posted: August 29, 2016
Video in Post: Video Link

Text Content:
"GOVERNER OF MAINE SAYS PEOPLE OF COLOR ARE 'THE EMENY'
In a Friday press conference, Maine Governor Paul LePage called people of color and people of Hispanic origin 'the enemy' and implied they should be shot.
LePage called up white people to kill Blacks! Does he want to repeat Rwandan genocide?
After this statement, we can clearly see what kind of people serve in American government!
White racist supremacy, that is for sure!
The only way to avoid mass killings of Black people is to fire LePage and all who have the same racist beliefs from American government!"

Facebook Page: Williams & Kalvin
Date Posted: September 8, 2016
Image in Post:

Text Content:
"MAINE GOVERNOR PAUL LEPAGE WAS DRAWN WEARING A KU KLUX KLAN CAPE AND HOOD
LePage faced a lot of criticism over the past two weeks after his racial statements. And the murals of LePage in a Ku Klux Klan cape and hood appeared over the weekend. We can clearly see the reference to the white supremacist group.
But as for me, this graffiti reflect the real situation in American government! That is not a secret that America is the country of white supremacy! And people like LePage must be replaced from their positions in the government.
America doesn't need racist politicians. Black people are tired of white supremacy!"

Facebook Page: Being Patriotic

Date Posted: August 25, 2017
Image In Post:

Text Content:
"Maine Gov. Paul LePage says he received death threats after comparing the removal of Confederate statues to the removal of a 9/11 memorial.

The Republican governor made the comparison a week ago during a radio appearance on WGAN-AM. He appeared on the same station Thursday to say he's gotten letters "threatening to kill me" and "threatening my personal life and my family."

When even the governor is not safe from leftists hate then what can we say about ordinary citizens. Liberals now are acting like terrorists. They try to intimidate everyone who disagrees with them. Hope our police will take appropriate measures.

Senator COLLINS. There are two negative posts related to the governor on one Russian Facebook page, called Williams & Calvin, that appeared in August of 2016. There's a video of comments made by Maine's governor from that same month. And the post in part says the following: "LePage called up white people to kill blacks. After this statement, we can clearly see what kind of people serve in American government: white racist supremacy—that's for sure. The only way to avoid mass killings of black people is to fire LePage and all who have the same racist beliefs from American government."

There was a second post on the same website about 10 days later. Let me just read part of that: "It is not a secret that America is the country of white supremacy, and people like LePage must be replaced from their positions in the government. America doesn't need racist politicians. Black people are tired of white supremacy."

Then, this year, this year, in August of 2017, Maine's governor was the subject of a positive post on a different Russian-backed Facebook page, called Being Patriotic. In this case, the post defended comments that the government made at the time about Confederate monuments.

The post ends with its own incendiary conclusion. It says: "When even the governor is not safe from leftist haters, then what can we say about ordinary citizens? Liberals are now acting like terrorists. They try to intimidate everyone who disagrees with them. Hope our police will take appropriate measures against these cowards."

Now, let me point out something. Our governor was not up for reelection last year; he is term-limited. He cannot run for reelection as governor. And yet these comments were made both last year and just a few months ago.

And the posts are just three among 80,000 that reveal the Russian playbook of playing both sides off against each other and of sowing discord and division with inflammatory rhetoric. And there were other posts that involved lower-level officials in the State of Maine that we found as well. And the Russians continue to push this kind of divisive rhetoric to this very day.

So my question to you is: what are you, as American companies, doing to effectively counter unpaid content posted by the Russians that is clearly designed to specifically polarize and anger the American people? And I would argue that you have a special obligation here, given your reach in American society and the fact that you are patriotic American companies.

Mr. Stretch.

Mr. STRETCH. Senator, we agree that we have a special responsibility here. We value the trust that users place in our services. And when they show up to connect with friends and family and to discuss issues, they need to know that the discourse they see is authentic.

What is so painful about this type of content is that it exploits truly and passionately held views and then inflames them to create more discord and more distrust.

To prevent this, we are investing much more heavily in authenticity. We believe that one of the cornerstones of Facebook is that users are known by their real names and so that creates a level of authenticity in the discourse that users can trust when they

come to the platform. This sort of content erodes that trust and it's contrary to everything we stand for as a company. As Americans, it's particularly painful because it is so exploitative of the openness of our society.

And so the investment we are making and the commitment we are making is to ensure that our authenticity policy is more effectively policed and monitored to prevent exactly this sort of behavior.

Senator COLLINS. Mr. Edgett, what is Twitter doing?

Mr. EDGETT. We're focusing on a number of things. The one we see the greatest strides in and where we see the greatest effect and protections from our users is on the amplification side, in the use of automated accounts. These bad actors need an audience for their voice, and generally they don't have a followership. So they are trying to use activity on the platform to automate and amplify their voices.

So we're looking behind the message and behind the content at the behavior of doing that, and have been successful in doubling our effectiveness of doing that, year over year, and looking at the behavior, taking down millions of accounts every single week because they're not actually humans, they're actually——

Senator COLLINS. Well, this just happened in August of this year. This isn't something old.

Mr. EDGETT. Right. We continue to try to stay ahead of their activities. We're also looking at things like coordinated human activity, where real people are coming together, like the IRA, and actually putting out divisive content like this. We are able to link those accounts and take action on them as we learn, not just what they're saying, but what's behind. What's behind it only we can see on the Twitter side. We've had great strides on the terrorism front in that regard, and we believe we can apply the same techniques and methodologies to this, this problem.

Senator COLLINS. Mr. Walker. Thank you.

Mr. WALKER. We're also very concerned about this kind of deceptive and divisive content. We remove it immediately from our services and we have removed these.

Going forward, and actually already, we have engaged a number of things to avoid the problem of fake news: changes to our algorithms, improving the training that our raters get in evaluating quality, labeling fake news where we can find it, working with third parties, et cetera.

Senator COLLINS. Thank you.

Chairman BURR. Senator Heinrich.

Senator HEINRICH. Thank you, Chairman.

Mr. Stretch, I want to start with you. Last month, President Trump called Russian-purchased Facebook ads a hoax. I've looked at those Russian-sponsored Facebook ads. I certainly hope you've had a chance to review them. Are they in fact a hoax?

Mr. STRETCH. All the information we've provided to the Committee did run on Facebook, so——

Senator HEINRICH. It's a yes or no answer. I know you're a lawyer; it's hard. But——

[Laughter.]

Mr. STRETCH. No. The existence of—those ads were on Facebook and were not a hoax.

Senator HEINRICH. So in the interest of just clearing this up and giving the American people some transparency into this, so that they can see the nature of what typically gets used to divide the American populace, why not simply release those Russian-financed Facebook ads to the public? Redact the pictures, but release the contents, so that people can understand how this works?

Mr. STRETCH. Senator, we believe this Committee is really best placed to determine what information to release. We stand ready to assist in that, in that effort. We agree that the more people can see the type of content that ran and the divisions that were sought to be exploited, the better.

Senator HEINRICH. Well, I think we have a disagreement on this Committee as to whether or not to release those. I would urge all of you as platforms to consider that kind of activity as well.

I want to move on to Russia's RBC magazine, which recently revealed that St. Petersburg's troll factory employed hundreds of trolls, including 90 at the, quote-unquote, "U.S. desk" alone, and spent about $2.3 million in 2016 to meddle in U.S. politics, actually contacted U.S. activists directly and offered them thousands of dollars to organize protests.

Your platform—your platforms are all global. They're not just U.S. platforms. And there is substantial open-source reporting right now suggesting that similar divisive activity may be occurring, for example, in the Catalonian region of Spain right now.

What are each of you doing right now to make sure that your platforms aren't being used in similarly divisive ways across the globe, to sow discord in Western democracies? And in particular with the Catalonian example, are you familiar with what you're doing there?

Mr. STRETCH. Senator, we are focused on preventing this form of abuse globally. So when we say we have an obligation to protect the platform from being used for abuse, that's a global obligation. So we are focused on elections as they appear on the calendar, including the Catalonian election that occurred recently, as well as the other elections that are on the calendar going forward.

We're focused on ensuring that all actors on the platform comply with local law, as Mr. Walker suggested earlier, and we are focused on making sure that any foreign threat actors that are seeking to undermine democracy anywhere are removed from the platform.

Senator HEINRICH. Have each of you taken, had to take corrective action against actors in that debate who are not who they purported to be?

Mr. Stretch.

Mr. STRETCH. Senator, the key I'd say progress we've made is——

Senator HEINRICH. That's a yes or no, once again.

Mr. Edgett.

Mr. EDGETT. I believe so, but I'll need to follow up with your staff.

Senator HEINRICH. Thank you.

Mr. Walker.

Mr. WALKER. We're constantly removing fraudulent and deceptive accounts from our services. I'm not familiar with the specifics there.

Senator HEINRICH. You can get back to us.

Mr. Edgett, given the discussion we've had about automated Twitter accounts and bots—and the range is obviously very wide, but we know that's a problem. And you made an assertion earlier that I want to come back to and just make sure it's accurate. Do you require at Twitter, by service agreement, that profiles are linked to real names, real people, or some other way to make sure that those go back to real human beings, from Social Security numbers to other unique identifiers?

Mr. EDGETT. We do not. We require some information at sign-up, but we don't require you to verify your identity. We have services that verify identities on the platform.

Senator HEINRICH. Why on Earth not?

Mr. EDGETT. Because we see the power of Twitter being used by folks like political dissidents, embedded journalists in difficult countries who use the ability to not have to identify themselves by name, like on other platforms, to speak their truth to power. We see that——

Senator HEINRICH. So the reason is for social dissidents and people in third world countries or where there is a hostile government regime? It is not your business model? You're not reliant, for example, on those automated accounts to generate revenue?

Mr. EDGETT. We don't rely on—there's some good automation on the platform and I'm happy to talk about that. But we do not rely on this, the bad, malicious automation that we're talking about here.

Senator HEINRICH. If I were running a political campaign today and I were to advertise on local television, on cable television, in print or on the radio, or even through the mail, I would have to have a "paid for by" disclaimer on those ads. Now, Mr. Walker I believe has already addressed this issue. But is there any policy reason that online social media ads, given how effective and influential they have clearly become, shouldn't meet that same level of transparency?

Mr. EDGETT. We agree with the transparency efforts and last week announced that we're creating a transparency center, not just for political ads, which will have even more information than all ads, but a transparency center for all ads, so that you can see not just the ad that you've seen and why it's been targeted to you, but all of the other ads created from that same advertiser.

On the election front, you'll also be able to see who's paying for the ad, how much they've spent on this ad campaign and all ad campaigns, and you'll—able to see what the targeting criteria are, so to better educate around why these ads are on the platform.

Senator HEINRICH. I appreciate that, Mr. Edgett.

Mr. Stretch.

Mr. STRETCH. The same is true for Facebook. We are working both on political ad transparency, enabling more visibility into campaign ads by third parties, and also enabling campaigns to meet their disclosure obligations in their—in their online communications.

Senator HEINRICH. Thank you, Mr. Chairman.

Chairman BURR. Senator Blunt.

Senator BLUNT. Thank you, Mr. Chairman.

So, Mr. Edgett, in response to Mr. Heinrich's question, there was a lot of information that you could get based on that policy, if you pursue it, like all the other ads they ran, how much. Would you get that by going to another spot? Surely that's not all right there on the ad.

Mr. EDGETT. Obviously we're a character-constrained platform, so we will be identifying very clearly whether or not something is a political ad, so that you can—you can see it right away. And then, depending on if you're on a web browser or on a mobile phone, you'll have to hover over or click on a spot to then see a sort of a full transparency center that gives you all that information right away.

Senator BLUNT. So would you be able, on the ad itself, to go ahead and put enough of a disclosure there that it's clear, when you're looking at the ad, who paid for it and how to find more information out about who paid for it?

Mr. EDGETT. We're still working through the technical details, but believe we'll be able to get that in front of——

Senator BLUNT. Mr. Walker, are you trying to do anything similar to that?

Mr. WALKER. We are. Our idea is to have an icon that a user can click on, so it's immediately available to them when they see the ad.

Senator BLUNT. But it wouldn't necessarily be—would any information be on the ad except the icon?

Mr. WALKER. It depends on the format of the ad. There may be, in display context or video context, where it makes more sense. In a very small amount of space, the FEC has struggled with figuring out appropriate disclosure requirements. We continue to look at that.

Senator BLUNT. And you're looking at the other disclosure requirements that other ads have to have on other media as you're considering this?

Mr. WALKER. Of course, broadcast, newspapers, and online.

Senator BLUNT. Mr. Stretch.

Mr. WALKER. Yes.

Mr. STRETCH. The same is true for Facebook.

Senator BLUNT. Looking at this same thing.

Well, on—when you're talking—and I think I'll start with Mr. Edgett on this. When you're talking about Russians, are you referring to the Russian government, or any Russian citizen, or people who paid in rubles?

You mentioned the IRA, which I assume is not either your individual retirement account or the Irish Republican Army. So how do you know they're Russians? And what are you looking for there when you're talking about Russians in retrospect?

Mr. EDGETT. Right. That's a great question. We are looking for signals. Not everyone identifies themselves as a Russian, especially these malicious actors. So we're looking at things like whether they registered in country in Russia. Do they have a Russian phone number? Are they on a Russian mobile carrier? Do they have a

Russian email address? Are they coming in from a Russian I.P.? Have they ever logged in—you'll see in our retrospective work, we looked at have you ever logged in at any time from Russia.

There are some technical—some technical challenges with that. The trail sometimes goes cold at data centers, where information is being processed. We saw about 14——

Senator BLUNT. Okay. Looking back at what the so-called—the Russians, however we're defining that, did during the election, when you're saying the Russians paid for these ads, these are ads paid for by the Russians because you've now gone back and checked groups like the Internet Research Agency, and you now know that's a Russian group?

Mr. EDGETT. Well, on the advertising side we also have some additional data around banking information, because folks are paying for these ads. But we didn't link the IRA accounts to advertising in the election. But what we did was found nine advertisers, based on the signals I talked about and also banking information. Largely it was Russia Today, who we have since removed as advertisers from the platform.

Senator BLUNT. Let's see if they got their money's worth. Everybody here has been involved in one way or another in buying advertising. I've always had some sense that in advertising you pretty much got what you paid for.

Mr. Stretch, how much money did the Russians spend on ads that we now look back as either disruptive or politically intended? Is that $100,000? Is that——

Mr. STRETCH. It's approximately $100,000.

Senator BLUNT. I meant from your company.

Mr. STRETCH. Yes, approximately $100,000.

Senator BLUNT. How much of that did they pay before the election?

Mr. STRETCH. The——

Senator BLUNT. I've seen the number 44,000. Is that right, 56 after, 44 before?

Mr. STRETCH. The ad impressions ran 46 percent before the election, the remainder after the election.

Senator BLUNT. Forty six percent? Well, if I had a consultant that was trying to impact an election and spent only 46 percent of the money before Election Day, I'd be pretty upset about that, I think.

So they spent $46,000. How much did the Clinton and Trump campaigns spend on Facebook during—I assume before the election?

Mr. STRETCH. Yes.

Senator BLUNT. They were more organized than the other group.

Mr. STRETCH. Combined, approximately $81 million.

Senator BLUNT. Eighty one million dollars. And before the election?

Mr. STRETCH. Yes.

Senator BLUNT. So $81 million. I'm not a great mathematician, but $46,000 out of $81 million, would that be like five one-thousandths of one percent? It's something like that.

Mr. STRETCH. It's a—it's a small number by comparison, certainly.

Senator BLUNT. Very small number by comparison. So the fact that we're talking about it today, it certainly seems like they got their money's worth after the election, whether they got it before or not. We're still talking about five one-thousandths of one percent of the Facebook money spent. And that was just by Clinton and Trump? Or was that all the presidential candidates put together?

Mr. STRETCH. No, those were the——

Senator BLUNT. The $81 million?

Mr. STRETCH. Those were the Clinton and Trump campaigns, combined.

Senator BLUNT. Well, probably got more attention here than they did.

I know Ferguson, Missouri, and Baltimore were a couple of big targets in a lot of these ad campaigns. Is there a way you could do this to where you principally target viewers in the St. Louis area for Ferguson or in Maryland, for Baltimore?

Mr. STRETCH. It's important to distinguish between our ad tools and the organic tools. Our ad—our ad tools do permit geographic targeting of content. Approximately 25 percent of the ads that we've identified and turned over to the Committee were geographically targeted to a region smaller than the United States. Most of them were targeted on a State basis.

Organic content—unpaid posts, if you will—are not geographically targeted.

Senator BLUNT. And some of those targeted dollars were spent in states where the election turned out not to be close at all. Is that right?

Mr. STRETCH. That's correct.

Senator BLUNT. The other questions that we'll get to, maybe in—maybe in writing later, but this—on the free media, I think we have to be very thoughtful here about who decides what's voter suppression and what's not; who decides what level of speech is acceptable and what's not. It's an unbelievable obligation that the government's never been very good at, and an unbelievable obligation that it sounds like to me your companies are all being asked to assume. And that'll be an ongoing discussion, I think, of whether that's possible or not, and the questions and problems that arise when somebody does begin to decide what's acceptable to talk about and what's not, and what discourages voters and what doesn't.

I would think the general election process these days would discourage voters from participating, so maybe that would just mean none of it could be discussed. But we will see how that goes.

Thank you, Mr. Chairman.

Chairman BURR. Senator King.

Senator KING. Thank you, Mr. Chairman.

Gentlemen, you've done a good job this morning. I must say, though, I'm disappointed that you're here and not your CEOs, because we're talking about policy and the policies of the companies. And it's fine to send general counsel, but I think, if you could take a message back from this Committee, if we go through this exercise again, we would appreciate seeing the top people who are actually making the decision.

I want to begin with two quotes, and I generally don't read quotes, but these are so apt. The first one says this: "Nothing was more to be desired than that every practicable obstacle should be opposed to cabal, intrigue, and corruption. These most deadly adversaries of republican government might naturally have been expected to make their approaches from more than one quarter, but chiefly from the desire of foreign powers to gain an improper ascendant in our councils." That's Alexander Hamilton in the 68th Federalist. He saw this coming.

The other is a more recent quote from a fellow named Vladimir Kvachkov, who's a former GRU officer. And he said: "A new type of war has emerged in which armed warfare has given up its decisive place in the achievement of the military and political objectives of war to another kind of warfare: information warfare." And that is exactly what we're talking about here today.

I appreciate the Chair and the Vice Chair giving us the context of what we're doing. Their visual demonstrations I think were very vivid. And the warfare is the division of our society. And it's not only us; it's the entire West.

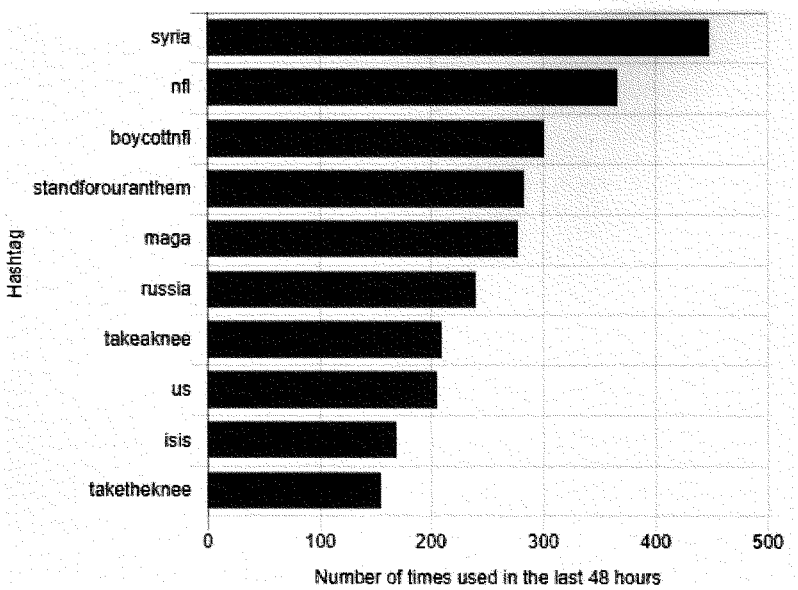
We know that the Russians were involved in the French election. We know that they were involved in the German elections. We are now learning that they're involved in the separation of Spain, and my understanding is they've set up shop in Scotland, which is talking about an independence vote from Great Britain. So this is a sophisticated, worldwide strategy that applied here in 2016.

There is one other piece I'd like to add to what the Chair and the Vice Chair did, and that is that it's still happening. This is a service of the German Marshall Fund called, interestingly, "Hamilton 68," that follows hashtags on a daily basis. And I just picked a day in September to show. These are the hashtags that are being propagated, not created by Russians, but these are 600 Russian websites that are using these are the hashtags on these particular days.

[The material referred to follows:]

September 23-24, 2017

Top Hashtags



Source: http://dashboard.securingdemocracy.org/

German Marshall Fund's *Hamilton 68 Project*

Senator KING. The interesting thing, Syria's up there; clearly, Russia has an interest there. But then we have the NFL; and then we have "boycott the NFL"; then we have "Stand for our anthem"; we have, "Make America great again"; Russia, "Take a knee." In other words, they were tweeting on both sides of the NFL dispute in order to exacerbate the divisions.

One witness said to this Committee that their strategy is to take a crack in our society and turn it into a chasm. And that's exactly what we saw in 2016. My point here is it hasn't stopped and it won't stop.

So we have to figure out what to do about it. And it seems to me that there are three possibilities, one of which you can make a significant contribution to; the other two, frankly, are up to us.

The first is a technical defense, the kind of thing you've already been talking about today: checking identities, identifying the source of this kind of information. I want to pursue that in a minute.

The second is we as a society have to understand when we're being conned. I spent some time a year ago in Eastern Europe, before our election. And the Eastern European politicians, all they wanted to talk about was Russian meddling in their elections. And I said, "How do you defend yourself? You can't undo the internet. You can't turn off the TV."

They said, "All of our people now get it, that this is what the Russians are doing. And when they see one of these postings, they say, 'Oh, it's just the Russians again.'"

We have to develop that level of sophistication so that we know when we're being misled. And to me, this is the mentality we all apply at the checkout counter of the supermarket and we see a tabloid that says a movie star had a two-headed baby. We say, "Oh, that's just a tabloid." We need to apply that same kind of sensibility to these kinds of fake news, misleading and purposeful distortions.

The third thing that we have to determine, I think, is that this country has to have some kind of cyber warfare deterrent capacity. Right now, there's no price to be paid for meddling in our democracy; and our adversaries have to understand that, if they're going to undertake a campaign like this, there will be a price to be paid; there will be results; and if they do X, we are going to do Y to them. Right now, that doesn't exist, and all of what the Russians did last year has basically been a free pass. And I think that's a very difficult problem.

Now, let me ask the technical question. Mr. Stretch, can you guys—could you, for example, require a date line on a posting that said where it comes from, just like a news story says "Moscow, September 23rd"? Is there some way to identify the source of information as it comes across your news feeds?

Mr. STRETCH. Senator, it's a great—it's a great question. We do permit users to identify the geographic location of the post. We don't require it. There are oftentimes privacy considerations that would prevent a user from——

Senator KING. You could require it by country, couldn't you? That's——

Mr. STRETCH. There are many uses of our services, Senator, where requiring people to designate their physical location could be problematic.

I would make two other points. One is, because of the way the internet is architected, your geographic location is—can be disguised. That's something we need to work on in order to make sure we're not being fooled, because I think your larger point is an excellent one. The geography of the location of the user, paired with the content they're serving——

Senator KING. It's part of the information.

Mr. STRETCH [continuing]. Is part of the information, and we need to do a better job tuning our system to be more sensitive to that.

Senator KING. Mr. Walker, you said the people should know what they're getting. When we get information, we know it's in a—it's in a newspaper, we see the name of the author, we see the date line. We're in a new information distribution world here, and we need to think about how to apply some of the principles that have helped us to assess that information. And I hope that you all will continue to develop policies, just as the newspaper business did 100 years ago, that help your customers to analyze and assess the validity of the data. The problem now is we're just taking what comes as it comes.

I'll end with this: I have a quote on my kitchen wall that my wife found, and it says, "The great problem with quotes on the internet is determining whether they're authentic." Abraham Lincoln.

[Laughter.]

Thank you, Mr. Chairman.

Chairman BURR. Senator Lankford.

Senator LANKFORD. Gentlemen, thank you for being here. I hope you hear loud and clear from this Committee there are lots of questions. You're asking lots of questions. This is not an opposition to free speech, though. This is actually a battle to try to protect free speech.

We want to have good American dialogue, and the fear is that your platforms are being used by foreign actors that want to abuse our free speech. If two Americans have a disagreement, let's have at it. Let's walk it through as two Americans. If an outsider wants to be able to come do it, we do have a problem with that. And we're trying to be able to work through that.

So we're grateful that you're here and to be able to walk through this, and we look forward to cooperation together and to be able to figure out how we actually resolve some of these extremely complicated issues.

I do want to be able to push on a little bit this issue about the type of ads and the type of content. Mr. Edgett, you mentioned from your testimony that in Twitter, of the 131,000 tweets posted during the time—and I assume that means that September to November time period that you were tracking—only 9 percent of those tweets from those Russia-targeted accounts were actually election-related; the others were all social engagement, other issues. And I think that's being lost in the conversation, that only 9 percent of the tweets were election-related.

Now, my question is, for all of your platforms, what are you seeing from Russian-related accounts that you're tracking now and trying to be able to pull down or identify? What are the social issues that are being discussed right now from those sites?

You can go back for the last six months if you want to. But give me some examples of the type of social issues that they're engaging with. One has already been mentioned by Senator King and that's the NFL, either boycott the NFL or take a knee on that. Has that been actively pursued on your sites? Give me examples of topics here.

Mr. STRETCH. So one example we saw following the election was an effort by the accounts we've identified to inflame some of the post-election demonstrations we saw. So some of the accounts turned to questioning the Electoral College, as an example.

Senator LANKFORD. Okay. So let me walk through multiple examples here. So Electoral College is one of them. Some of them, it's been publicly reported that the site was used to try to organize events that were election protest events in certain cities, that—was sending out messages saying, "We're all going to protest at this spot," but obviously it was created by a Russian group.

What else? NFL? Yes or no on that?

Mr. EDGETT. We've seen that activity.

Senator LANKFORD. Okay. What else? What other issues?

Mr. WALKER. We've seen more limited use of our services, Senator, but among that I would say police shootings and racial issues.

Senator LANKFORD. Okay. What else?

Mr. STRETCH. Certainly immigration has remained a topic throughout.

Senator LANKFORD. Okay. Any other issues?

[No response.]

This is part of the reason that multiple members—and Senator Heinrich mentioned it earlier—we really do want these ads to get out in the public space. We think there's great value for all of your platforms to be able to say, "This is the type of content that foreign actors are actually trying to put out, that are divisive content. When we put it out, that's one thing; when you put it out, it's completely different."

We think there's a great benefit for you to be able to say, when you're aware of things, "Please note, this is the type of issue that's been coming out, that's coming out, and this is what it looks like," and so people can say, "That's the type of thing I've seen before," or they can say, "I've actually liked on that before and didn't have any idea that that was Russian-related." That'd be helpful.

Can I ask a question? When were you aware of Russian activities on your platform during the election time? During the election or before your election? When were you aware that entities within the Russian government, whether that be the Internet Research Agency or other individuals that you knew of that were Russian, either government-related or at least policy-related, were involved in election issues on your platform? Before or after the election? And all three of you can say. Before or after?

Mr. STRETCH. We were aware of Russian state actors active on the platform prior to and through the election, separate from the Internet Research Agency. And we communicated with law enforce-

ment about our concerns at the time. These actors were engaged in more traditional cyber threat activity, focusing on account compromise, as well as trying to direct attention to stolen information that was hosted on other sites.

Senator LANKFORD. How far back? Early 2016, 2015?

Mr. STRETCH. We had seen activity as early as 2015.

Senator LANKFORD. Okay. Mr. Edgett.

Mr. EDGETT. Twitter also saw activity from the IRA on our platform and took large-scale action to take down accounts in 2015. We generally are aware of intelligence community reports, so became aware of the activity in the report that came out in January of this year; and then obviously, through the retrospective of work, have uncovered what we think is the full extent. We're continuing to look and to research that issue.

Senator LANKFORD. Okay. Mr. Walker.

Mr. WALKER. We've been looking at cyber espionage issues, accounts compromise issues, for many years. It was only after the issuance of the report in January that we took a deeper dive on the particular kinds of things we're talking about here today.

Senator LANKFORD. One of the things that we're trying to address is getting additional information. Getting the ads I mentioned before would be very helpful. Getting the type of posts that have been done would be very helpful to the American people to be able to see.

Getting the statistical information would also be helpful. The statistics that you've given us are the number of accounts that are related to this, but it's not giving us the breadth and the depth of those accounts once they're activated. So for instance, it's helpful to know that one percent of those accounts were Russian-related. But what we're not getting statistically is was that one percent the first one percent? They actually created it, launched it, and then millions of people saw it after that? Are they in the middle, stirring it and advancing it? Or were they beginning it?

That would be helpful to us as well. And I know you have that data to be able to see if they started it or were they in the middle of broadcasting it. So just giving us the percentage of users that shared it doesn't help us. Knowing when in that process and what happened after that is what helps us.

You all have done a lot of work on terrorism, on Islamic extremism, on the advance of ISIS. You've done a lot of work on child pornography, on human trafficking, on the sales of illegal drugs on your sites. We're asking for help on this area as well. And this is something that I would hope that we do not have to engage legislatively or, if we do, it's the lightest possible touch. This is something you have been actively engaged in with other topics, and we look forward to cooperation in this as well, so that you all are managing that.

But I do hope in the days ahead we continue to protect a platform for free speech, to allow individuals to be able to speak their opinions, whether its agreed or disagreed on by other Americans, so Americans can engage in that dialogue. Thank you.

Chairman BURR. Senator Manchin.

Senator MANCHIN. Thank you, Mr. Chairman.

Thank you all. RT, the Russian state news organization that Federal intelligence officials call the Kremlin's principal international propaganda outlet, RT America TV broadcasts negative programs, derogatory information about the United States. It's essentially information warfare directed against the United States. According to the unclassified intelligence report released on the 2016 elections, the Kremlin staffs RT and closely supervises RT's coverage, recruiting people who can convey Russian strategic messaging.

Additionally, the Kremlin spends $190 million a year on the distribution and dissemination of RT programming. Can you all answer, do any of your organizations allow RT to purchase space or advertise on your accounts?

Mr. EDGETT. We've off-boarded, which means we've banned, Russia Today and their related accounts from advertising on the Twitter platform.

Senator MANCHIN. That's effective as of when?

Mr. EDGETT. That was effective as of a week or so ago.

Mr. WALKER. We have reviewed the RT accounts. As you know, RT advertises extensively in newspapers, magazines, airports across the United States. We've not found violations of our accounts. But we are focused on making sure that there is enhanced transparency with regard to government-funded broadcasting of all kinds, whether that's RT or Al Jazeera or other sources.

Senator MANCHIN. Mr. Stretch.

Mr. STRETCH. The same is true for Facebook, Senator.

Senator MANCHIN. Well, it says here that RT uses Google's YouTube, Facebook, and Twitter as the main distributors of their content. So you all have been the main go-to to get their propaganda out to the United States and do harm to us.

Mr. WALKER. That may be true online, Senator, but of course, RT is covered by—RT channels are included on major cable television networks, satellite television networks, hotel television choices, et cetera. So it is a problem that goes beyond the web.

Senator MANCHIN. Let me ask you this question, if I may. Kaspersky Labs, their antivirus software, do any of you all have it on your personal computers? Your personal computers, are you using Kaspersky Labs?

Mr. WALKER. No, sir.

Senator MANCHIN. Does your company use Kaspersky?

Mr. WALKER. I do not believe so.

Senator MANCHIN. Could you check and find out?

Mr. WALKER. We will—we will follow up.

Senator MANCHIN. How about any of the other two?

Mr. EDGETT. Not aware, but we'll follow up with your staff.

Mr. STRETCH. Likewise.

Senator MANCHIN. Do you all have any doubts about Russia's involvement to interfere in our 2016 presidential election? Do you have any doubts at all that Russia intervened, interfered, had a profound outcome, basically, on our outcome to our election? Do you all have any thoughts on that? Do you have any doubts about that?

Mr. STRETCH. We have no doubt that there were attempted efforts at interference. It's something we're focused on addressing

going forward. In terms of whether it had an effect on the outcome, that's not something we're in a position to judge.

Senator MANCHIN. Well, let me ask this: Are you or your CEOs concerned about the threat and damage your companies can do to the U.S. with your far-reaching power, and that you have been identified as the major distributors of fake news? Are you concerned about that? Do your CEOs talk about the threats to the United States of America, where you're domiciled? Or is it basically just a business model that you're worried about?

Mr. EDGETT. We're deeply concerned. This is an issue that we talk about constantly. As I said earlier, the first part of this year, we pointed our entire engineering product and design team on tackling the issues of information quality, abuse of our systems and protecting our users.

Mr. WALKER. I'd join that. It's absolutely a very serious issue. The North Star of Google is to provide accurate, comprehensive, relevant information to people. We don't always get that right. But we have tens of thousands of engineers who are trying to improve our algorithms, improve the rating guidelines we use for individuals, address the problem of breaking news, which is a very challenging one to get right when there's just not a lot of content out there. So we take this very seriously.

Senator MANCHIN. You all would agree, then, I guess, with the legislation that's been introduced by different members and bipartisan Members of this Committee and other committees, that you all should be regulated and overseen the same as we do other news medias?

Mr. Stretch, you have any idea, a comment? Are you all going to fight back on that, lobby against it, or are you going to basically support the legislation that's going to be needed to make sure that the American people are getting the facts and not fake news?

Mr. EDGETT. Senator, we stand ready to work with the Committee on legislation. Any particular pieces of legislation, we're certainly happy to talk about.

Senator MANCHIN. You've seen the legislation that we've put out there. You all three are lawyers. I'm sure you're watching it very closely, you know, the legislation that we have. Do you agree with the exemption? Would you support a change in law that treats all political advertising on the internet the same as print and broadcast ads, to require identification of sponsors, basically the legislation we're putting forth?

Mr. EDGETT. We're very supportive of the direction of the Honest Ads Act, and have had really productive conversations——

Senator MANCHIN. You all we will be speaking in support of these pieces of legislation?

Mr. EDGETT. Yeah, we have some fine-tuning that we'd love to talk about. But we, as you saw, put out our own transparency center that very much aligns with the information that the Honest Ads Act was asking us to provide to you.

Senator MANCHIN. According to an Oxford University study released in October, Russian trolls are now targeting American military personnel and veterans on Twitter and Facebook. Allegedly, these trolls are pushing fake news and injecting them into veterans groups and to active-duty personnel.

In fact, one fake Facebook page was highlighted in a Stars & Stripes article from October the 18th. The page was called "Vietnam Vets of America," and it had attracted a follower network of nearly 200,000. The real veterans organization, Vietnam Veterans of America, called it an impostor page and another example of how military and veterans are being targeted with disinformation.

A week after the original article was reported on October 18th, Facebook reportedly took down the site, ostensibly for violating intellectual property of the real veterans service organization.

So I would ask Facebook and Twitter, is the story accurate? Did you all know about this? And are you seeing our military and our veterans being targeted? And how come it took so long to take it down?

Mr. STRETCH. Senator, we're intensely proud of the use of Facebook by our military. You asked——

Senator MANCHIN. We're not talking about that——

Mr. STRETCH. Right.

Senator MANCHIN. We're talking about the people who are targeting them.

Mr. STRETCH. Yes. And we are very focused on making sure that it remains an authentic experience for them. We receive many reports of inauthentic behavior. We try to act on them quickly. We're trying to improve our tools to detect it even before it's reported to us. I'm not familiar with the particular—the particular page you've described.

Senator MANCHIN. Stars and Stripes?

Mr. STRETCH. Yes, but I——

Senator MANCHIN. I hope you will check into that.

Mr. STRETCH. I will certainly check into it, Senator.

Senator MANCHIN. Let me just say this, as my time's wrapping up. You can see this is not a Democrat or Republican issue. This is an American issue that we're concerned about, the security of our Nation.

We're getting hit from every way you possibly can imagine. And you all are the largest, one of the largest distributors of news. And there can be no doubt that it has to be authentic and true. You cannot allow what's going on against the United States of America.

You are on the front lines with us, and we're doing everything we can to support our military, our veterans, all the people who put their lives on the line. And what you're doing by allowing this fake stuff to come across, this misleading, this damaging information, is really threatening the security and the sovereignty of our nation.

I would hope that your CEOs—and I agree with Senator King. I wish that your CEOs would be here. They need to answer for this. It can't be a business model. It's got to be a security issue.

Thank you.

Chairman BURR. Senator Cotton.

Senator COTTON. Thank you, gentlemen, for your appearance this morning.

Mr. Edgett, I want to discuss Twitter's history of cooperation with our intelligence community. Last year, in an open hearing before this Committee, I asked then-CIA director John Brennan about Twitter's decision to prohibit a subsidiary called Data Miner

from working with our intelligence community. Director Brennan stated that he was disappointed in Twitter's decision.

But at the same time that we learned that Twitter was refusing to work with the CIA and the rest of the intelligence community, we also learned that Twitter was pitching Russia Today and Sputnik, propaganda arms of the Kremlin, to sell advertisements for profit.

So, in essence, last year Russia was beginning its covert influence campaign against the United States, and Twitter was on the side of Russia, as opposed to the national security interests of the United States. How can your company justify this pattern of behavior to its fellow citizens?

Mr. EDGETT. We work frequently and hard with law enforcement all the time. We do have global policies that prohibit the use of our data hoses or publicly available data around tweets for purposes of surveillance. But we allow law enforcement to use Data Miner and Twitter products around news alerts, first response technology to see what's going on in an area if a 911 call is made and an emergency responder is going somewhere. But we do not allow surveillance based on Twitter data.

Senator COTTON. Did Twitter cut off the CIA and the intelligence community from Data Miner last year?

Mr. EDGETT. We asked that our policy of surveillance be applied consistently to all organizations, and I believe that Data Miner has been enforcing that policy.

Senator COTTON. Has it cut off RT and Sputnik?

Mr. EDGETT. As to Russia Today, when we approached Russia Today last year to talk about our advertising products and to sell them our advertising services, they were approached as a regular media organization like a BBC or an NPR.

Senator COTTON. Do you consider RT to be a regular media organization?

Mr. EDGETT. Obviously not now. Coming out of the DNI report earlier this year and the retrospective work that we've done most recently, we don't. And that's why we have banned Russia Today from advertising on the Twitter platform.

Senator COTTON. So there's a difference, though, between the advertising question, which was improvident, and the use of Data Miner. According to a Wall Street Journal report to which Director Brennan was responding, Twitter CEO Jack Dorsey vetoed the Data Miner-CIA contract at the last minute because he objected to the, quote, "optics" of continuing to help U.S. intelligence agencies.

That Wall Street Journal report also said, though, that customers still getting Data Miner include RT. Is that an accurate report? John Brennan had no reason to doubt its accuracy.

Mr. EDGETT. I'm—I don't—I don't have the information, but will follow up on Russia Today's use of Data Miner's products, which is the third party where we have a relationship. I believe Mr. Dorsey wanted to make sure that our policies were being applied consistently around surveillance.

Senator COTTON. Do you see an equivalency between the Central Intelligence Agency and the Russian intelligence services?

Mr. EDGETT. We're not offering our service for surveillance to any government.

Senator COTTON. So you will apply the same policy to our intelligence community that you apply to an adversary's intelligence services?

Mr. EDGETT. As a global company, we have to apply our policies consistently.

Senator COTTON. This reminds me of the old line from the Cold War of one who did not see a distinction between the CIA and the KGB on the other hand, because the KGB officer pushed an old lady in front of an oncoming bus, the CIA officer pushed the old lady out from the path of the oncoming bus, because they both go around pushing old ladies.

I hope that Twitter will reconsider its policies when it's dealing with friendly intelligence services in countries like the United States and the U.K. as opposed to adversarial countries like Russia and China.

Would Twitter entertain the possibility of once again allowing the intelligence community to use Data Miner?

Mr. EDGETT. We do today, for purposes of news alerts and first response technology, getting information on certain areas. We do not allow anyone—our policy is not to allow anyone, for the purposes of user privacy, to use our technology to run surveillance.

Senator COTTON. Okay, let's move on to another hostile intelligence service. Other than Vladimir Putin and Russia, I can't think of anyone who was more involved in efforts to influence our election last year than Julian Assange and WikiLeaks. The current director of the CIA, Mike Pompeo, as well as this Committee in our annual Intelligence Authorization Act, has labeled WikiLeaks a non-state hostile intelligence service who aids hostile foreign powers like the Kremlin. Yet, to my knowledge, Twitter still allows them to operate uninhibited. Is that accurate?

Mr. EDGETT. We have terms of service and rules that apply to all users and will apply those consistently and without bias. We take action on accounts like WikiLeaks——

Senator COTTON. Is it bias to side with America over our adversaries?

Mr. EDGETT. We're trying to be unbiased around the world. We're obviously an American company and care deeply about the issues that we're talking about today. But as it relates to WikiLeaks or other accounts like it, we make sure that they're in compliance with our policies, just like every other account, and have and will continue, if we need to take———

Senator COTTON. So you'll be unbiased towards WikiLeaks and Julian Assange, but you'll take down videos of people like Marsha Blackburn, a Republican running for the United States Senate?

Mr. EDGETT. Marsha Blackburn's video was never removed from the Twitter platform. She ran that tweet and that video as an advertisement, and we have different standards for our advertisements than we do for the organic tweets and content on our platform, because we're serving ads to users who haven't asked to follow Representative Blackburn or others and we want to make sure that that's a positive experience. And so our policies have a different standard. And in that case, we had users reporting that it was inflammatory and upsetting, and it was initially taken down.

We're making these tough calls all of the time, and in that case we reversed the decision and allowed the advertisement to continue to run. But we never took down Representative Blackburn's tweet or allowed her not to convey that message to those who were following her and to engage in the dialogue with her.

Senator COTTON. Mr. Edgett, I know that you're the acting general counsel, not the general counsel. And if you were the general counsel, these decisions are made at the CEO and the board of directors level. But I have to say most American citizens would expect American companies to be willing to put the interests of our country above, not on par with, our adversaries—countries like Russia and China, or non-state actors like WikiLeaks, or individuals like Julian Assange.

As many other Members of this Committee have expressed, I think your companies have accomplished amazing things for our country and its citizens, and made our lives better in many ways. I also support the channels that you've created for free speech, especially for some oppressed or persecuted people around the world.

But this kind of attitude I would submit is not acceptable to the large majority of Americans, and it's going to be part of what would lead to unwise or imprudent regulation, not sensible and smart regulation.

My time's expired.

Chairman BURR. Senator Harris.

Senator HARRIS. Thank you.

California is home to many of the world's most successful technology companies and we're proud of that. And we also know that with that great success comes great responsibility. Your companies, therefore, have a great responsibility to the American public.

And, as you know, you are the modern town square and the modern postmaster. You are the phone company and the Yellow Pages. You are the newspaper and the radio broadcaster and the television station, and you are the emergency alert system. Your decisions fundamentally inform public discourse.

So our Nation's enemies have used your platforms in a way that has been designed to create and disseminate and advertise hateful rhetoric, with the intent and the effect of disrupting our democracy. And that, of course, is why we're all here.

I have several questions, but I'd like to start with what I think is, frankly, an elephant in the room. And I'm holding up the SEC Form 10–Q that has been filled out by each of your companies. And your response to this is pretty much the same, but I have in front of me that from Facebook. But Twitter and Alphabet have the same information.

There's a section here which requests, "What are the risks related to the business?" And it reads, "If we fail to retain existing users or add new users, that will be a problem for us." It goes on to say, "We generate substantially all of our revenue from advertising. The loss of marketers or reduction in spending by marketers could seriously harm our business."

It goes on to say, "Our advertising revenue could also be adversely affected by a number of other factors, including adverse legal developments relating to advertising, including legislative and regulatory developments, and developments in litigation."

So my question to you is about American ads, not the Russian ads, American ads that run on your platforms. There are legitimate ads that appeared alongside of the Russian placement and propaganda pages on Facebook, on Twitter and even on YouTube.

So can you please tell me that, as it relates to those advertisements on Facebook, on Twitter or in YouTube, how you are addressing that, and in particular, how much money did you make off of the legitimate ads that ran alongside the Russia propaganda?

And we can start with Alphabet or with Google, please. And that would be the advertisements that ran before your videos on YouTube.

Mr. WALKER. Sure. The total amount of advertising we discovered across our platforms was $4,700 from the Russian sources.

Senator HARRIS. That's not my question.

Mr. WALKER. I understand.

Senator HARRIS. My question is American advertising or legitimate advertising. How much money did you make from legitimate advertising that ran alongside the Russia propaganda?

Mr. WALKER. A de minimis amount, Senator. I don't have it in front of me. We'd be happy to follow up.

Senator HARRIS. Okay. What about for Twitter?

Mr. EDGETT. I don't have the data, but I will follow up and———

Senator HARRIS. Have you not looked into that?

Mr. EDGETT. I believe—are you asking how much advertising revenue we made for the period, totally? Or——

Senator HARRIS. I'm asking how much advertising revenue did you receive from legitimate advertisers that advertised alongside or in connection with Russian propaganda?

Mr. EDGETT. We haven't done that analysis, but we'll follow up and work on that.

Senator HARRIS. Okay. What about Facebook?

Mr. STRETCH. The same is true for Facebook, Senator.

Senator HARRIS. You've not done that calculation?

Mr. STRETCH. We've not done that analysis.

Senator HARRIS. I find that difficult to understand, because it would seem to me that we would figure out how much you've profited from Russian propaganda on your platforms. So please do follow up with us as soon as possible on that.

And also, it is critically important that this Committee have access to all of the information it needs to understand the Russia propaganda in the 2016 election. So will you each commit to retaining records, as you are required to do from the minimum standard of media rating research, but do that and extend it beyond the 11 months that they require and extend it through the completion of our investigation into Russia's interference in the 2016 election? Will you commit to keeping those records during the duration of our investigation?

Mr. WALKER. We will commit—we will keep all relevant records to this investigation and provide them to the Committee, yes.

Mr. EDGETT. Same goes for Twitter.

Senator HARRIS. Thank you.

Mr. WALKER. Yes.

Senator HARRIS. And as for all three of you, can you please name the senior executive who is responsible in your operation for coun-

tering state-sponsored information operations? And if you do not have one, please indicate that, as well.

Mr. WALKER. It's a challenging question, because we have a number of people across different teams, including our cyber espionage teams, as well as our trust and safety teams. I would say our chief security officer is one such person. Another person would be the head of our trust and safety team. Then we also have separate teams at YouTube who work in these areas.

Senator HARRIS. So I take it you have not designated an individual as part of your executive team who's responsible specifically for state-influence operations?

Mr. WALKER. I will take responsibility for that, Senator.

Senator HARRIS. Okay, I appreciate that.

Mr. EDGETT. That role—there's two people filling that role at Twitter. The first is our general counsel. I'm currently our acting general counsel, so currently it is me. But also our head of our Twitter product, the Twitter product that we all use, has taken responsibility for safety, abuse, and information quality on the platform. So I feel like that's directly related to your question.

Senator HARRIS. Okay. But I'd like you each to appreciate and everyone to appreciate that this is a very specific issue with its own pathology, requiring a great amount of resources, because we are talking about state-sponsored activity. This is not about an individual conducting this activity and then you need to review it.

So as it relates to state-sponsored information operations, I'm requesting that you name whoever is responsible now, but as we go forward that you designate in your operation someone at the executive level who is responsible specifically for those types of operations, understanding that, as we know now, there are governments that are willing to put incredible amount of resources into manipulating the American public.

And it is beyond what you might need to review in terms of activity on your sites that involves issues of posting inappropriate images and things of that nature.

Mr. Stretch.

Mr. STRETCH. Senator, we have a chief security officer and a threat intelligence team that's acutely focused on this threat. I will take responsibility for our overall response to this threat.

Senator HARRIS. And how many of your employees are dedicated to addressing state-sponsored operations specifically? And if there aren't, please follow up in terms of what you're prepared to dedicate to that.

Mr. STRETCH. This is a—it's a harder question, because there are so many vectors that we're investing in. I stated earlier that we have 10,000 people at Facebook across a number of teams who are focused on safety and security generally, and we're doubling that number. The number of people who think of this as their full-time job is something I'll have to come back to you on.

Senator HARRIS. Okay, I appreciate that. And for each of the companies, we'd appreciate that.

You can create automated systems that detect foreign propaganda. For example, you can determine whether a user is active during Moscow business hours, or connects through a VPN, or registers with a fishy voice over an IP telephone number. And you can

feed those signals into a machine that can actually create an algorithm that can allow us to indicate or figure out if propaganda is actually being pushed through. Have you done that as it relates to state-sponsored manipulation of elections?

Mr. EDGETT. So our technology is agnostic. We have the technology you're talking about, which is an algorithm that helps us catch the bad actors based on their pattern and behavior, and also connect accounts so that if they start new accounts or new networks of accounts, we get those before they tweet.

We want to catch that activity all over Twitter. That, having automated accounts, malicious actors on Twitter, is a bad experience for our users. So we've been tackling that problem for years, and the challenge is as we get better, these actors get better. And so it's a constant game of cat and mouse and one-upmanship.

But we are committed every single day to making sure that we are removing those actors from our platform.

Senator HARRIS. My time is running out, so perhaps we can just have quick answers for the remaining folks.

Mr. WALKER. Our answer would be similar.

Mr. STRETCH. The same.

Senator HARRIS. Thank you.

Chairman BURR. Members should be aware that there has been a series of votes started about seven minutes ago, two votes. We've got two Members left. We're going to move through those and wrap up.

And at this time, I would ask unanimous consent that all Members be allowed for seven days to submit questions to our witnesses today.

[No response.]

Without objection, so ordered.

Senator Cornyn.

Senator CORNYN. Thank you for being here.

It strikes me that the United States is operating at a tremendous disadvantage. We are a free and open society. We believe in freedom of the press, freedom of expression, and we respect the privacy rights of individual—of individuals. Our opponents have the opposite view. They view information as a tool of warfare, while denying their own citizens access to the sort of freedoms—the press, individual thought, and expression—that we celebrate in this country. But it seems to me that you're at the intersection of this problem, which brings us to why you're here today.

I'll restate the Chairman's comments when he started by quoting H.L. Mencken who said, "For every complex problem, there is a clear, simple, and wrong answer." And so we need to be very careful, I think, in how we deal with this.

But I do think the public needs to understand how your platforms operate. My friend Senator Harris talked about your being the town square and the newspaper, the radio station. But you are more than just a publisher of information. As you point out, most of the income that your companies earn is from data mining. You know more about individual Americans than anybody else, including their own government. And, of course, you vow to protect that information and their privacy at the same time.

But you use it in order to target ads. Many of us here on the panel have used your platforms in political campaigns to make sure that our message gets to voters who we think might be receptive to our point of view or our platform.

But I'd like to know as a general matter how do you distinguish between somebody, like Senator Feinstein alluded to, using social media as a means to recruit and incite lone-wolf terrorists like the one that plowed down unsuspecting New Yorkers yesterday, killing 8 and injuring 11 others, between that person and a foreign government using your platforms in order to pursue the sort of disinformation and active measures that caused so much confusion and polarization in our election?

And how do you distinguish between the way you treat those people on your platforms and how you treat sex traffickers, who are targeting young girls and selling them, in essence, for sex? How do you distinguish between those three?

Mr. WALKER. Senator, I'd say none of those activities are acceptable on our platforms. We have strong policies against abuse of platforms to promote hate, hate speech, incitement of violence, sex trafficking, human trafficking, et cetera. In addition, when you have the added layer of a deceptive actor, like a foreign government, trying to push its points of view in deceptive ways, without identifying itself, etcetera, that separately violates another layer of our policies.

Mr. EDGETT. It goes back to what we talked about earlier. We also have the same policies prohibiting all of this. We've had the best success so far looking at the behavior and the signals we see only on the Twitter side, around how accounts are linked and the activity of those accounts, where they're logging in from, what they're doing with each other, to stop these bad actors before they're even able to tweet.

A good example of this is on the terrorism side. We are now able to automatically detect and take down 95 percent of terrorist accounts, 75 percent of those before they tweet for the first time. So because we're focusing on behavior and not the content, we don't have to wait for them to get their messages out. We take those down proactively before they're able to speak.

Mr. STRETCH. I would just add, Senator, that of the three forms of abuse of the platform you describe—child safety, terrorism, and foreign interference in elections—the first two we've been working on for quite a long time as an industry and with government, and I think we have a proven track record of working well together, as an industry and with government, to make sure we're taking appropriate steps to address those abuses. We have work to do, but we have made progress.

This threat of foreign interference in the elections is something where we do need to up our game, I think, as a company and as an industry and working with government. But the success we've made or the successes we've had on those first two forms of abuse gives me some reason for optimism going forward, with respect to our ability to address the foreign interference threat.

Senator CORNYN. For each of you, have the terms of service of your company changed at all since the 2015, 2016 actions of Russia? Your terms of service?

Mr. WALKER. Yes. We have changed our policies with regard to ads that are appropriate, as well as content that's available on YouTube.

Senator CORNYN. Focused on active measures or on other matters?

Mr. WALKER. Our terms have to do with terms around advertising and terms about what acceptable content is. We are simultaneously using additional tools behind the scenes to identify material.

Mr. EDGETT. It's very similar at Twitter.

Mr. STRETCH. The same is true for Facebook.

Senator CORNYN. Why should your companies be treated any different than the press from a legal accountability standpoint?

Mr. EDGETT. We believe, as a user-generated content platform, that the rules around Section 230 provide a platform to our users around free speech and expression, and don't require us to take a bias on removing content that we fear will violate certain rights. And so we work actively to prohibit things like violence and terrorism and abuse and harassment. And you'll see how we were tackling this problem with urgency and seriousness.

But we believe that, as a user-generated content platform, we want to allow the free expression and debate without the interference of some of the things you're talking about.

Senator CORNYN. So you believe you should be treated from a legal standpoint differently than a newspaper, cable TV show, or a radio show?

Mr. EDGETT. Yes. We're not producing the content; we're allowing users to upload. We have a lot of great journalists and news organizations who are putting content on our platform to share, linking back to their sites. We're offering the service to allow that interchange, that information sharing.

Senator CORNYN. That may well be a distinction that is lost on most of us, that you're just a platform for other people to express their views, as opposed to being a publisher in your own right of those, of those views.

Finally, let me just ask each of you, please, to continue to work with us on the Stop Enabling Sex Traffickers Act of 2017. As you know, this deals with the Communications Decency Act, which has been used as a legal bar to those who have been victims of sexual abuse, when they seek to bring the people who facilitated that sex trafficking to justice. And I think there is a way that, working together, we can come up with something that protects the victims, but also maintains the freedom of the internet. And I would just encourage each of you to continue working with us on that, so we can reach an acceptable outcome.

Thank you, Mr. Chairman.

Chairman BURR. Senator Reed.

Senator REED. Thank you, Mr. Chairman.

For all the panelists, but starting with Mr. Stretch: When you discover a deceptive foreign government presentation on your platform, my presumption is from what you've said today you'll stop it and take it down. Do you feel an obligation in turn to notify those people who have accessed that? And can you do that? And shouldn't you do that?

Mr. STRETCH. Senator, we feel an obligation, as you say, first to stop the activity; second, to investigate it further, to fan out, essentially, from the account to make sure we're taking an expansive view of the investigation to try to capture any related activity; third, to share threat information with the industry and with the government so we can all do a better job; and then, fourth, to bring the issue to the attention of, in this case, this Committee.

And the content itself, we've said we're supportive of this Committee making it publicly available. The question of reaching out to individuals who may have seen it is a much more difficult and complex one. But we believe our commitment to transparency on this issue generally should address that.

Senator REED. Well, potentially you could do that, I presume, or you could invest the resources to do it. And as a result, frankly, reporting to us about the nefarious activities of Russia is not going to immediately translate to the thousands or apparently 126 million people who saw the message and thought it was legit.

You have the, I presume, the technical skill to do that. Again, apropos Senator Cornyn, you know, you'll see in the newspaper, "We correct the statement we made the other day; it was wrong," or "It was deliberately wrong." And I think you, given the First Amendment, you can live with that, I hope.

Mr. STRETCH. I'm sorry, Senator. Could you repeat the question?

Senator REED. Well, the question goes back to having an obligation under the First Amendment to notify people who you know have been deliberately misled by a foreign government—not just us, not just law enforcement.

Mr. STRETCH. The technical challenges associated with that undertaking are substantial, particularly because much of the data work underneath our estimate of the number of people who may have been exposed to this relies on data analysis and modeling.

That said, we do believe transparency in this area is important, and we are supportive of making as much of this information available to the public as the Committee deems warranted.

Senator REED. Mr. Edgett. I deem it warranted, for whatever that's worth.

Mr. Edgett.

Mr. EDGETT. It's an interesting proposition. We have a team dedicated to information quality and how we present information on the platform. We see, as an open platform, active dialogue around a lot of this false information, fake information right away. So when you're seeing the tweets, you're also seeing a number of replies to it, showing people where to go, where other information is that's accurate. But we will definitely take that idea back to explore how we could implement a process like that.

Senator REED. Mr. Walker, your platform?

Mr. WALKER. We're somewhat differently positioned in that, because were not primarily a social network, many of our users are not logged in at the time they access content. So it's difficult for us to know exactly who has seen what. But we too will take it under consideration.

Senator REED. Thank you.

With respect to bots, what I've gleaned from the testimony is that you can technically identify a bot system operating on your

platform; and then, am I right to assume that you will shut them down? Any bot system, you will shut down? Particularly a government-related bot system?

Mr. WALKER. When we refer to bots, it's primarily a Twitter issue. I'm not familiar with bots on Google per se.

Senator REED. Well, let's go to Twitter. I'm not the technical expert, but YouTube is your subsidiary, I presume.

Mr. WALKER. That's correct, yes.

Senator REED. And a lot of the hits on YouTube I presume were generated by electronic devices, not people, so that the RT program that was attacking Secretary of State Clinton had a 2 percent over-the-air audience, but a huge number of hits on YouTube. And as a result, you know, you are being unwittingly or wittingly used by bot systems all of the time.

Mr. WALKER. A bot, an automation, an automated view of content, really isn't sort of the core issue. What people tend to do on YouTube is try to drive up their perceived view counts to make themselves appear to be more popular than they are.

Senator REED. And they do it by using electronic networks.

Mr. WALKER. That's certainly right. And so we—yes, across—and this is a problem not limited to this context. Many people would like to make themselves appear more popular than they are. So we have a lot of sophisticated tools that are precisely designed to combat that kind of phenomenon, yes.

Senator REED. And you will, if you find it, reduce the number of hits so it's no longer trending?

Mr. WALKER. Either that or remove people from our services for abuses of our terms of service, yes.

Senator REED. So you do have to deal with these bot networks, and you're dealing with it.

Mr. WALKER. In that sense, that's correct, yes.

Senator REED. Okay.

Bots?

Mr. EDGETT. Similarly, we remove as many bad automated accounts as we can find. As I said earlier, some of these bad actors are trying to get more sophisticated, and so we're staying ahead of that by learning from the automated accounts that we're seeing. But we will remove them, and have technology to make sure that automated accounts aren't gaming trends, so that—the trending hashtags that people are seeing on the platform. We will remove their content from search and from the timelines, and we will remove them permanently from the system, you know, once we are able to investigate.

Senator REED. Mr. Stretch, please.

Mr. STRETCH. Senator, we—apologies.

We prohibit automated account creation, and in doing so we're always looking for evidence of accounts being created en masse and engaging in either of the behaviors that Mr. Walker and Mr. Edgett identified.

Senator REED. Thank you.

Just a quick question, because my time is going. This is a daunting effort. We're being attacked, and you have to go on the offense, the counter-offense, because the way we've structured this

system, we have very limited government role in your regulation, your activities, et cetera.

And it comes down ultimately to resources. So I would like to follow up officially. But what percent of your revenue are you devoting to these activities? I mean proactive activities, not, you know, just if someone complains enough we'll take it down, but finding bots, thinking about notifying recipients of clearly bad information. So what percent do you think, Mr. Stretch, right now?

Mr. STRETCH. Senator, I cannot give you a percentage. I can tell you that the company is committed to getting this right. Our most expensive resources are—resources are people and, as I stated earlier, we are doubling the amount of people who will be focused on these efforts in the coming year.

Senator REED. Can you get us a number, please, in writing?

Mr. STRETCH. Yes.

Senator REED. Thank you.

Mr. Edgett, please.

Mr. EDGETT. We also dedicate a lot of resources to this, and I'll follow up with your staff.

Senator REED. Mr. Walker, similarly?

Mr. WALKER. Similarly.

Senator REED. Thank you.

Thank you.

Chairman BURR. The Chair recognizes the Vice Chair.

Vice Chairman WARNER. Thank you, Mr. Chairman. I'll be very brief. I know our time is limited.

One, I want to acknowledge Senator Reed I think raised a very good question. And if you were in a medical facility and you got exposed to a disease, the medical facility would have to tell the folks who were exposed. The comment as well about TV and radio making corrections. I do think it's an interesting question about what obligation you might have.

I just have to tell you, I think there has been some progress made and I appreciate some of your efforts. I still find it very disturbing that it appears that, at least from Twitter and Facebook, the sense is that all the Russian active measures only originated with one single troll farm in St. Petersburg, and it still appears that most of the work that you have provided us is derivative of your initial reports.

I was hoping very much that you would come in today and either say that was absolutely all of it or we've identified other troll farms or other entities. And I think we've got a lot more work to do.

Thank you so much, Mr. Chairman, for this hearing.

Chairman BURR. Thank you. Thank you, Senator Warner.

We've come to the close of this and let me just make a couple of statements, if I can. If, for some reason, you need antitrust waivers to collaborate with each other, please let us know. More importantly, seek for the waiver yourself. This is going to take an overall effort to minimize—I'm not going to use the term "eliminate"—to minimize the damage and, more importantly, the impact of what Russia is doing, did do, and what others will do next year.

I firmly believe that all three of your companies have a new perspective on security and that you've got your varying degrees of changes that are good. The challenge is if it fails the impact of that

failure is significantly different than it was in the 2016 elections. I need you to know that up front.

You all acknowledge that FEC law applies to you, but it hasn't been lost on me that all of you asked for an exemption from the applicable FEC law. So I sort of am reminded that a portion of the content posted on Facebook by foreign actors appeared to support one candidate or another. Clearly, it falls within the lines of what the FEC law was there for. And, as you know, Federal campaign law requires disclosures of sources for ads. I have to put that little thing, "Paid for by."

Mr. Edgett, you said your guys are adopting something similar. I applaud you on that. And I'm sure, if I asked why you didn't apply it, you might have told me before that the FEC law didn't apply to you because they had a hung jury at the FEC. They didn't decide it did, and they didn't decide it didn't. Or maybe it's the excuse that it was small, impractical items, therefore they had an exception to the disclosure.

Let me make it perfectly clear: There is no exception to the disclosure as it relates to foreign money used to influence U.S. elections. That is a national security issue. It is a direct attempt to infiltrate the democracy that we have here. And if it's not stated in the law, it should be your company's responsibility to take it on head-on.

So in the future I hope that, if there's a takeaway from this, it's that everybody's going to adhere to FEC law. If you're a media outlet and you've known that it applied to you; if for some reason you ever questioned whether it was foreign money, then you probably didn't run the ad. I hope that none of your platform is conditional upon you not verifying where that money's coming from.

So the one thing that I didn't hear today, and I hope you will take it back, is the effort to certify who's paying for these things. I, like others, do not want the government to stipulate to any of you what content, especially political content, should look like. By the same token, you're the front line before anything else has to kick in to certify that foreign money is not finding its way into influencing U.S. elections.

I wish I could leave today and believe the only thing we have to worry about are elections. The truth is we've spent a tremendous amount of time as two old guys trying to figure out what bots were and things that I don't use. But I have to understand them in a way that as a policymaker makes decisions that are best for the future of my kids and my grandchildren, to make sure they've got access to your platforms, to make sure that they can experience things I never dreamed about experiencing and am too old to understand.

But I recognize the fact that I can't be influenced just because I don't understand it, because I've got to match my capital with the intellect of all of you at the table and the people that work at all your companies. That is our future.

Don't let nation-states disrupt our future. And you're the front line of defense for it. Please take that back to your companies.

This hearing is adjourned.

[Whereupon, at 12:30 p.m., the hearing was adjourned.]

Supplemental Material

January 8, 2018

VIA EMAIL

Chairman Richard Burr
U.S. Senate Select Committee on Intelligence
211 Hart Senate Office Building
Washington, D.C. 20510

Dear Chairman Burr, Vice Chairman Warner, and Members of the Committee:

Thank you for your questions for the record from the November 1, 2017 Committee Hearing on Social Media Influence in the 2016 U.S. Elections. Per your request, attached are the answers for the record to your questions, as well as our hearing testimony.

Please let us know if you have any further questions.

Regards,

Colin Stretch
General Counsel, Facebook

facebook

Address: 1601 Willow Road
Menlo Park, CA 94025

Chairman Burr

1. **What procedures must the Russian government follow to compel the production of customer-created content or personally identifiable information from your company?**

As part of official investigations, government officials sometimes request data about people who use Facebook. We have strict processes in place to handle these government requests, and we disclose account records solely in accordance with our terms of service and applicable law. We require officials to provide a detailed description of the legal and factual basis for their request, and we push back if the request appears to be legally deficient or is overly broad, vague, or otherwise inconsistent with our policies. Further, with respect to government requests for disclosure from outside the United States, a Mutual Legal Assistance Treaty request or letter rogatory may be required to compel the disclosure of the contents of an account. Facebook has never produced customer-created content or personally identifiable information in response to a request from the Russian government.

2. **Has the Russian government compelled the production of customer created content or personally identifiable information from your company?**

As part of our ongoing effort to share information about the requests we have received from governments around the world, Facebook regularly produces a Transparency Report about government requests to Facebook. Our Transparency Report contains historical information about Russian requests for data going back to 2013. In summary, we received 28 requests from the Russian government between 2013 and 2017. We did not provide any data in response to these requests.
See https://transparency.facebook.com/country/Russia/2017-H1/.

3. **If so, has your company complied with such efforts by the Russian government to compel the production of customer-created content or personally identifiable information?**

See response to question 2.

4. **Has your company ever refused to comply with efforts by the Russian government to compel the production of customer-created content or personally identifiable information? If so, have any of these efforts been successful?**

See response to question 2.

5. **Has your company provided any content created by a U.S. person or personally identifiable information about a U.S. person to the Russian government?**

See response to question 2.

6. More specifically, has your company provided to the Russian government the content of any direct messages sent to or from a U.S. person?

See response to question 2.

7. Has your company provided to the Russian government any information that could be used to determine the location of a U.S. person?

See response to question 2.

Vice Chairman Warner

1. **Facebook took some action to curb activity on tens of thousands of nefarious accounts in the lead-up to this year's French election.**

    a. **What were the lessons learned by Facebook and the French election authorities in the aftermath of that election, where Russian propaganda did not appear to be particularly effective?**

While we cannot speak to lessons learned by French election authorities, we are encouraged that improvements to our fake account detection systems allowed us to disable more than 30,000 additional accounts in connection with the French election—though these accounts were most commonly used for financially-motivated spam, not organized propaganda campaigns from a particular country. In addition, after reports of foreign interference in the run-up to the French—and U.S.—elections, we worked closely with German officials on a number of initiatives to fight disinformation and make Facebook a safer and more secure environment for genuine civic engagement. As with all security threats, we have been continuously incorporating new insights into our models for detecting fake accounts, including information specific to fake accounts focused on social, political, or election issues. We believe that we were more effective at taking down fake accounts connected to the French and German elections as a result.

2. **Does Facebook intend to notify unwitting American users who shared, liked, or commented on content published by Russian-backed users? For example, informing users that they followed or interacted with a Facebook community that was actually a Russian front. Why or why not?**

We recently launched a portal to enable people on Facebook to learn which of the IRA Facebook Pages or Instagram accounts they may have liked or followed between January 2015 and August 2017. This tool is available in the Facebook Help Center at https://www.facebook.com/actionplan.

In the coming weeks, we will take significant steps to make users aware of this new tool, including a notification in their News Feed. We will be promoting this tool alongside our efforts to educate people about changes that we are making to strengthen our platform's resistance to inauthentic and malicious behavior, including increasing ads transparency, implementing a more robust ads review process, imposing tighter content restrictions, and exploring how to add additional authenticity safeguards. These efforts complement ongoing work to help promote news literacy by giving people information so they can make smart choices about the news they read. This work includes partnerships with organizations like the News Literacy Project, support for the News Integrity Initiative, and collaboration with academics and researchers around the world.

We have also worked to notify people about this issue, broadly, through our white paper in April 2017, *Information Operations on Facebook*, and our disclosures this past fall.

3. **What are your policies regarding the hosting and distribution of hacked and stolen emails from your platform?**

We prohibit any content that is claimed or confirmed to have come from a hacked source. In rare situations and on a case-by-case basis, we may choose to allow content that is newsworthy, significant, or important to the public interest even if it otherwise violates our policies.

4. Reports suggest that in 2014 and 2015, Facebook was alerted by Ukranian activists and politicians—and reportedly even Ukraine's President—about an active campaign by Russian trolls to push disinformation on Facebook.

a. What actions did you take in response to address the threat at the time?

Those reports are incorrect to the extent that they imply that we were warned of information operations similar to those that we have described to this Committee in connection with the 2016 election.

In Russia and Ukraine, like in many countries, we've seen people use slang to refer to people of other countries. For example, some people in Ukraine refer to Russians as "moskal" (literally "Muscovites") and some in Russia call Ukrainians "khokhol" (literally "topknot"). After conflict started in the region in 2014, people in both countries started to report posts containing these words as hate speech. We conducted a review and concluded that these words were indeed being used in some cases as hate speech that violates our Community Standards. We removed reported content, a decision that was initially unpopular on both sides. Anyone can report content to us if they think it violates our policies, and one report is enough for us to remove something. Multiple reports will not lead to the removal of content if it meets our standards.

Senator Collins

1. **Several independent researchers have said that Facebook has the ability to search for content or metadata that could substantiate or disprove allegations of possible collusion between the Russian disinformation operation and the Trump campaign's own social media efforts, such as timing of certain posts and sharing of content.**

    a. **Is this true, and if so, has Facebook found any information relevant to these allegations?**

Facebook does not believe it is in a position to substantiate or disprove allegations of possible collusion. Facebook is, however, providing investigators, including this Committee, with information it has regarding the scope and nature of Russian information operations on our platform so that those investigators have information that may be relevant to their inquiries. We are happy to schedule a meeting with your staff to discuss our findings in more detail.

2. **Facebook has an automated engine for recommending content to users.**

    a. **Did this recommendation engine suggest to any Facebook user that they view, follow, or join any of the Russian-linked pages?**

This happened in some cases. Because we were not aware that these Pages were not legitimate, they were sometimes recommended when people followed similar Pages, for example. However, these recommendations were not the primary way that the Pages attracted their audience.

3. **What provision in your Terms of Service ensures that political advertisements targeted towards the United States are purchased by an American citizen?**

Facebook's Statement of Rights and Responsibilities (the terms that govern all use of our services) prohibit using Facebook to do anything that is unlawful, misleading, or malicious. In addition, advertisers must comply with Facebook's Advertising Policies, including acknowledging that they are responsible for understanding and complying with all applicable laws and regulations. Therefore, violating the Federal Election Campaign Act also violates our terms.

We also support efforts to promote greater transparency in political advertising online and recently announced steps to make advertising on Facebook more transparent, increase requirements for authenticity, and strengthen our enforcement against ads that violate our policies. *See* https://newsroom.fb.com/news/2017/10/update-on-our-advertising-transparency-and-authenticity-efforts/.

4. **Do your Terms of Service prohibit users from influencing elections in other countries?**

Facebook requires advertisers and users to comply with all applicable laws and regulations, including laws related to electoral activity. We also require advertisers and users to comply with our policies, which require that people use their authentic name and identity. Our advertising policy also prohibits misleading or false content, stating: "Ads, landing pages, and business practices must not contain deceptive, false, or misleading content, including deceptive claims, offers, or methods."

5. **If a foreign national working on behalf of a foreign intelligence service was an authentic user in real name on your platform, could he post divisive, but non-violent content related to a U.S. election without violating your Terms of Service? Would he be able to purchase political advertising?**

If the person was engaged in coordinated inauthentic behavior on behalf of a foreign intelligence service, that would violate our terms even if he or she was using his or her real name. In addition, our terms prohibit ads that are illegal, so if the advertising was prohibited by the Federal Election Campaign Act or any other law, that would also violate our terms.

Senator Feinstein

1. **Facebook has conceded that the number of people exposed to content from foreign groups online is far more pronounced through organic traffic and fake accounts than it is through paid advertising. Troublingly, it does not appear there is a proven method for combating the spread of fake accounts created to sow division in society. Although Facebook has indicated authenticity activity measures are in development, as recently as August 2017, divisive foreign unpaid content designed to polarize and anger the American people could be found on Facebook.**

    a. **What specific actions is Facebook taking to combat this type of divisive, unpaid activity on an on-going basis?**

We are constantly improving our technical systems to identify and remove inauthentic accounts and reduce the distribution of material that can be spread by accounts that violate our policies, and we do have a track record of success and improvement in this area. Each day, we block millions of fake accounts at registration, as our systems examine thousands of account attributes and focus on detecting behaviors that are difficult for bad actors to mask or fake, including their connections to others on our platform. For example, we are encouraged that recent improvements to our fake account detection systems focused on social and political content allowed us to disable more than 30,000 additional accounts in connection with the French election. However, these accounts were most commonly used for financially-motivated spam, not organized propaganda campaigns from a particular country.

Facebook also removes hate speech, which includes content that directly attacks people based on their protected characteristics. We don't allow any organizations or individuals that are engaged in terrorist activity, organized violence or criminal activity, or organized hate groups to have a presence on Facebook. We also remove content that expresses support for groups that are involved in violent or criminal behavior. And, we remove credible threats of physical harm to individuals and specific threats of theft, vandalism, or other financial harm.

We have deployed a variety of tools in this fight to find and remove bad content, including artificial intelligence, specialized human review, and industry cooperation, as well as supporting important corrective measures such as counter-speech training. We are more than doubling the number of people who work on safety and security at Facebook.

2. **One of the more troubling findings from this investigation is the number of targeted voter disengagement efforts promoted through social media.**

    a. **Can you say with certainty that foreign actors did not use the U.S. voter registration data to target individuals through both paid and unpaid activity?**

Facebook is not in a position to know everything that foreign actors did in their online activities, but to date we have uncovered no evidence that the IRA used U.S. voter

registration data for ad targeting on Facebook. The targeting for the IRA ads that we have identified and provided to the Committee was relatively rudimentary, targeting broad locations and interests, and did not use a tool known as Contact List Custom Audiences. That tool (which can be used for ad targeting, but not organic, unpaid content) is the one that a candidate's campaign might use (in connection with their own vendors) to develop customized targeting based on voter profile information. More information about Facebook's targeting options in general is publicly available on our website at https://www.facebook.com/business/products/ads/adtargeting.

3. Between June 2015 and August, an estimated 126 million Americans were exposed to Facebook content generated by Russian troll farms.

a. Are you keeping a database of accounts exposed?

We recently launched a portal to enable people on Facebook to learn which of the IRA Facebook Pages or Instagram accounts they may have liked or followed between January 2015 and August 2017. This tool is available in the Facebook Help Center at https://www.facebook.com/actionplan.

In the coming weeks, we will take significant steps to make users aware of this new tool. We will be promoting this tool alongside our efforts to educate people about changes that we are making to strengthen our platform's resistance to inauthentic and malicious behavior, including increasing ads transparency, implementing a more robust ads review process, imposing tighter content restrictions, and exploring how to add additional authenticity safeguards.

4. Facebook confirmed in the House Intelligence committee hearing that they found no overlap in the groups targeted by the Trump campaign's advertisements, and the advertisements tied to the Russia-linked accounts identified thus far.

a. Does this targeting assessment extend to the content used by the Trump campaign and the Russia-related accounts?

b. Does this assessment extend to both the content used and groups targeted by the companies associated with the campaign—like Cambridge Analytica—and Russian accounts?

We have seen only what appears to be insignificant overlap between the targeting and content used by the IRA and that used by the Trump campaign (including its third-party vendors). We are happy to schedule a meeting with your staff to discuss our findings in more detail.

Senator Cotton

1. **Do Facebook's Terms of Service prohibit collaboration with Russian intelligence services intended to influence a U.S. election?**

Such conduct would violate our policies requiring users not to use Facebook to do anything unlawful, misleading, or malicious, and prohibiting the use of inauthentic accounts. We have processes designed to identify inauthentic and suspicious activity, and we also maintain a sanctions compliance program to screen advertisers.

That said, the challenge of attributing online activities to specific governments or organizations is widely recognized in the intelligence and law enforcement communities. It is extremely difficult to definitively attribute online activity to particular threat actors, and we often rely on information from others, like information included in the January 6, 2017 DNI report, to identify actors behind abuse that we observe and to better understand these issues.

2. **Provided an individual or entity does not violate Facebook's Terms of Service, will they be allowed to use your platform to work with hostile, foreign intelligence services to potentially influence the 2018 and 2020 U.S. elections?**

We do not believe an individual or entity could engage in this kind of activity without violating our policies—including our policy prohibiting coordinated inauthentic activity – or the law, and we are working to improve detection and enforcement in this area. We are also making significant investments across all of our safety and security teams, which means that we will have more people dedicated to finding this type of abuse among many others.

We support efforts to promote greater transparency in political advertising online and recently announced steps to make advertising on Facebook more transparent, increase requirements for authenticity, and strengthen our enforcement against ads that violate our policies. *See* https://newsroom.fb.com/news/2017/10/update-on-our-advertising-transparency-and-authenticity-efforts/. We'll require more thorough documentation from advertisers who want to run election-related ads. We are starting with federal elections in the U.S., and will progress from there to additional contests and elections in other countries and jurisdictions. As part of the documentation process, advertisers may be required to identify that they are running election-related advertising and verify both their entity and location. Once verified, these advertisers will have to include a disclosure in their election-related ads, which reads: "Paid for by." When users click on the disclosure, they will be able to see details about the advertiser, and we will maintain a searchable archive of information. Like other ads on Facebook, they will also be able to see an explanation of why they saw that particular ad. For political advertisers that do not proactively disclose themselves, we are building machine learning tools that will help us find them and require them to verify their identity.

3. What is Facebook's justification for allowing entities and individuals such as WikiLeaks, Julian Assange, and Edward Snowden to maintain Facebook pages?

Facebook is a place where people are empowered to communicate, and we make our services available to everyone who complies with our policies. We take seriously our role in keeping abuse off our services. These individuals and organizations can maintain a presence on Facebook as long as they comply with our policies. We take action on activity that violates these policies, including blocking the accounts of repeat offenders. In addition, when governments believe that something on Facebook violates their laws, they may ask us to restrict access to that content. We scrutinize these requests, and if we determine the specified content does indeed violate local laws, we may make it unavailable in the relevant country or territory.

Senator Heinrich

1. What percent of Facebook content reviews are conducted by an actual human being rather than via automated review?

We don't have an either-or approach to reviewing content. All content goes through some degree of automated review, and we use human reviewers to check some content that has been flagged by that automated review or reported by people that use Facebook. We also use human reviewers to perform reviews of content that was not flagged or reported to check the accuracy and efficiency of our automated review systems. The percentage of content that is reviewed by a human varies widely depending on the type and context of the content, and we don't target a specific percentage across all content on Facebook.

2. Are Facebook's content review processes the same now as they were during the 2016 election? If not, how have they changed?

Our content review processes are fundamentally the same, but we are more than doubling the number of people who work on safety and security at Facebook and have already hired thousands more content reviewers. They will be engaged in processes that we are continuously refining, but this significant investment of resources will help us to perform those processes more accurately, quickly, and thoroughly. One improvement that we believe will help to address more subtle kinds of abuse is that our ad review team will do more to assess not just the content, but also the overall context of an ad, including the buyer and intended audience. We will also significantly expand the number of people who work specifically on election integrity before the 2018 U.S. federal elections this fall, including people who investigate this specific kind of abuse by foreign actors. Additionally, we have begun testing a program where people will be able to click "View Ads" on a Page and view advertisements a Page is running on Facebook, Instagram and Messenger—whether or not the person viewing it is in the intended target audience for the ad. All Pages will be part of this effort, and we will require that all ads be associated with a Page as part of the ad creation process. Finally, we continue to make improvements to our efforts to more effectively detect and deactivate fake accounts to help reduce the spread of spam, false news, and misinformation. We continually update our technical systems to identify, checkpoint, and remove inauthentic accounts, and we block millions of attempts to register fake accounts every day. These systems examine thousands of detailed account attributes and prioritize signals that are more difficult for bad actors to disguise, such as their connections to others on our platform. As with all security threats, we have been incorporating new insights into our models for detecting fake accounts, including information specific to election issues.

We are determined to do everything that we can to protect our platform. The investments that we are making to address these issues and other security issues will be so significant that we have informed investors that we expect that the amount that we will spend will impact our profitability.

3. How does accountability work when an algorithm makes bad recommendations? For example, as recently as mid-September, anybody

could target ads towards anti-Semites using terms provided by Facebook such as "Jew Hater" and "History of 'why Jews ruin the world.'" Was anybody held accountable for this?

In September 2017, we temporarily disabled some of our ad tools following news reports that slurs or other offensive language could be used as targeting criteria for advertising. In order to allow businesses—especially small ones—to find customers who might be interested in their specific products or services, we offered them the ability to target profile field categories like education and employer. So, if someone on Facebook self-identified as a "Jew-hater" or said that they studied "how to burn Jews" in their education or employer fields on their profile, those terms showed up as potential targeting options for advertisers. These deeply offensive terms were used so infrequently in these write-in fields that we did not discover this until a journalist brought it to our attention.

We have long prohibited hate on Facebook, and although we are not aware of instances in which these terms were ever used to actually target ads, we take our failure to enforce that policy with adequate caution and care in this instance extremely seriously. We never intended or anticipated that this functionality would be used this way, and we did not find it ourselves. We are accountable for these failures. We have tried to learn everything that we can from this painful incident so that we can do better in the future. We have tightened our ad policies and have taken steps to improve our enforcement, including by adding more oversight of our automated review processes, and have been exploring how best to implement tools for people to tell us when our systems may inadvertently enable abuse. We have also used human reviewers to manually check existing targeting options and reinstate the roughly 5,000 most commonly used targeting terms—terms like "nurse" or "dentistry"—to ensure that they meet our Community Standards. We will do more manual review of new targeting options going forward to help prevent offensive terms from appearing.

Targeted advertising on Facebook has helped millions of businesses grow, find customers, and hire people. Our systems match organizations with potential customers who may be interested in their products or services. The systems have been particularly powerful for small businesses, who can use tools that previously were only available to advertisers with large budgets or sophisticated marketing teams. Our ads help make meaningful connections between business and people, and the improvements we are making to our ad policies will help us do this more effectively.

4. **In hiring more content reviewers, are your companies simply throwing bodies at a specific problem, or are you fundamentally rethinking how to prioritize which user interactions require additional human oversight and review. If so, how? What other changes have you made in this regard?**

We work continuously to make our platform safer and more secure, and our effort to do so is a holistic one that involves not only hiring additional employees when issues arise, but also a continual evaluation of our processes and policies. We rely on both automated and manual ad review, and we're now investing in and taking steps to strengthen both. Reviewing ads means assessing not just what's in an ad but also the context in which it

was bought and the intended audience—so we're changing our ads review system to pay more attention to these signals. We're also adding more than 1,000 people to our teams dedicated to reviewing ads around the globe, and their work will be used to train our automated review systems to be more efficient and effective at finding improper ads and enforcing our policies. Enforcement is never perfect, but we will get better at finding and removing improper ads.

Senator Manchin

1. **Does Facebook or any Facebook affiliate use information security products or services of Kaspersky Lab or any Kaspersky Lab affiliate?**

We work with anti-malware companies to make available free malware cleanup software to Facebook users when Facebook detects that the user is accessing Facebook from a device that may be infected with malware. In October 2017, we removed Kaspersky's anti-virus software from the list of products that we make available to these users.

We are also in the process of phasing out internal use of a different Kaspersky anti-virus product. That product does not transmit data back to Kaspersky, and is not subject to the security and privacy concerns that have been identified in recent months. We continue to use a Kaspersky service that provides us with information about threat activity as a one-way feed.

2. **How many Facebook subscribers took advantage of your offer to provide Kaspersky Lab malware detection products to clean up their computer systems?**

We no longer make available Kaspersky's anti-virus software to people with infected devices. Unfortunately, we are unable to easily reconstruct how many Facebook users downloaded Kaspersky software.

3. **Does Facebook or any Facebook affiliate sell network space to RT or Sputnik news agencies?**

RT and Sputnik can maintain Pages on Facebook and use our advertising tools as long as they comply with Facebook's policies, including complying with applicable law.

4. **If you recently terminated any agreements with RT or Sputnik, on what date did the termination become effective?**

Not applicable.

5. **Do either RT or Sputnik need to purchase advertising space on your platform, or can they freely maintain a Page or distribute web content via their own or affiliated Facebook accounts?**

RT and Sputnik can maintain Pages on Facebook for free, as long as they comply with Facebook's policies, including complying with applicable laws.

6. **Does Facebook prohibit, or have any concern about, foreign state-sponsored news organizations positing content via the Facebook platform?**

Many media organizations, including state-sponsored media organizations, have a presence on Facebook and use our advertising services to promote their content. Like everyone on Facebook, these organizations are required to comply with Facebook's

policies, including complying with applicable laws. They must also comply with our policy requiring them to use their authentic names and identities. And, no entities that advertise on Facebook, including media organizations, can use deceptive, false, or misleading content in their ads. If we become aware that our policies are being violated, we will take action.

Senator Harris

1. **Facebook has produced information about Russian propaganda advertisements. Your company has also produced information about Russian propaganda that appeared as ordinary user content. You have not, however, provided information about the legitimate advertisements that accompanied Russian content.**

   a. **How long do you retain placement and billing records for advertisements on your services?**

Facebook generally retains core billing and advertisement records for as long as it is commercially reasonable and necessary for our business.

   b. **Have you instructed relevant business units to retain these records of advertisements that accompanies Russian propaganda? If you have not, will you immediately issue that instruction?**

Facebook has taken appropriate steps to retain relevant information related to IRA activity on Facebook.

   c. **How much revenue do you estimate that you earned from the advertising that accompanied Russian propaganda?**

Ads generally did not run on IRA Pages, and we expect that any revenue from such ads would be immaterial. Ads that appear in News Feed are not connected to or endorsed by other pieces of content in an individual's News Feed.

   d. **Have you notified the advertisers whose advertisements accompanied Russian propaganda?**

Facebook has notified all its users and vendors via publicly accessible postings about general activity associated with the IRA. Ads generally did not run on IRA Pages, and ads that appear in News Feed are not connected to or endorsed by other pieces of content in an individual's News Feed.

   e. **What do you plan to do with the revenue that you earned from the advertisements that accompanied Russian propaganda?**

Ads generally did not run on IRA Pages, and we expect that any revenue from such ads would be immaterial. Ads that appear in News Feed are not connected to or endorsed by other pieces of content in an individual's News Feed. We have contributed hundreds of thousands of dollars to the Defending Digital Democracy Project, which is a bipartisan project launched by the Harvard Kennedy School that works to secure democracies around the world from external influence. In addition, the investments that we are making to address election integrity and other security issues will be so significant that we have informed investors that we expect that the amount that we will spend will impact our profitability.

2. The problems of inauthentic, false, and hyper-partisan content are much broader than Russian propaganda.

a. How many of the accounts on your service do you estimate are inauthentic?

We regularly evaluate metrics to estimate the number of "false" accounts among our monthly active users. We divide "false" accounts into two categories. The first category includes user-misclassified accounts, where users have created personal profiles for a business, organization, or non-human entity such as a pet. Such entities are permitted on Facebook using a Page rather than a personal profile under our terms of service. The second category includes undesirable accounts, which represent user profiles that we determine are intended to be used for purposes that violate our terms of service, such as spamming. We estimate that in the third quarter of 2017, user-misclassified and undesirable accounts may have represented approximately two to three percent of our worldwide monthly active users. Our estimation of false accounts can vary as a result of episodic spikes in the creation of such accounts. Additional information relating to our estimate of false accounts is included in our quarterly filings with the Securities and Exchange Commission.

b. How much of the activity on your service do you estimate is inauthentic or false?

See response to question 2(a).

c. How much of your annual revenue do you estimate is attributable to inauthentic or false content?

We believe that annual revenue that is attributable to inauthentic or false accounts is immaterial.

d. Do you have a policy of notifying advertisers when their advertisements accompany inauthentic or false content?

Ads do not run on Pages, so there is no advertising that "accompanies" Pages on Facebook. Ads that appear in News Feed are not connected to or endorsed by other pieces of content in an individual's News Feed.

e. What do you do with the revenue that you earn from advertisements that accompany inauthentic or false content?

See response to question 2(d).

f. If you are aware of independent estimates of inauthentic or false content on your platform, please provide those estimates. If you disagree with the estimates, please explain why.

We estimate that in the third quarter of 2017, user-misclassified and undesirable accounts may have represented approximately two to three percent of our worldwide monthly active users. The estimates of these accounts are based on an internal review of a sample of accounts, and we apply significant judgment in making this determination. Our estimates may change as our methodologies evolve, including through the application of new data signals or technologies, which may allow us to identify previously undetected duplicate or false accounts and may improve our ability to evaluate a broader population of our users.

g. If the independent estimates were accurate, how much of your annual revenue would be attributable to inauthentic or false content?

Not applicable.

h. How much of the news content that is shared on your services do you estimate is false?

We are taking steps to better understand the prevalence of content people find to be wrong or misleading based on the sources they trust. We must better understand if people trust that the information they see on Facebook is credible, and one of the areas we want to better understand is the broader category of information that people find wrong or misleading. Defining what is false news content is difficult and controversial. While it is difficult to estimate a formal percentage, we believe that only a very small amount of content on Facebook is false news.

i. How much of the news content that is shared on your services do you estimate is hyper-partisan?

Defining what is hyper-partisan is difficult and controversial, and we do not have an estimate.

j. Have you conducted any studies of how false content performs on your services? If yes, please describe those studies and provide copies.

As part of our efforts to reduce the spread of false news and misinformation, we routinely track and analyze how such content is disseminated on our platform based on various signals. We do not have formal written studies or reports.

k. Have you conducted any studies of how hyper-partisan content performs on your services? If yes, please describe those studies and provide copies.

We are aware of the concern that our platform may contribute to polarization, and we have been working to understand the role that we play in discourse and information diversity. Defining what is hyper-partisan is difficult and controversial, and we have not conducted any formal studies on how such content spreads on the platform.

3. In the area of state-sponsored hacking, each of your companies has a responsible senior executive and dedicated technical experts.

a. Who is the senior executive responsible for countering state-sponsored information operations? When did that executive assume that responsibility, and what is the scope of the responsibility?

Our Chief Security Officer manages a threat intelligence team that is acutely focused on state-sponsored information operations. He reports to Colin Stretch, Facebook's General Counsel, who is ultimately responsible for Facebook's overall response to this threat.

b. As of November 2016, how many of your technical employees had the primary day-to-day task of countering state-sponsored information operations?

In 2014, we stood up a threat intelligence team dedicated to reviewing and monitoring for, among other things, attacks from threat actors tied to nation states. That work was mostly directed at traditional cybersecurity, such as account compromise, surveillance, and the dissemination of stolen information, but we did have some people addressing state-sponsored information operations. We are expanding our threat intelligence team, and more broadly, we are working now to ensure that we will more than double the number of people working on safety and security at Facebook, from 10,000 to 20,000, by the end of 2018. Many of the people we are adding to these efforts will join our ad review team, and we also expect to add at least 3,000 people to Community Operations, which reviews content that our users and automated tools flag as inappropriate, dangerous, abusive, or otherwise violating our policies. These investments will help us to enforce our policies, including our authenticity policy, and help us to counter threats from malicious actors, including those who are state-sponsored. We will also significantly expand the number of people who work specifically on election integrity before the 2018 U.S. federal elections this fall, including people who investigate information operations by foreign actors.

c. As of today, how many of your technical employees have the primary day-to-day task of countering state-sponsored information operations?

Many people at Facebook have a role in countering state-sponsored information operations and other threats. We are working now to ensure that we will more than double the number of people working on safety and security at Facebook, from 10,000 to 20,000, by the end of 2018. Many of the people we are adding to these efforts will join our ad review team, to assess not just the content but the entire context of an election ad, including the buyer and the intended audience. We expect to add at least 3,000 people to Community Operations, which reviews content that our users and automated tools flag as inappropriate, dangerous, abusive, or otherwise violating our policies. These investments will help us to enforce our policies, to identify new kinds of abuse on our platform, and to respond quickly to reports from our community and from law enforcement. We will also significantly expand the number of people who work specifically on election integrity

before the 2018 U.S. federal elections this fall, including people who investigate information operations by foreign actors.

4. **Much of what we know about Russian propaganda is because of academic researchers and investigative journalists. These groups do not currently have access to the data that they need to inform the public and to build tools for detecting state-sponsored information operations. For example, these groups generally cannot assess the full set of public user activity associated with state-sponsored information operations. Providing access to this data need not come at the expense of user privacy, since these groups could be bound by non-disclosure agreements and use privacy-preserving algorithms to conduct their studies.**

    a. **Will you commit to, by the end of the year, providing five or more independent non-profit entities with access to the data they need to understand and counter state-sponsored information operations? If you will, please provide specifics and a timeline for how you plan to honor the commitment. If you will not, please explain why.**

Information operations can affect the entire information ecosystem, from individual consumers of information and political parties to governments, civil society organizations, and media companies. We recognize that an effective response requires a whole-of-society approach and collaboration on matters of security, education, governance, and media literacy. We are committed not only to addressing information and other threats that directly involve our platform, but also supporting the efforts of others to understand and counter these threats. That's why we are supporting the Defending Digital Democracy Project, which is a bipartisan project launched by the Harvard Kennedy School that works to secure democracies around the world from external influence. We are the founding sponsor of Defending Digital Democracy's first big project: building an information sharing and analysis organization with members in various critical areas of the democratic process. We would need to evaluate any request for data on a case-by-case basis that would include understanding the information security practices and capabilities of a third-party organization.

5. **Similarly, much of what we know we now know about inauthentic, false, or hyper-partisan content is because of independent groups.**

    a. **Will you commit to, by the end of the year, providing five or more independent non-profit entities with access to the data they need to understand the prevalence and performance of inauthentic, false, or hyper-partisan content on your services? If you will, please provide specifics and a timeline for how you plan to honor the commitment. If you will not, please explain why.**

At Facebook, we have been working on the issue of inauthentic and false content for a long time, and we believe that tech companies, media companies, newsrooms, and

educators all need to work together to address these societal problems. We are engaged with partners across these industries to help create a more informed community.

Though we are committed to doing everything we can to reduce the spread of false news, we also need to make sure we take steps to address the problem when people do encounter hoaxes. To that end, we are exploring ways to give people more context about stories so they can make more informed decisions about what to read, trust, and share; we are also exploring ways to give people access to more perspectives about the topics about which they're reading. We are committed to collaborating with news organizations to develop products together, providing tools and services for journalists, and helping people get better information so they can make smart choices about what they read. We have also joined a group of over 25 funders and participants—including tech industry leaders, academic institutions, non-profits and third-party organizations—to launch the News Integrity Initiative, a global consortium focused on helping people make informed judgments about the news they read and share online.

We are also committed to working with others to protect the political process more generally. That's why we are supporting the Defending Digital Democracy Project, which is a bipartisan project launched by the Harvard Kennedy School that works to secure democracies around the world from external influence. We are the founding sponsor of Defending Digital Democracy's first big project: building an information sharing and analysis organization with members in the various critical areas of the democratic process.

We would need to evaluate any request for data on a case-by-case basis that would include understanding the information security practices and capabilities of a third-party organization.

6. Addressing state-sponsored information operations will continue to require cooperation among private sector entities and with the government.

a. Have you established a formal mechanism for promptly sharing actionable information about the state-sponsored information operations with other online services, similar to the mechanisms that already exist for sharing information about state-sponsored cybersecurity threats? If not, will you commit to developing such a mechanism?

We agree that information-sharing among companies is critical to combating constantly evolving cyber threats, including state-sponsored information operations. We have been working with many others in the technology industry, including Google and Twitter, on this issue, building on our long history of working together on issues like child safety and counterterrorism. We are already sharing more but agree that there must be a formal, enduring effort in this area, and are working to establish an independent organization dedicated to these efforts.

b. The FBI is the federal agency responsible for countering foreign propaganda. Do you have a written policy of promptly sharing what you learn about state-sponsored information operations with the FBI? If not, will you commit to developing such a policy?

We have a long history of working successfully with the DOJ, the FBI, and other law enforcement to address a wide variety of threats to our platform, including threats emanating from Russia. When appropriate, we share our understanding of abusive behavior on our platform with these authorities, and when we learn of a situation involving an imminent threat of harm to a person, we immediately report the situation to first responders. Further, as part of official investigations, government officials sometimes request data about people who use Facebook. We have strict processes in place to handle these government requests, and we disclose account records solely in accordance with our terms of service and applicable law.

7. You currently have automated systems in place to detect spam and abuse.

a. Do you have an automated system in place to detect state-sponsored information operations? If yes, will you provide this to the Committee with a private briefing on the system's design and performance? If no, why not?

We are constantly refining our technical systems to detect and remove abuse on our platform. We have systems that identify and remove inauthentic accounts, and we prioritize signals that are difficult for sophisticated bad actors to disguise. We have also incorporated signals specifically related to accounts connected to social or political issues. And we use automated systems to help identify hate speech, terrorist and extremist content, and other forms of abusive activity on our platform.

These systems do not differentiate on the basis of whether the bad actor is or may be state-sponsored. The challenge of attributing online activities to specific governments or organizations is widely recognized in the intelligence and law enforcement communities. It is extremely challenging to definitively attribute online activity to particular threat actors, and we often rely on information from others, like information included in the January 6, 2017 DNI report, to identify actors behind abuse that we observe and to better understand these issues.

We do not share detailed descriptions of how our tools work in order to avoid providing a road map to bad actors who are trying to avoid detection.

8. You have promised to adopt additional transparency and verification requirements for political advertising.

a. Please detail the new requirements and your timeline for implementing those requirements

We support efforts to promote greater transparency in political advertising online and recently announced steps to make advertising on Facebook more transparent,

increase requirements for authenticity, and strengthen our enforcement against ads that violate our policies. *See* https://newsroom.fb.com/news/2017/10/update-on-our-advertising-transparency-and-authenticity-efforts/. We'll require more thorough documentation from advertisers who want to run election-related ads. We expect these reforms to be in effect by the 2018 U.S. federal elections this fall, and will progress from there to additional contests and elections in other countries and jurisdictions. As part of the documentation process, advertisers may be required to identify that they are running election-related advertising and verify both their entity and location. Once verified, these advertisers will have to include a disclosure in their election-related ads, which reads: "Paid for by." When users click on the disclosure, they will be able to see details about the advertiser, and we will maintain a searchable archive of information. Like other ads on Facebook, they will also be able to see an explanation of why they saw that particular ad. For political advertisers that do not proactively disclose themselves, we are building machine learning tools that will help us find them and require them to verify their identity.

b. How do you define the political advertisements that are covered by the new requirements? Why did you adopt the definition that you did?

We support efforts to promote greater transparency in political advertising online and recently announced steps to make advertising on Facebook more transparent, increase requirements for authenticity, and strengthen our enforcement against ads that violate our policies. But our commitment to ad transparency is not limited to political ads. While our most recent announcements have focused on election-related ads—although not necessarily only ads that mention candidates by name—we are bringing greater transparency to all ads by making sure that people can see all of the ads run by any Page, regardless of whether those ads are targeted to them.

c. Will you commit to including within your definition, at a minimum, advertisements that advocate for or against a specific candidate, political party, piece of legislation, regulatory action, or ballot referendum? If not, why not?

Our commitment to ad transparency is not limited to political ads. While our most recent announcements have focused on election-related ads—although not necessarily only ads that mention candidates by name—we are bringing greater transparency to all ads by making sure that people can see all of the ads run by any Page, regardless of whether those ads are targeted to them.

9. Your platform offers a range of advertisement targeting criteria.

a. Which types of targeting criteria, such as demographic, behavioral, lookalike, or email matching did Russia use for its information operations?

We have provided the targeting criteria to this Committee along with the ads themselves.

10. Have you seen any evidence of state-sponsored information operations associated with American elections in 2017, including the gubernatorial elections in Virginia and New Jersey?

We have learned from the 2016 election cycle and from elections worldwide this last year. We have incorporated that learning into our automated systems and human review and have greatly improved in preparation for the upcoming elections. We hope to continue learning and improving through increased industry cooperation and dialogue with law enforcement moving forward.

11. User reports are an important signal of when an account is not authentic.

a. How frequently do you receive user reports about inauthentic accounts?

User reports are an important signal, and we rely on our community to help identify inauthentic accounts. Facebook's Community Operations team receives millions of reports each week about content that may violate our community standards, including about potential inauthentic accounts.

b. What is your process for responding to those reports? How often does that process usually take?

Our community of users helps us by reporting accounts or content that may violate our policies. Our Community Operations team—which is growing significantly over this year—works around the world, 24 hours a day, and in dozens of languages to review these reports.

c. What proportion of those reports result in an account restriction, suspension, or removal?

When we review accounts that have been reported, we look for any violation of our policies, not just for the violation that may have been identified by the reporter. When our review identifies a policy violation, remedies may include feature disabling, content removal, checkpointing, or account disabling. The severity of the remedy is dictated by the policy violation in question, as well as its frequency and whether the account is a repeat offender.

d. Among the reports that you decline to take action on, what proportion involve reported accounts that you subsequently identify as inauthentic?

Our automated processes for identifying fake accounts typically take effect before we receive reports. Whether an account has been reported multiple times does not affect whether it is disabled. Our reviewers are trained to look for violations and enforce our policies consistently and as objectively as possible.

e. **How many of the accounts that you have identified as associated with Russian information operations were the subject of a user report? Please provide all the user reports associated with these accounts and the actions you took in response including the specific time for the report and each action.**

We are not aware that any of these accounts were reported as inauthentic.

12. **Much of the public discussion about state-sponsored information operations on your platforms has centered on the Internet Research Agency. That is not the only group surreptitiously spreading state-sponsored propaganda.**

    a. **What other groups are you tracking that are affiliated with the Russian government?**

We have used "the Internet Research Agency" or "the IRA" to describe a set of actors that were active on our platform during the 2016 U.S. election cycle. We removed accounts linked to those actors in August 2017, and we are continually on the lookout for recidivist actors. These actors may have called themselves by other names, including Glavset.

We have also tracked activity from a cluster of accounts we have assessed to belong to a group, APT28, that the U.S. government has publicly linked to Russian military intelligence services and the "DCLeaks" organization.

    b. **What other countries do you believe are conducting state-sponsored information operations on your platforms? Please describe the groups that you are tracking for each country, including both government agencies and affiliates.**

It is extremely difficult to definitively attribute online activity to particular threat actors, including state actors. We are constantly monitoring for threat actors who, like the IRA, are engaged in state-sponsored information operations.

13. **According to news reports, Russia's propaganda is not just online. Russia appears to have organized pro-Trump rallies across Florida during the 2016 campaign, for example, convened an anti-immigrant, anti-Muslim rally in Idaho, and orchestrated a protest and a counter-protest at an Islamic center in Texas.**

    a. **What data does Facebook possess about the real-world gatherings that were associated with Russian propaganda?**

A total of 129 events were created across 13 IRA Pages. Approximately 338,300 unique accounts viewed these events. About 25,800 accounts marked that they were interested in an event, and about 62,500 marked that they were going to an event. We do not have data about the realization of these events.

b. Will Facebook make that data public to increase awareness of the threat?

We believe we have a responsibility to be transparent about what we know regarding foreign influence in our election, which is why, as we have discovered information, we have come forward with it to this Committee and to share information publicly. In an effort to provide additional transparency, we recently launched a portal to enable people on Facebook to learn which of the IRA Facebook Pages or Instagram accounts they may have liked or followed between January 2015 and August 2017. This tool is available to users in the Facebook Help Center.

c. How many individuals checked-in at, liked, or shared event pages associated with Russian propaganda?

See response to question 13(a).

14. Recent news reports indicated that Facebook collects, analyzes, and uses a range of information from consumers for purposes of the "Find Friends" feature.

a. What information does Facebook collect, analyze, and use for this feature? How is the data collected, analyzed, and used?

b. Is the information visible to a consumer? If not, will you commit to making this information visible?

c. Can a consumer edit or delete the information? If not, will you commit to enabling consumers to edit or delete the information?

d. Can an advertiser target ads based on this information?

e. Is there any indication Russia may have used or attempted to use this information to advance its information operations?

People You May Know can help Facebook users find friends on Facebook. People You May Know suggestions come from things such as having friends in common, or mutual friends; being in the same Facebook group or being tagged in the same photo; users' networks (for example, school or work); and contacts users have uploaded. We give people context when we suggest someone with mutual friends. Users may delete contacts that they have uploaded to Facebook, in which case that information is no longer used for People You May Know. Facebook does not allow advertisers to target ads based on People You May Know.

15. Inauthentic accounts can be disabled subsequent to automated or manual review.

a. What role do automated and human review play in your decision to disable a suspected inauthentic account?

We rely on both automated and manual review, and we are now taking steps to strengthen both. We continually update our technical systems to identify, checkpoint, and remove inauthentic accounts. We block millions of attempts to register fake accounts every day. These systems examine thousands of detailed account attributes and prioritize signals that are more difficult for bad actors to disguise, such as their connections to others on our platform. We do not share detailed descriptions of how our tools work in order to avoid providing a road map to bad actors who are trying to avoid detection.

b. Do you require that a human employee review a suspected inauthentic account before it is disabled?

When we suspect that an account is inauthentic, we typically enroll the account in a checkpoint that requires the account holder to provide additional information or verification. We view disabling an account as a severe sanction, and we want to ensure that we are highly confident that the account violates our policies before we take permanent action. When we have confirmed that an account violates our policies, we remove the account.

c. If so, given the rate at which inauthentic accounts can be regenerated, how do you anticipate remaining ahead of the problem?

We continually update our technical systems to identify, checkpoint, and remove inauthentic accounts, and we block millions of attempts to register fake accounts every day. These systems examine thousands of detailed account attributes and prioritize signals that are more difficult for bad actors to disguise, such as their connections to others on our platform. We also look for recidivists who repeatedly create inauthentic accounts. We do not share detailed descriptions of how our tools work in order to avoid providing a road map to bad actors who are trying to avoid detection.

d. What are you doing to improve automation in the process of detecting and disabling inauthentic accounts?

As explained above, we continue to learn common traits of bad actors and to update our systems to better identify and remove inauthentic accounts.

e. What are you doing to make it more difficult to establish inauthentic accounts?

The combination of our constantly updated technical systems and human review aids us in preventing the creation of fake accounts and in discovering and removing them if they are created. It is an evolving process and as new methods are used by bad actors creating inauthentic accounts, we will develop new solutions for identification and prevention.

Senator McCain

1. **Current campaign finance law establishes disclosure standards for television, radio, and print media. The Pew Research Center recently found that 65 percent of Americans identified an Internet-based source as their leading source of information about the 2016 election.**

    a. **Under current law, to what extent is Facebook responsible for providing a similar quality of disclosure to the public?**

Facebook requires advertisers to comply with all applicable laws and with our policies, including our authenticity policy. We are also implementing new verification and disclosure standards on Facebook that will bring greater transparency to political advertising on our platform in general and make it easier for us to enforce our policies. Starting with the 2018 U.S. federal elections this fall, we will require these advertisers to identify who is paying for the ads to Facebook and to the public. For election advertisers who do not self-identify, we are building automated tools that will help us identify these ads proactively.

2. **The *Honest Ads Act* requires disclosures and disclaimers for entities engaging in paid and intentional campaign activity, all in an effort to better understand and detect illegal activity, like foreign interference. Given the unique nature and accessibility of social media, bringing campaign finance law into the digital realm poses some challenges.**

    a. **What can Facebook and Congress do to ensure that free speech is not violated in this process?**

Facebook is a platform for people to express themselves freely and openly, and we are working to strike the right balance between enabling free expression and ensuring that our platform is safe. Our policies are aimed at encouraging expression and respectful dialogue. Facebook believes that transparency in political advertising and authentic dialogue promotes open and effective democracies. We are taking several steps to make it clear who is running election ads on Facebook and to identify and remove inauthentic accounts. To ensure that advertising is as transparent on other platforms as it is on Facebook, we support industry-wide standards that provide clear and consistent guidance to advertisers regarding their disclosure obligations.

3. **The public nature of television, radio, and print ensures that political advertisements are subject to scrutiny of the press, fact-checkers, and political opponents. Political advertisements sold on Facebook, however, can be targeted towards specific groups, and frequently bear no indication as to the purchaser of the advertisement.**

    a. **Does Facebook have plans to create a permanent online record where the public is able to monitor the content and ownership of certain advertisements?**

We support efforts to promote greater transparency in political advertising online and recently announced steps to make advertising on Facebook more transparent, increase requirements for authenticity, and strengthen our enforcement against ads that violate our policies. *See* https://newsroom.fb.com/news/2017/10/update-on-our-advertising-transparency-and-authenticity-efforts/. We'll require more thorough documentation from advertisers who want to run election-related ads. We expect these reforms to be in effect by the 2018 U.S. federal elections this fall and will progress from there to additional contests and elections in other countries and jurisdictions. As part of the documentation process, advertisers may be required to identify that they are running election-related advertising and verify both their entity and location. Once verified, these advertisers will have to include a disclosure in their election-related ads, which reads: "Paid for by." When users click on the disclosure, they will be able to see details about the advertiser, and we will maintain a searchable archive of information. Like other ads on Facebook, they will also be able to see an explanation of why they saw that particular ad. For political advertisers that do not proactively disclose themselves, we are building machine learning tools that will help us find them and require them to verify their identity.

4. Facebook's Terms of Service require that paid advertisers use authentic information in the purchase and promotion of their content.

a. What steps has Facebook taken to monitor and enforce this requirement?

Facebook builds and updates technical systems every day to better identify and remove inauthentic accounts, which also helps reduce the distribution of material that can be spread by accounts that violate our policies. Each day, we block millions of fake accounts at registration. Our systems examine thousands of account attributes and focus on detecting behaviors that are very difficult for bad actors to fake, including their connections to others on our platform. By constantly improving our techniques, we also aim to reduce the incentives for bad actors who rely on distribution to make their efforts worthwhile.

We are also implementing new verification and disclosure standards on Facebook that will bring greater transparency to political advertising on our platform in general and make it easier for us to enforce our policies. Starting with the 2018 U.S. federal elections this fall, we will require these advertisers to identify who is paying for the ads to Facebook and to the public. For election advertisers who do not self-identify, we are building automated tools that will help us identify these ads proactively.

January 15, 2018

Questions for the Record
Senate Select Committee on Intelligence
Hearing on Social Media Influence in the 2016 U.S. Elections
November 29, 2017

Questions for the Record for Mr. Sean Edgett, Acting General Counsel, Twitter.

[From Chairman Burr]

1. **What procedures must the Russian government follow to compel the production of customer-created content or personally identifiable information from your company?**

Twitter publishes global guidelines for law enforcement personnel that explain our policies and the process for submitting requests for information. *See* https://help.twitter.com/en/rules-and-policies/twitter-law-enforcement-support. Since 2012, Twitter has published bi-annual Transparency Reports, reflecting the number of requests that we have received for user information and content removal on a per-country basis, including requests from Russia. *See* https://transparency.twitter.com/.

Although we have received requests for user information from Russian government entities, the number of requests per reporting period has been relatively small compared to requests from other jurisdictions. As the Transparency Reports indicate, Twitter has not complied with any of those requests. *See, e.g., Fig. 1 below* (showing Twitter's Transparency Report table reflecting 0% compliance for information requests from Russia).

Fig. 1: Summary of Information Requests from Russia

Russia

Russia information requests

Report	Account information requests	Percentage where some information produced	Accounts specified
January - June 2017	2	0%	2
July - December 2016	-	-	-
January - June 2016	2	0%	2
July - December 2015	82	0%	87
January - June 2015	43	0%	46
July - December 2014	108	0%	108

2. **Has the Russian government compelled the production of customer-created content or personally identifiable information from your company?**

3. **If so, has your company complied with such efforts by the Russian government to compel the production of customer-created content or personally identifiable information?**

4. **Has your company ever refused to comply with efforts by the Russian government to compel the production of customer-created content or personally identifiable information? If so, have any of these efforts been successful?**

5. **Has your company provided any content created by a U.S. person or personally identifiable information about a U.S. person to the Russian government?**

6. **More specifically, has your company provided to the Russian government the content of any direct messages sent to or from a U.S. person?**

7. **Has your company provided to the Russian government any information that could be used to determine the location of a U.S. person?**

The answers to questions 2-7 are provided in response to question 1.

8. **The persona, GUCCIFER2.0 (@GUCCIFER_2), emerged in June 2016 and almost immediately started to post material purportedly hacked from the Democratic National Committee (DNC), linking to a seemingly related WordPress site.**

- **When did Twitter become aware that the @GUCCIFER_2 account was posting links to a site containing material hacked from the DNC?**
- **What investigation, if any, did Twitter perform into the @GUCCIFER_2 account?**
- **If an investigation was conducted, to whom were the results provided?**
- **Did Twitter provide any information about @GUCCIFER_2 to U.S. law enforcement or the U.S. Intelligence Community?**
- **Why is the @GUCCIFER_2 permitted to remain active on Twitter?**

Our ability to respond to these questions is limited because we are unable to comment on whether or not we received requests related to any specific law enforcement investigations.

Twitter maintains a dedicated 24/7 team to respond to law enforcement requests. We work closely with U.S. law enforcement agencies around the country and promptly respond to properly scoped and valid legal process. To the extent we are permitted to do so by law, we make available to the Twitter community and the general public bi-annual, high-level reports summarizing the types of requests we receive and Twitter's responses, if any. *See* https://transparency.twitter.com.

Our Rules prohibit users from posting content that violates our private information policy, unless those individuals provide express authorization and permission for Twitter users to do so. An example of private information covered by the policy includes, but is not limited to, a non-public personal email address. Sharing private information on the platform could pose serious safety and security risks for the person whose information is shared and is a violation of the Twitter Rules, which we take very seriously.

When we receive a complaint that private information was shared on our platform, Twitter will take appropriate action under its policies, which can include temporarily suspending the account in question pending removal of the private information posted in violation of the Twitter Rules. Subsequent violations of the Twitter Rules can result in a permanent suspension. Twitter applies these rules to all accounts, including the account referenced in the question, and has taken action when that account or others do not comply with the Twitter Rules.

9. **Relatedly, another account, currently also named Guccifer2.0 (@Guccifer2) was one of the first accounts to welcome @GUCCIFER_2 to Twitter, responding to the latter's first Tweet. The @Guccifer2 account has been identified, through Twitter's application programming interface (API), to have been created on June 9, 2016. The moniker "Guccifer2.0" did not publicly exist until @GUCCIFER_2 emerged, which did not occur until June 16, 2016.**

   - **Has Twitter conducted an investigation as to how the account @Guccifer2 and the @GUCCIFER_2 account interacted?**
   - **Has the @Guccifer2 account used any other names or handles? If so, when did the change to Guccifer2.0/@Guccifer2 occur?**
   - **What investigation, if any, did Twitter perform into the @Guccifer2 account?**
   - **If an investigation was conducted, to whom were the results provided?**
   - **Did Twitter provide any information about @GUCCIFER 2 to U.S. law enforcement or the U.S. Intelligence Community?**

Our ability to respond to these questions is limited because we are unable to comment on whether or not we received requests related to any specific law enforcement investigations.

As noted above, Twitter works closely with U.S. law enforcement to promptly respond to properly scoped and valid legal process. To the extent we are permitted to do so by law, we make available to the Twitter community and the general public bi-annual, high-level reports summarizing the types of requests we receive and Twitter's responses, if any. *See* https://transparency.twitter.com. Any law enforcement requests that Twitter received in reference to this account would be addressed consistent with Twitter's Law Enforcement Guidelines.

Twitter users are permitted to change their usernames (also referred to as their handles) and display names over time while maintaining an account on our platform. Once a Twitter user changes a username, the prior username and date of the change is no longer visible on Twitter or

via our application programming interface ("API"). More information about how Twitter account holders can update this information is available through Twitter's Help Center. *See* https://help.twitter.com/en/managing-your-account/change-twitter-handle.

[From Vice Chairman Warner]

10. Outside researchers suggest that as much as 15% of the accounts — or 48 million accounts — on Twitter are automated bots, while Twitter has consistently contended the proportion of automated accounts is much lower.

- **If the researchers are inaccurate with respect to the number of fake accounts on your platform, as you suggest, what steps will you commit to take to assist these researchers with providing the real information?**

We regularly receive and welcome input from researchers and Twitter users about ways in which we can optimize our detection and enforcement methods with respect to false or spam accounts. We are committed to continuing to work on refining those tools and to update the public and the Twitter community periodically about our estimates and analysis. And Twitter is unique in the transparency it provides about public Tweet data via our application programming interface ("API"). Through our API, we provide developers, researchers, and other third parties access to public Twitter content. This service is a hallmark of our commitment to transparency, collaboration, and innovation.

Based on a review of a representative sample of accounts, we estimate that false or spam accounts represent less than 5% of our MAUs. Our estimates are lower than those reported by outside researchers because although we can make a significant amount of information public, researchers do not have access to critical internal information necessary to make an accurate determination of the scale of spam, false accounts or automated bots on Twitter. As a result, reports from third-party researchers often overestimate the true volume of such accounts on our platform—sometimes by large orders of magnitude.

While our detection tools for false or spam accounts rely on a number of inputs and variables and do not operate with 100% precision, they are informed by data not available outside of Twitter. Our internal researchers have access to and can analyze a number of different signals including, among other things, email addresses, phone numbers, login history, and other non-public account and activity characteristics that enable us to conduct a more thorough review and reach more accurate conclusions as to whether the account in question is fake or spam. We keep such information confidential and do not make it available to researchers in order to protect the privacy of our users.

Because third-party researchers do not have access to internal signals that Twitter can access, their bot and spam detection methodologies must be based on public information and often rely on human judgment, rather than on internal signals available to us. One common model for determining whether an account is fake or automated is the "Botometer model," which compares publicly available account features, such as Tweet count, follower count, and use of language, to the characteristics exhibited by purportedly "known" bots. The initial evaluation of whether an account is or is not a bot, however, relies on an individual assessment and is, therefore, inherently imprecise.

The studies that rely on information from the Twitter API to identify automated accounts similarly overestimate both the number and impact of these accounts because our internal

detection tools and filtering techniques are not available to third parties. Those tools enable us to remove from the platform malicious automated accounts (and content generated by such accounts), but the accounts may nevertheless appear in the data stream that researchers access through our API, thus inaccurately reflecting the traffic on Twitter.

A study conducted by the University of Southern California and Indiana University estimated that as much as 15% of Twitter accounts are automated, spam accounts. That estimate, however, was based on a prediction of whether a user may or may not be an automated account and was derived from human judgments about an account's attributes. The authors of the study acknowledge that detecting automated accounts "is a hard task. Many criteria are used in determining whether an account is controlled by a human or a bot, and even a trained eye gets it wrong sometimes." See https://botometer.iuni.iu.edu/#!/faq#bot-threshold.

In addition to our ongoing steps to promote transparency about our platform through the API, as we have announced, we are also committed to donating the $1.9 million we projected to have earned from RT advertising to support external research into the use of Twitter in civic engagement and elections, including the use of malicious automation and misinformation.

11. What are your policies regarding the distribution of hacked and stolen emails from your platform?

The use of Twitter to distribute hacked or stolen emails or documents may implicate a number of the Twitter Rules, including our prohibitions on posting private information, infringement of intellectual property rights, and/or unlawful use. For example, users are prohibited from posting other people's private information, unless those individuals provide express authorization and permission for Twitter users to do so. This policy protects information such as non-public personal email addresses and mobile phone numbers.

In addition, under the unlawful use provision of the Twitter Rules, users are prohibited from using Twitter's "service for any unlawful purpose or in furtherance of illegal activities" and "[i]nternational users agree to comply with all local laws regarding online conduct and acceptable content." *See* Twitter User Agreement—Twitter Rules, https://twitter.com/en/tos. Twitter has processes in place for law enforcement and private parties to report Twitter Rules violations to us and to submit legal requests and court orders for removal of illegal content. When Twitter detects content posted in violation of our rules and policies, we may take a range of enforcement actions, including requiring the deletion of specific content, withholding an account or specific Tweets where they are unlawful, or suspending the account.

12. We've seen that bad actors are working across the various platforms to spread their disinformation. It has proven true in the past several months that identifying fake accounts on one platform can facilitate identification on other platforms.

- **Do you share data with other firms?**
- **What concrete steps are you taking to share information to improve detection?**

Twitter has partnered with other platforms to make progress against common threats. In June 2017, for example, we launched the Global Internet Forum to Counter Terrorism (the

"GIFCT"), a partnership among Twitter, YouTube, Facebook, and Microsoft. The GIFCT facilitates, among other things, information sharing; technical cooperation; and research collaboration, including with academic institutions.

The GIFCT has created a shared industry database of "hashes"—unique digital "fingerprints"—for violent terrorist imagery or terrorist recruitment videos or images that have been removed from our individual services. The database allows a company that discovers terrorist content on one of their sites to create a digital fingerprint and share it with the other companies in the forum, who can then use those hashes to identify such content on their services or platforms, review against their respective policies and individual rules, and remove matching content as appropriate, or even block extremist content before it is posted in the first place. The database now contains more than 40,000 hashes. Instagram, Justpaste.it, LinkedIn, Oath, and Snap have also joined this initiative, and we are working to add several additional companies in 2018. Twitter also participates in the Technology Coalition, which shares images to counter child abuse.

Twitter understands that, to succeed, we must combine information, knowledge, and effort with industry partners, civil society, academic institutions, and government. We do not compete against other companies on our ability to detect and label malicious content on our platform; instead, we recognize that we will all be stronger if we view this as a shared threat. We are committed to a continued collaborative approach and believe it will prove successful going forward.

13. Press investigations have found that for as little as $100 it is possible to buy a "bot army" via unscrupulous underground online actors, enabling the coordinated propagation of tweets, including of false information, to create trending topics. The *Daily Beast* publication investigated and was able to buy 1000 Twitter accounts for just $45.[1]

- **Is it a violation of your Terms of Service to buy and sell bots?**
- **What safeguards do you have in place to prevent this type of activity?**

Twitter strictly prohibits the purchasing and selling of account interactions on our platform. We advise our users that, by purchasing followers, Retweets, and likes, they are often purchasing bots, fake, or hacked accounts. Accounts found to have purchased, sold, or promoted the selling of followers, Retweets, and likes are in violation of the Twitter Rules and may be subject to suspension. *See* https://help.twitter.com/en/rules-and-policies/twitter-rules.

The Twitter Rules prohibit using automation tools for the purpose of generating spam—unwanted content consisting of multiple postings either from the same account or from multiple coordinated accounts. While "spam" is frequently viewed as having a commercial element, since it is a typical vector for spreading advertising, Twitter's Rules take an expansive view of spam because it negatively impacts the user experience. Examples of spam violations on Twitter include automatically Retweeting content to reach as many users as possible, automatically

[1] https://www.thedailybeast.com/i-bought-a-russian-bot-army-for-under-dollar1100

Tweeting about topics on Twitter in an attempt to manipulate trends, generating multiple Tweets with hashtags unrelated to the topics of those hashtags, repeatedly following and unfollowing accounts to tempt other users to follow reciprocally, Tweeting duplicate replies and mentions, and generating large volumes of unsolicited mentions.

Our systems are built to detect malicious automated and spam accounts across their lifecycles, including detection at the account creation and login phase and detection based on unusual activity (*e.g.*, patterns of Tweets, likes, and follows). Our ability to detect such activity on our platform is bolstered by internal, manual reviews conducted by Twitter employees. Those efforts are further supplemented by user reports, which we rely on not only to address the content at issue but also to calibrate our detection tools to identify similar content as spam.

Once our systems detect an account as generating spam, we can take action against that account at either the account level or the Tweet level. Depending on the mode of detection, we have varying levels of confidence about our determination that an account is violating our rules. We have a range of options for enforcement; generally, the higher our confidence that an account is violating our rules, the stricter our enforcement action will be, with immediate suspension as the harshest penalty. If we are not sufficiently confident to suspend an account on the basis of a given detection technique, we may challenge the account to verify a phone number or to otherwise prove human operation, or we may flag the account for review by Twitter personnel. Until the user completes the challenge, or until the review by our teams has been completed, the account is temporarily suspended; the user cannot produce new content (or perform actions like Retweets or likes), and the account's contents are hidden from other Twitter users.

We also have the capability to detect suspicious activity at the Tweet level and, if certain criteria are met, to internally tag that Tweet as spam or otherwise suspicious. Tweets that have been assigned those designations are hidden from searches, do not count toward generating trends, and generally will not appear in feeds unless a user follows that account. Typically, users whose Tweets are designated as spam are also put through the challenges described above and are suspended if they cannot pass.

For safety-related Terms of Service ("TOS") violations, we have a number of enforcement options. For example, we can stop the spread of malicious content by categorizing a Tweet as "restricted pending deletion," which requires a user to delete the Tweet before the user is permitted to continue using the account and engaging with the platform. So long as the Tweet is restricted—and until the user deletes the Tweet—the Tweet remains inaccessible to and hidden from all Twitter users. The user is blocked from Tweeting further unless and until he or she deletes the restricted Tweet. This mechanism is a common enforcement approach to addressing less severe content violations of our TOS outside the spam context; it also promotes education among our users. More serious violations, such as posting child sexual exploitation or promoting terrorism, result in immediate suspension and may prompt interaction with law enforcement.

14. If Twitter feels it is important to allow for bots on its platform, then why not require a disclosure that a bot account is non-human? Why not ensure that your real users know when they are interacting with an automated bot?

Because automated content can originate with any type of account, such disclosure would necessarily be both over-inclusive and under-inclusive. For example, certain automation tools that do not violate our rules enable users to schedule their Tweets to post automatically at a particular time or in response to specific activity. Since they may be utilized by individual users, applying a categorical designation to accounts that employ those tools would not accurately characterize such accounts.

It is important to note, moreover, that not all automation is malicious. Automation is essential for certain informational content, particularly when time is of the essence, including for law enforcement or public safety notifications. Examples include Amber Alerts, earthquake and other storm warnings, and notices to "shelter in place" during active emergency situations. Automation is also used to provide customer service for a range of companies. For example, as of April 2017, users are able to Tweet @TwitterSupport to request assistance from Twitter. If a user reports a forgotten password or has a question about our rules, the initial triage of those messages is performed by our automated system—a Twitter-developed program to assist users in troubleshooting account issues.

To maintain the integrity of our platform and to ensure a positive user experience, Twitter's approach to addressing the spread of malicious automation is to focus on problematic behavior and abuse, and on accounts that engage in such behavior. To that end, we monitor various behavioral signals related to the frequency and timing of Tweets, Retweets, likes, and other such activity, as well as to similarity in behavioral patterns across accounts, in order to identify accounts which are likely to be automated and acting in a malicious automated and coordinated fashion. When we identify such accounts or abusive activity, we take action to prevent them from interfering with the integrity of the platform and detracting from the positive experience of our users.

[From Senator Collins]

15. What provision in your Terms of Service ensures that political advertisements targeted toward the United States are purchased by an American citizen?

As part of our ads transparency and electioneering ads efforts announced in October 2017, Twitter will require advertisers to go through an onboarding process, which will obligate them to provide information about how they are funding their media buys. For advertisers who do not self-identify but who run electioneering ads, we will use a combination of machine-learning models and human manual review to detect and halt these advertisers until they have correctly onboarded with us as an electioneering advertiser.

While it is possible that foreign governments may attempt to purchase ads through consultants or management companies, Twitter's upcoming Transparency Center is intended to provide identifying information about any such companies and their other advertising activities on Twitter. That information will better enable users and outside parties to conduct their own research or evaluation regarding particular ads.

If Twitter concluded that any advertiser was running an unlawful ad on Twitter, Twitter would restrict the user from such further action, remove the ad, or both as appropriate.

16. Do your Terms of Service prohibit users from influencing elections in other countries?

Twitter is a global platform with more than 330 million monthly active users around the world. Facilitating organic, robust debate and commentary about important events around the world is a core part of Twitter's mission. So long as our users do not violate the Twitter Rules or the Twitter Terms of Service, we do not place restrictions on the organic content that they choose to Tweet about and share with their followers, including when that content contains commentary about elections in other countries.

By contrast, unlawful interference with elections is prohibited. As noted in the unlawful use provision of the Twitter Rules, users are prohibited from using Twitter's "service for any unlawful purpose or in furtherance of illegal activities" and "[i]nternational users agree to comply with all local laws regarding online conduct and acceptable content." Twitter User Agreement—Twitter Rules, *available at* https://twitter.com/en/tos. For example, during the period leading up to the 2016 election, Twitter took action on Tweets that suggested to users that they can vote by text message. Because the Tweets in question appeared to mislead users into believing that they could vote online or vote by text, Twitter viewed them as an unlawful interference with the voting process and took action against those accounts and Tweets.

17. If a foreign national working on behalf of a foreign intelligence service was an authentic user in real name on your platform, could he post divisive, but non-violent content related to a U.S. election without violating your Terms of Service? Would he be able to purchase political advertising?

Twitter is committed to providing a service that fosters and facilitates free and open democratic debate and that promotes positive change in the world. Twitter has a history of

facilitating civic engagement and political freedom, and we intend for Twitter to remain a vital avenue for free expression here and abroad. As a global platform, we believe that our users benefit from the exchange of ideas with other users around the world. Accordingly, unless an account or a user violates the Twitter Rules or the Twitter Terms of Service—including by engaging in abusive behavior, promoting violence, harassing individuals, or using the platform for unlawful purposes—we do not restrict the type of content they choose to share with their followers based on their nationality or citizenship.

Advertisements generally receive a different type of review than organic Tweets. This is because organic Tweets are generally shown to people who choose to follow the user that sends the Tweet, while ads—Promoted Tweets—can be served to a broader audience, including users who have not chosen to follow the user or account that generated the ad. And Twitter places greater limitations on the type of content that can be promoted with Twitter ads compared to organic content that our users generate. In addition, foreign nationals may be subject to legal restrictions governing campaign contributions and electioneering. If Twitter concluded that any advertiser, including a foreign national, was running an unlawful ad on Twitter, Twitter would restrict the user from such further action, remove the ad, or both as appropriate.

[From Senator Feinstein]

18. Twitter has conceded that the number of people exposed to content from foreign groups online is far more pronounced through organic traffic and fake accounts than it is through paid advertising. Troublingly, it does not appear there is a proven method for combatting the spread of fake accounts created to sow division in society. Although the Committee has heard testimony indicating that Twitter has a number of ways to detect "bot-like" activity, as recently as August 2017, divisive foreign unpaid content designed to polarize and anger the American people could be found on Twitter.

- **What specific actions is Twitter taking to combat this type of divisive unpaid activity on an on-going basis?**

We are committed to addressing the spread of misinformation on our platform—and to prevent future attempts to interfere with U.S. elections—but we recognize that spam and malicious automation are not limited to political content and can undermine the positive user experience we seek to offer regardless of content. Twitter's approach to addressing the spread of malicious automation and inauthentic accounts on our platform is to focus on identifying problematic behavior and abuse, not primarily on the content that such accounts attempt to disseminate. This is not to say that the content is not important—or that content has no place in our analysis—but we recognize that those who are seeking to influence a wide audience must find ways to amplify their messages across Twitter. As with spam and terrorist content, these behaviors frequently provide more precise signals than focusing on content alone.

Accordingly, we monitor various behavioral signals related to the frequency and timing of Tweets, Retweets, likes, and other such activity, as well as to similarity in behavioral patterns across accounts, in order to identify accounts that are likely to be maliciously automated or acting in an automated and coordinated fashion in ways that are unwelcome to our users. We monitor and review unsolicited targeting of accounts, including accounts that mention or follow other accounts with which they have had no prior engagement. For example, if an account follows 1,000 users within the period of one hour, or mentions 1,000 accounts within a short period of time, our systems are capable of detecting that activity as aberrant and as potentially originating from suspicious accounts.

Twitter is continuing its effort to detect and prevent malicious automation by leveraging our technological capabilities and investing in initiatives aimed at understanding and addressing behavioral patterns associated with such accounts. For example, in early 2017, we launched the Information Quality initiative, an effort aimed at enhancing the strategies we use to detect and stop bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

Since the 2016 election, we have made significant improvements to reduce external attempts to manipulate content visibility. These improvements were driven by investments in methods to detect malicious automation through abuse of our API, limit the ability of malicious actors to create new accounts in bulk, detect coordinated malicious activity across clusters of accounts, and better enforce policies against abusive third-party applications.

In addition, we have developed new techniques for identifying patterns of activity inconsistent with legitimate use of our platform (such as near-instantaneous replies to Tweets, nonrandom Tweet timing, and coordinated engagement), and we are currently implementing these detections across our platform. We have improved our phone verification process and introduced new challenges, including reCAPTCHA (utilizing an advanced risk-analysis engine developed by Google), to give us additional tools to validate that a human is in control of an account. We have enhanced our capabilities to link together accounts that were formed by the same person or that are working in concert. And we are improving how we detect when accounts may have been hacked or compromised.

With our improved capabilities, we are now detecting and blocking approximately 450,000 suspicious logins each day that we believe to be generated through automation. In September 2017, our systems identified and challenged an average of four million suspicious accounts per week, which represents more than double our rate of detection at this time last year. Over three million of those accounts were challenged upon signup, before their content or engagements could impact other users. Between June and September 2017, we also suspended more than 117,000 malicious applications for API abuse. Those applications were collectively responsible for more than 1.5 billion Tweets in 2017.

We plan to continue building upon our 2017 improvements, including through collaboration with our peers and investments in machine-learning capabilities that help us detect and mitigate the effect on users of fake, coordinated, and malicious automated account activity.

We have also observed the expansion of malicious activity on our platform from automated accounts to human-coordinated activity, which poses additional challenges to making our platform safe. We are determined to meet those challenges and have been successful in addressing such abusive behavior in other contexts. We are committed to leveraging our technological capabilities in order to do so again by carefully refining and building tools that respond to signals in the account behavior. For example, as of September 2017, 95% of account suspensions for promotion of terrorist activity were accomplished using our existing proprietary detection tools—up from 74% in 2016. These tools focus on indicia of violating activity beyond the content of the Tweet. We are confident that the combination of our dedicated teams, our detection tools, and other technological advancements at our disposal will prove essential in addressing malicious human-coordinated activity as well.

19. One of the more troubling findings from this investigation is the number of targeted voter disengagement efforts promoted through social media.

- **Can you say with certainty that foreign actors did not use U.S. voter registration data to target individuals through <u>both</u> paid and unpaid activity?**

As we explained in connection with the November 1, 2017, hearing before the Committee, as a result of our retrospective review, we have identified ways in which Russian actors engaged with our platform in the period leading up to the 2016 election. Although we have no visibility into what information those actors had at their disposal, users posting organic (unpaid) content cannot target other users based on any criteria, and voter registration is not an

available targeting criterion for ads and promoted Tweets on our platform (*i.e.*, paid Twitter services).

[From Senator Cotton]

20. Do Twitter's Terms of Service prohibit collaboration with Russian intelligence services to influence an election?

Unlawful interference with elections is strictly prohibited and users who engage in malicious activity designed to exert artificial influence on an election are likely to violate any number of Twitter's rules and policies. These may include our rules against spam, malicious automation, abuse or harassment, posting private information, or advertising policies. In addition, any illegal collaboration with Russian intelligence services to influence an election would implicate Twitter's prohibition against use of the "service for any unlawful purpose or in furtherance of illegal activities." Twitter's Rules specify that "international users agree to comply with all local laws regarding online conduct and acceptable content." Twitter User Agreement—Twitter Rules, *available at* https://twitter.com/en/tos.

21. Provided an individual or entity does not violate Twitter's Terms of Service, will they be allowed to use your platform to work with hostile, foreign intelligence services to potentially influence the 2018 and 2020 U.S. elections?

The answer to question 21 has been provided in response to question 20.

22. What is Twitter's justification for allowing entities and individuals such as WikiLeaks, Julian Assange, and Edward Snowden to maintain Twitter accounts?

One of Twitter's core purposes is to help advance the global, public conversation on various topics of interest to our users. As we stated in connection with the Committee hearing, Twitter's values include defending and respecting the user's voice—a two-part commitment to freedom of expression and privacy. Twitter has a history of facilitating civic engagement and political freedom, and we intend for Twitter to remain a vital avenue for free expression here and abroad.

Consistent with our values and commitment to fostering an open exchange of ideas, unless the activity or posted content violates our Terms of Service or Twitter Rules, we do not bar controversial figures from our platform or prohibit accounts from posting controversial content. We believe that barring controversial figures from our platform or removing their controversial Tweets would hide important information that our users should be able to see and debate and would detract from the public dialogue that our platform is intended to promote.

We take action against accounts for Terms of Service and Twitter Rules violations, and we apply those rules consistently to all accounts. So long as those accounts remain in compliance with our policies, we do not take action against their Tweets or suspend them from the platform.

23. Describe how Twitter came to acquire DataMinr.

Twitter did not acquire Dataminr. As has been publicly reported, Twitter owns a 5% stake in Dataminr and maintains an ongoing commercial relationship with that company.

24. Is there any portion of the DataMinr platform that shows non-public facing tweets or messages?

Twitter provides Dataminr only with Tweets that users choose to make public. We do not share non-public facing Tweets or messages with Dataminr.

25. What is Twitter's justification for labeling U.S. Intelligence Community access to information sold by DataMinr as "surveillance"?

We prohibit the use of Twitter data for surveillance purposes by any entity whose primary function is surveillance or the collection of intelligence. This is a longstanding Twitter policy. Twitter is proud to work with a range of government and law enforcement agencies, including the FBI, and to provide Twitter data for public safety, news alerting purposes, or in response to valid legal process.

26. Which Russian and Chinese entities currently have access to information sold by DataMinr?

Dataminr and its business relationships with its end users are managed independently of Twitter. Dataminr has notified Twitter that it does not have existing customers in China or Russia.

[From Senator Heinrich]

27. **On November 8, CNN reported that a Twitter account — MAGA Mike King — tweeted more than a dozen times on Election Day, November 7, 2017, a graphic purportedly instructing Virginians how to vote by text. This graphic included the logos of the Democratic Party and its gubernatorial candidate, Ralph Northam. According to CNN, the account remained active for almost three hours out of the 13 hours that the polls were open in Virginia.**

- **Did Twitter devote additional resources to monitoring misinformation on Election Day, November 7, 2017?**
- **Why did Twitter take so long to suspend the account?**

When we become aware of malicious uses of our platform, we take immediate action to enforce our rules. We also recognize the importance of events such as elections, and we commit additional resources to respond to law enforcement inquiries concerning abuse, spam, and other malicious uses of our platform during campaign and election periods. We regularly reexamine staffing and resources and adjust as needed, and we are launching a process to ensure that during election periods we are positioned to respond in the most effective and efficient way.

Due to the high volume of content posted to Twitter and the real-time nature of the platform, Twitter is not able to proactively monitor all Tweets posted in relation to those events. Our main line of defense against malicious activity on our platform remains our technological tools and systems, which are capable of detecting malicious automated and spam accounts across their lifecycles, including at the account creation and login phase, as well as when those accounts exhibit unusual activity (*e.g.*, patterns of Tweets, likes, and follows). Our ability to detect such activity on our platform is bolstered by internal, manual reviews conducted by Twitter employees, as well as by information we obtain through third-party security vendors. Those efforts are further supplemented by user reports, on which we rely not only to address the content at issue but also to calibrate our detection tools to identify similar content as spam.

Twitter is continuing its effort to detect and prevent malicious automation by leveraging our technological capabilities and investing in initiatives aimed at understanding and addressing behavioral patterns associated with such accounts. For example, in early 2017, we launched the Information Quality initiative, an effort aimed at enhancing the strategies we use to detect and stop bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform. Our efforts have already allowed us to respond more quickly to automation, spam, and malicious activity during high-profile events.

When Twitter received reports about the referenced account, we permanently suspended the user. Our action against this account is consistent with the approach we took against illegal voter suppression Tweets during the 2016 election. Here, however, and well before our manual review of the account's activity resulted in its permanent suspension, Twitter's automated spam detection systems identified malicious behavior originating from this account and took action to hide that user's Tweets from appearing in searches and counting toward trends. Those

automated systems, which we continue to invest in as part of our Information Quality initiative, help us address emerging malicious behavior even before a human reviewer can assess the content.

28. What percentage of Twitter content reviews are conducted by an actual human being rather than via automated review?

Twitter dedicates significant resources to addressing malicious automation, bots, and other coordinated activities. We believe we have the right resources and strategies in place. We dedicated nearly the entire engineering, product, and design teams to look at these issues at the beginning of 2017, and we regularly reexamine staffing and resources and adjust as needed.

Critical to the continued success of our efforts is our ability to leverage our technological advancements and improvements to tackle this problem; given the scale, this is not something that we or anyone else can review and address by hand.

But we do not depend on automated systems alone to address malicious automation, bots, and other abusive content or activity on our platform. Our ability to detect such activity on our platform is bolstered by internal, manual reviews conducted by Twitter employees. Those efforts are further supplemented by user reports, which we rely on not only to address the activity at issue but also to calibrate our detection tools to identify similar content as spam and to enforce the Twitter Terms of Service and Twitter Rules.

While automation provides significant opportunities to scale enforcement activity, it frequently performs better when it supplements, but does not supplant, human review of content. For example, our automated systems flag accounts that engage in suspicious activity for further manual review by Twitter personnel. Those systems also assist our staff in prioritizing manual reviews of user reports. For accurate and consistent enforcement of the Twitter Rules, many of the most sensitive and nuanced types of Twitter Rules violations are typically conducted by Twitter employees. Sensitive reports of illegal activities, such as voter suppression, are subject to review by a Twitter employee and in coordination with the legal department.

We also recognize that computer algorithms alone are not sufficient to address the problem. Context matters, and Twitter's commitment to protecting users' opinions and expression require that tooling alone does not try and solve these complex issues. Accordingly, those tools are complemented by manual review teams, collaboration and information sharing with industry peers and participants, reliance on data and intelligence from third-party security vendors, and partnerships with other companies and civil society.

Twitter understands that, to succeed, we must combine resources, information, knowledge, and effort with industry partners, civil society, and government. We do not compete against other companies on our ability to detect and label malicious content on our platform; instead, we recognize that we will all be stronger if we view this as a shared threat. We are committed to a continued collaborative approach and believe it will prove successful going forward.

29. Are Twitter's content review processes the same now as they were during the 2016 election? If not, how have they changed?

Twitter's approach to addressing the spread of malicious automation and inauthentic accounts on our platform is to focus on problematic behavior and abuse, not primarily on the content that such accounts attempt to disseminate. We are committed to addressing the spread of misinformation on our platform—and to prevent future attempts to interfere with U.S. elections—but we recognize that spam and malicious automation are not limited to political content and can undermine the positive user experience we seek to offer irrespective of the content.

Accordingly, we monitor various behavioral signals related to the frequency and timing of Tweets, Retweets, likes, and other such activity, as well as to similarity in behavioral patterns across accounts, in order to identify accounts that are likely to be automated or acting in an automated and coordinated fashion in ways that are unwelcome to our users. We monitor and review unsolicited targeting of accounts, including accounts that mention or follow other accounts with which they have had no prior engagement. For example, if an account follows 1,000 users within the period of one hour, or mentions 1,000 accounts within a short period of time, our systems are capable of detecting that activity as aberrant and as potentially originating from suspicious accounts.

Twitter is continuing its effort to detect and prevent malicious automation by leveraging our technological capabilities and investing in initiatives aimed at understanding and addressing behavioral patterns associated with such accounts. For example, in early 2017, we launched the Information Quality initiative, an effort aimed at enhancing the strategies we use to detect and deny bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

Since the 2016 election, we have made significant improvements to reduce external attempts to manipulate content visibility. These improvements were driven by investments in methods to detect malicious automation through abuse of our API, limit the ability of malicious actors to create new accounts in bulk, detect coordinated malicious activity across clusters of accounts, and better enforce policies against abusive third-party applications.

In addition, we have developed new techniques for identifying patterns of activity inconsistent with legitimate use of our platform (such as near-instantaneous replies to Tweets, nonrandom Tweet timing, and coordinated engagement), and we are currently implementing these detections across our platform. We have improved our phone verification process and introduced new challenges, including reCAPTCHA (utilizing an advanced risk-analysis engine developed by Google), to give us additional tools to validate that a human is in control of an account. We have enhanced our capabilities to link together accounts that were formed by the same person or that are working in concert. And we are improving how we detect when accounts may have been hacked or compromised.

With our improved capabilities, we are now detecting and blocking approximately 450,000 suspicious logins each day that we believe to be generated through automation. In September 2017, our systems identified and challenged an average of four million suspicious

accounts per week, which represents more than double our rate of detection at this time last year. Over three million of those accounts were challenged upon signup, before their content or engagements could impact other users. Between June and September 2017, we have also suspended more than 117,000 malicious applications for API abuse. Those applications were collectively responsible for more than 1.5 billion Tweets in 2017.

We plan to continue building upon our 2017 improvements, including through collaboration with our peers and investments in machine-learning capabilities that help us detect and mitigate the effect on users of fake, coordinated, and malicious automated account activity.

We have also observed the expansion of malicious activity on our platform from automated accounts to human-coordinated activity, which poses additional challenges to making our platform safe. We are determined to meet those challenges and have been successful in addressing such abusive behavior in other contexts. We are committed to leveraging our technological capabilities in order to do so again. For example, as of September 2017, 95% of account suspensions for promotion of terrorist activity were accomplished using our existing proprietary detection tools—up from 74% in 2016. We are confident that the combination of our dedicated teams, our detection tools, and other technological advancements at our disposal will prove essential in addressing malicious human-coordinated activity as well.

As noted above, ability to detect malicious activity and spam on our platform is bolstered by internal, manual reviews conducted by Twitter employees. Those efforts are further supplemented by user reports, which allow us to refine and calibrate our detection tools and carefully review content potentially in violation of the Twitter Rules and Twitter Terms of Service. Twitter has also devoted resources to improving our process for reviewing user reporting, including adding better technology to improve how we rank reports for review and adopting policies to allow more reports filed by observers of abuse to be actioned.

30. In hiring more content reviewers, are your companies simply throwing bodies at a specific problem, or are you fundamentally rethinking how to prioritize which user interactions require additional human oversight and review; if so, how? What other changes have you made in this regard?

The answer to question 30 is provided in response to question 28.

[From Senator Manchin]

31. Does Twitter or any Twitter affiliate use the information security products or services of Kaspersky Lab or any Kaspersky Lab affiliate?

Neither Twitter nor any entity controlled by Twitter uses any Kaspersky Lab or Kaspersky Lab-affiliated products or services.

32. Does Twitter or any Twitter affiliate sell network space to Russia Today or Sputnik news agencies?

Twitter recently off-boarded Russia Today ("RT") and Sputnik and will no longer allow those companies to purchase ad campaigns and promote Tweets on our platform. As we announced in October 2017, Twitter will donate the $1.9 million that RT had spent globally on advertising on Twitter to academic research into elections and civic engagement.

33. If you recently terminated any agreements with Russia Today or Sputnik, on what date did the termination become effective?

Twitter off-boarded RT and Sputnik as advertisers on October 26, 2017.

34. Do Russia Today or Sputnik need to purchase advertising space on your platform, or can they freely maintain a Page or distribute web content via their own or affiliated Twitter accounts?

As noted above, Twitter recently off-boarded RT and Sputnik as advertisers on the platform. With respect to organic (non-paid) content, in contrast, unless those accounts violate the Twitter Rules or the Twitter Terms of Service—including by engaging in abusive behavior, promoting violence, harassing individuals, posting prohibited content, or using the platform for unlawful purposes—we do not restrict the type of content they choose to share with their followers. As a global platform, we believe that our users benefit from the exchange of ideas with other users around the world.

Twitter places greater limitations on the type of content that can be promoted with Twitter ads compared to organic content that our users generate. We draw this distinction because organic Tweets are generally shown to people who choose to follow the user that creates it, while ads—Promoted Tweets—are served to a broader audience, including users who have not chosen to follow the user or account that generated the ad.

35. Does Twitter prohibit, or have any concern about, foreign state-sponsored news organizations posting content via the Twitter platform?

Twitter does not categorically prohibit state-sponsored news organizations from posting organic content on our platform. Twitter is a global company with hundreds of millions of users accessing and engaging with information on the platform from around the world. Access to news and real-time media reports is an essential feature of our platform, regardless of location. As with any other account, we permit news organizations to post content on our platform that is

accessible to their followers, so long as they do not engage in illegal activity or otherwise violate our Terms of Service.

[From Senator Harris]

36. Your company has produced information about Russian propaganda advertisements. Your company has also produced information about Russian propaganda that appeared as ordinary user content. You have not, however, provided information about the legitimate advertisements that accompanied Russian content.

- **How long do you retain placement and billing records for advertisements on your services?**
- **Have you instructed your relevant business units to retain the records of advertisements that accompanied Russian propaganda? If you have not, will you immediately issue that instruction?**

Twitter maintains advertisers' billing records in the ordinary course of business. Those records are and will be retained.

- **How much revenue do you estimate that you earned from the advertising that accompanied Russian propaganda?**
- **Have you notified the advertisers whose advertisements accompanied Russian propaganda?**
- **What do you plan to do with the revenue that you earned from the advertisements that accompanied Russian propaganda?**

Twitter's advertising revenue is primarily driven by our Promoted Products. The way in which advertisers use our platform, and the nature of those Promoted Products, supports an estimate that very little revenue was generated from advertising that "accompanied" Russian propaganda on Twitter, as described below. Our Promoted Products are designed to be incorporated into our platform as native advertising, ideally to be as compelling and useful to our users as organic content on our platform. Given this design, Twitter's advertising differs from other platforms and most Twitter advertising does not accompany particular content. For example, Twitter does not display banner ads that accompany a news story.

Twitter's Promoted Products include Promoted Accounts, Promoted Trends, and Promoted Tweets. Promoted Accounts appear in the same format and place as accounts suggested by our Who to Follow recommendation engine, or in some cases, in Tweets in a user's timeline. Promoted Accounts provide a way for our advertisers to grow a community of users who are interested in their business, products or services.

Promoted Trends appear at the top of the list of trending topics for an entire day in a particular country or on a global basis. When a user clicks on a Promoted Trend, search results for that trend are shown in a timeline and a Promoted Tweet created by our advertisers is displayed to the user at the top of those search results.

Promoted Tweets, in the vast majority of cases, appear within a user's timeline or search results just like an ordinary Tweet, and the advertisement is the Tweet itself. These Promoted Tweets do not "accompany" any specific Tweet, nor are they otherwise linked to a particular account.

A small percentage of Promoted Tweets or Accounts (approximately 7% during the 2016 election period) are served to user profiles and may appear within the profile page of an account that a user chooses to visit. As with other Promoted Product placements, to protect user experience, only a very limited number of Promoted Product impressions will render in a profile when another user views it.

The results of our retrospective review allow reasonable estimates of how much revenue could have been generated by Promoted Tweets served to profiles of accounts linked to the Internet Research Agency ("IRA"). Our review has found that a very small fraction of the total content on Twitter during the pre-2016 election period originated from IRA accounts. Even in the unlikely scenario in which ads appeared in each of the account profiles identified as linked to the IRA, the maximum amount of revenue Twitter would have earned from those ads would be very small, as described below.

The analysis we have conducted supports that estimate. We reviewed data from the election time period concerning the number of impressions that were generally served on user profiles available for ad impressions as well as the average revenue collected from those profiles. Extrapolating from that data to a set of 2,752 accounts such as those that Twitter previously identified as linked to the IRA, would yield an estimate of approximately $400 total revenue during the late 2016 election period for Promoted Products that would have accompanied that number of accounts by appearing in those user profiles. While this is a rough estimate based upon aggregate data, it provides a sense of scale for revenue from the types of ads that could accompany this content given the nature of Twitter's advertising offerings during the relevant time period.

Twitter has recently off-boarded Russia Today ("RT") and Sputnik from running ad campaigns on our platform on the basis of their efforts to disrupt the 2016 Presidential election (as reported by the Intelligence Community) and due to violations of our advertising policies. Twitter subsequently announced that we will donate the $1.9 million that RT had spent globally on advertising on Twitter to academic research into elections and civic engagement.

37. The problems of inauthentic, false, and hyper-partisan content are much broader than Russian propaganda.

- **How many of the accounts on your service do you estimate are inauthentic?**
- **If you are aware of independent estimates of inauthentic or false content on your platforms, please provide those estimates. If you disagree with the estimates, please explain why.**
- **How much of the activity on your service do you estimate is inauthentic or false?**

Based on a review of a representative sample of accounts, we estimate that false or spam accounts represent less than 5% of our MAUs. Our estimates are lower than those reported by outside researchers because those researchers do not have access to critical internal information necessary to make an accurate determination of the scale of spam, fake accounts or automated bots on Twitter. As a result, reports from third-party researchers often overestimate the true volume of such accounts on our platform—sometimes by large orders of magnitude.

While our detection tools for false or spam accounts rely on a number of inputs and variables and do not operate with 100% precision, they are informed by information not available outside of Twitter. Our internal researchers have access to and can analyze a number of different signals including, among other things, email addresses, phone numbers, login history, and other non-public account and activity characteristics that enable us to conduct a more thorough review and reach more accurate conclusions as to whether the account in question is fake or spam. We keep such information confidential and do not make it available to researchers in order to protect the privacy of our users.

Because third-party researchers do not have access to internal signals that Twitter can access, their bot and spam detection methodologies must be based on public information and often rely on human judgment, rather than on internal signals available to us. One common model for determining whether an account is fake or automated is the "Botometer model," which compares publicly available account features, such as Tweet count, follower count, and use of language, to the characteristics exhibited by purportedly "known" bots. The initial evaluation of whether an account is or is not a bot, however, relies on an individual assessment and is, therefore, inherently imprecise.

There are also studies that use the limited public Tweet data that we offer researchers through an application programming interface ("API"). The studies that rely on information from the Twitter API to identify automated accounts similarly overestimate both the number and impact of these accounts because our internal detection tools and filtering techniques are not available to third parties. Those tools enable us to remove from the platform malicious automated accounts (and content generated by such accounts), but the accounts may nevertheless appear in the data stream that researchers access through our API, thus inaccurately reflecting the traffic on Twitter.

A study conducted by the University of Southern California and Indiana University estimated that as much as 15% of Twitter accounts are automated, spam accounts. That estimate, however, was based on a prediction of whether a user may or may not be an automated account

and was derived from human judgments about an account's attributes. The authors of the study acknowledge that detecting automated accounts "is a hard task. Many criteria are used in determining whether an account is controlled by a human or a bot, and even a trained eye gets it wrong sometimes." See https://botometer.iuni.iu.edu/#!/faq#bot-threshold.

We are committed to continuing to work on refining our spam detection tools and to update the Twitter community and the public periodically about our estimates and analysis of these things on our platform. We regularly receive and welcome input from researchers and Twitter users about ways in which we can optimize our detection and enforcement methods. In addition, as we have announced, we are also committed to donating the $1.9 million we projected to have earned from RT advertising to support external research into the use of Twitter in civic engagement and elections, including the use of malicious automation and misinformation.

Note that Twitter does not prohibit the use of pseudonymous accounts (accounts used by real people for non-spam purposes under any name they choose) provided they comply with the Twitter Rules. Many common and powerful uses of Twitter are enabled by this policy, including allowing religious and/or political dissidents and others to engage in free expression without fear of retribution from oppressive governments. It also allows users to have accounts focused on specific interests and to keep those interests separate from a professional or other account associated with their real name. Other users make creative use of this ability to Tweet in the name of a pet or to engage in parody or satire. Such uses of Twitter do not violate our Rules.

- **If the independent estimates were accurate, how much of your annual revenue would be attributable to inauthentic or false content?**
- **How much of your annual revenue do you estimate is attributable to inauthentic or false content?**
- **Do you have a policy of notifying advertisers when their advertisements accompany inauthentic or false content?**
- **What do you do with the revenue that you earn from advertisements that accompany inauthentic or false content?**
- **How much of the news content that is shared on your services do you estimate is false?**
- **How much of the news content that is shared on your services do you estimate is hyper-partisan?**

Twitter's approach to addressing the spread of malicious automation and inauthentic accounts on our platform is to focus on problematic behavior and abuse, not primarily on the content that such accounts attempt to disseminate. We are committed to addressing the spread of misinformation on our platform—and to prevent future attempts of interfering with U.S. elections—but we recognize that spam and malicious automation are not limited to political content and can undermine the positive user experience we seek to offer irrespective of the content.

Accordingly, we monitor various behavioral signals related to the frequency and timing of Tweets, Retweets, likes, and other such activity, as well as to similarity in behavioral patterns across accounts, in order to identify accounts which are likely to be maliciously automated or acting in an automated and coordinated fashion. We monitor and review unsolicited targeting of accounts, including accounts that mention or follow other accounts with which they have had no prior engagement. For example, if an account follows 1,000 users within the period of one hour, or mentions 1,000 accounts within a short period of time, our systems are capable of detecting that activity as aberrant and as potentially originating from suspicious accounts.

Twitter is continuing its effort to detect and prevent malicious automation by leveraging our technological capabilities and investing in initiatives aimed at understanding and addressing behavioral patterns associated with such accounts. For example, in early 2017, we launched the Information Quality initiative, an effort aimed at enhancing the strategies we use to detect and deny bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

The spread of misinformation online is neither a new phenomenon nor unique to our platform. Twitter takes this issue seriously, but we also recognize that our ability to monitor or control the veracity of the content our users choose to share on the platform is limited. We cannot prevent individuals from lying or exaggerating. And given the scale of activity on our platform—where over 330 million users are Tweeting nearly half a billion Tweets per day in scores of languages—we are not able to assess whether each of those Tweet contains arguably inaccurate information (or assess revenue using that criterion).

We are open to examining new solutions to addressing this problem. But we also recognize that the Twitter community itself remains one of the most powerful tools to addressing the spread of misinformation. While it is true that false information and rumors can spread quickly, accurate information—particular information directed at contesting untruths—propagates in a similarly high velocity.

We have observed our users engage with false information by refuting it: they Retweet it, reply to it, and Tweet original content contradicting it. As we noted in connection with the Committee hearing, in response to the attempted "vote-by-text" effort and similar voter suppression attempts during the 2016 election, Twitter restricted as inaccessible, pending deletion, 918 Tweets from 529 users who proliferated that content. Twitter also permanently suspended 106 accounts that were collectively responsible for 734 "vote-by-text" Tweets. Twitter identified, but did not take action against, an additional 286 Tweets of the relevant content from 239 Twitter accounts, because we determined that those accounts were seeking to refute the "text-to-vote" message and alert other users that the information was false and misleading. Notably, those refuting Retweets generated significantly greater engagement across the platform compared to the Tweets spreading the misinformation—8 times as many impressions, engagement by 10 times as many users, and twice as many replies.

- **Have you conducted any studies of how false content performs on your services? If yes, please describe those studies and provide copies.**

- **Have you conducted any studies of how hyper-partisan content performs on your services? If yes, please describe those studies and provide copies.**

Twitter has not conducted such studies. As noted above, our efforts to address malicious activity on our platform focus on behavior rather than content.

38. In the area of state-sponsored hacking, each of your companies has a responsible senior executive and dedicated technical experts.

- **Who is the senior executive responsible for countering state-sponsored information operations? When did that executive assume that responsibility, and what is the scope of the responsibility?**

The threats posed by state-sponsored misinformation operations have the potential to impact many parts of our company, including consumer product, advertising, and information security teams. Twitter's General Counsel and Head of Consumer Product, along with our Head of Trust & Safety and Chief Information Security Officer, are generally responsible for ensuring that the platform remains safe. That responsibility includes overseeing and directing Twitter's response to state-sponsored misinformation and malicious human coordinated and automated activity. Twitter's Information Quality team, formed in in early 2017, reports to Twitter's Head of Consumer Product and is intensively focused on enhancing the strategies we use to detect and stop bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

- **As of November 2016, how many of your technical employees had the primary day-to-day task of countering state-sponsored information operations?**

- **As of today, how many of your technical employees have the primary day-to-day task of countering state-sponsored information operations?**

Twitter dedicates significant resources to addressing malicious automation, bots, and other coordinated activities. We believe we have the right resources and strategies in place. We dedicated nearly the entire engineering, product, and design teams to look at these issues at the beginning of 2017, and we regularly reexamine staffing and resources and adjust as needed.

Critical to the continued success of our efforts is our ability to leverage our technological advancements and improvements to tackle this problem; given the scale, this is not something that we or anyone else can review and address by hand alone. We have been successful at addressing other challenges in other contexts and we believe we can meet this challenge as well. For example, as of September 2017, 95% of account suspensions for promotion of terrorist activity were accomplished using our existing proprietary detection tools—up from 74% in 2016. We are confident that the combination of our dedicated teams and our ability to use our detection tools and other technological advancements at our disposal equip us well to confront this ongoing threat.

We also recognize that, at this time, computer algorithms alone are not sufficient to address the problem. Accordingly, those tools are complemented by manual review teams, collaboration and information sharing with industry peers and participants, reliance on data and intelligence from third-party security vendors, and partnerships with other companies and civil society.

Twitter understands that, to succeed, we must combine resources, information, knowledge, and effort with industry partners, civil society, and government. We do not compete against other companies on our ability to detect and label malicious content on our platform; instead, we recognize that we will all be stronger if we view this as a shared threat. We are committed to a continued collaborative approach and believe it will prove successful going forward.

39. Much of what we now know about Russian propaganda is because of academic researchers and investigative journalists. These groups do not currently have access to the data that they need to inform the public and to build tools for detecting state-sponsored information operations. For example, these groups generally cannot assess the full set of public user activity associated with a specific topic, nor can they analyze the behavior of accounts associated with state-sponsored information operations. Providing access to this data need not come at the expense of user privacy, since these groups could be bound by non-disclosure agreements and use privacy-preserving algorithms to conduct their studies.

- **Will you commit to, by the end of the year, providing five or more independent, non-profit entities with access to the data they need to understand and counter state-sponsored information operations? If you will, please provide specifics and a timeline for how you plan to honor the commitment. If you will not, please explain why.**

Twitter is working to deepen our partnership with independent researchers. An example of this commitment is the significant resources we are dedicating to the effort. Twitter recently off-boarded Russia Today ("RT") and Sputnik from running ad campaigns on our platform on the basis of their efforts to disrupt the 2016 Presidential election (as reported by the Intelligence Community) and due to violations of our advertising policies. Twitter subsequently announced that we will donate the $1.9 million that RT had spent globally on advertising on Twitter to academic research into elections and civic engagement.

We are also implementing changes to our data services that will make our public data more accessible than before for research purposes. These changes include, for example, new services which offer developers greater historical search access than was previously accessible. Twitter's data services are unique in the industry, offering insights into the Twitter platform that other companies do not provide.

In addition, Twitter is launching an industry-leading Transparency Center that will offer the public better visibility into who is advertising on Twitter and how those ads are targeted. That information will better enable users and outside parties to conduct their own research or evaluation regarding particular ads.

40. Similarly, much of what we now know about inauthentic, false, or hyper-partisan content is because of independent groups.

- **Will you commit to, by the end of the year, providing five or more independent, non-profit entities with access to the data they need to understand the prevalence and performance of inauthentic, false, or hyper-partisan content on your services? If you will, please provide specifics and a timeline for how you plan to honor the commitment. If you will not, please explain why.**

The answer to question 40 has been provided in response to question 39.

41. Addressing state-sponsored information operations will continue to require cooperation among private sector entities and with the government.

- **Have you established a formal mechanism for promptly sharing actionable information about state-sponsored information operations with other online services, similar to the mechanisms that already exist for sharing information about state-sponsored cybersecurity threats? If not, will you commit to developing such a mechanism?**

- **The FBI is the federal agency responsible for countering foreign propaganda. Do you have a written policy of promptly sharing what you learn about state-sponsored information operations with the FBI? If not, will you commit to developing such a policy?**

Twitter agrees that cooperation with other private-sector entities and the government is necessary to address state-sponsored information operations. Twitter engages in information sharing with its industry counterparts on a variety of threats and is committed to maintaining such cooperative efforts.

Twitter has partnered with other platforms to make progress against common threats. In June 2017, for example, we launched the Global Internet Forum to Counter Terrorism (the "GIFCT"), a partnership among Twitter, YouTube, Facebook, and Microsoft. The GIFCT will facilitate, among other things, information sharing, technical cooperation, and research collaboration, including with academic institutions.

The GIFCT announced a commitment to create a shared industry database of "hashes"—unique digital "fingerprints"—for violent terrorist imagery or terrorist recruitment videos or images that have been removed from our individual services. The database allows a company that discovers terrorist content on one of their sites to create a digital fingerprint and share it with the other companies in the forum, who can then use those hashes to identify such content on their services or platforms, review against their respective policies and individual rules, and remove matching content as appropriate, or even block extremist content before it is posted in the first place. The database now contains more than 40,000 hashes. Instagram, Justpaste.it, LinkedIn, Oath, and Snap have also joined this joint initiative, and we are working to add several additional companies in 2018.

Twitter also engages in regular discussions with law enforcement agencies, including the FBI. We respond promptly to properly scoped legal process and valid requests for information from those agencies. Given the difficulty of identifying and labeling activity as state-sponsored, we also recognize the important role of government information sharing efforts, such as the Intelligence Community's Report about the 2016 U.S. election.

42. You currently have automated systems in place to detect spam and abuse.

- **Do you have an automated system in place to detect state-sponsored information operations? If yes, will you provide this Committee with a private briefing on the system's design and performance? If no, why not?**

Twitter's approach to addressing the spread of malicious, inauthentic automation on our platform is to focus on problematic behavior and abuse, not primarily on the content that such accounts attempt to disseminate. We are committed to addressing the spread of misinformation on our platform—and to prevent future attempts to interfere with U.S. elections—but we recognize that spam and malicious automation are not limited to political content and can undermine the positive user experience we seek to offer irrespective of the content.

Accordingly, we monitor various behavioral signals related to the frequency and timing of Tweets, Retweets, likes, and other such activity, as well as to similarity in behavioral patterns across accounts, in order to identify accounts that are likely to be maliciously automated or acting in an automated and coordinated fashion in ways that are unwelcome to our users. We monitor and review unsolicited targeting of accounts, including accounts that mention or follow other accounts with which they have had no prior engagement. For example, if an account follows 1,000 users within the period of one hour, or mentions 1,000 accounts within a short period of time, our systems are capable of detecting that activity as aberrant and as potentially originating from suspicious accounts.

Twitter is continuing its effort to detect and prevent malicious automation by leveraging our technological capabilities and investing in initiatives aimed at understanding and addressing behavioral patterns associated with such accounts. For example, in early 2017, we launched the Information Quality initiative, an effort aimed at enhancing the strategies we use to detect and stop bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

Since the 2016 election, we have made significant improvements to reduce external attempts to manipulate content visibility. These improvements were driven by investments in methods to detect malicious automation through abuse of our API, limit the ability of malicious actors to create new accounts in bulk, detect coordinated malicious activity across clusters of accounts, and better enforce policies against abusive third-party applications.

In addition, we have developed new techniques for identifying patterns of activity inconsistent with legitimate use of our platform (such as near-instantaneous replies to Tweets, nonrandom Tweet timing, and coordinated engagement), and we are currently implementing these detections across our platform. We have improved our phone verification process and introduced new challenges, including reCAPTCHA (utilizing an advanced risk-analysis engine

developed by Google), to give us additional tools to validate that a human is in control of an account. We have enhanced our capabilities to link together accounts that were formed by the same person or that are working in concert. And we are improving how we detect when accounts may have been hacked or compromised.

With our improved capabilities, we are now detecting and blocking approximately 450,000 suspicious logins each day that we believe to be generated through automation. In September 2017, our systems identified and challenged an average of four million suspicious accounts per week, which represents more than double our rate of detection at this time last year. Over three million of those accounts were challenged upon signup, before their content or engagements could impact other users. Between June and September 2017, we have also suspended more than 117,000 malicious applications for API abuse. Those applications were collectively responsible for more than 1.5 billion Tweets in 2017.

We plan to continue building upon our 2017 improvements, including through collaboration with our peers and investments in machine-learning capabilities that help us detect and mitigate the effect on users of fake, coordinated, and malicious automated account activity.

We have also observed the expansion of malicious activity on our platform from automated accounts to human-coordinated activity, which poses additional challenges to making our platform safe. We are determined to meet those challenges and have been successful in addressing such abusive behavior in other contexts. We are committed to leveraging our technological capabilities in order to do so again. For example, as of September 2017, 95% of account suspensions for promotion of terrorist activity were accomplished using our existing proprietary detection tools—up from 74% in 2016. We are confident that the combination of our dedicated teams, our detection tools, and other technological advancements at our disposal will prove essential in addressing malicious human-coordinated activity as well.

43. You have promised to adopt additional transparency and verification requirements for political advertising.

- **Please detail the new requirements and your timeline for implementing those requirements.**
- **How do you define the political advertisements that are covered by the new requirements? Why did you adopt the definition that you did?**
- **Will you commit to including within your definition, at a minimum, advertisements that advocate for or against a specific candidate, political party, piece of legislation, regulatory action, or ballot referendum? If not, why not?**

Twitter's approach to greater transparency in political advertising centers on two components: a new electioneering policy and an industry-leading Transparency Center. We expect to roll out the new policy in the U.S. during the first quarter of 2018.

To make it clear when a user is viewing or engaging with content considered to be an electioneering ad, our policy will require that advertisers that meet the definition of

electioneering identify their campaigns as such. We will also change the interface of such ads and include a visual political ad indicator (*see, e.g.*, Fig. 2 below).

Fig. 2: Template for New Electioneering Ad

Twitter's definition of electioneering ads will be derived from the FEC regulations' definition of that term, which includes any broadcast, cable, or satellite communication that refers clearly to a candidate for federal office, is published 60 days before a general election or 30 days before a primary, convention, or caucus, and is targeted to the relevant electorate (if the candidate is running for Congress).

The goal of the Transparency Center is to offer the public increased visibility into all advertising on the platform, and to provide users with tools to share feedback with us. With respect to electioneering ads and the Transparency Center, we intend to better enable users and outside parties to conduct their own research or evaluation regarding particular ads. Electioneering ads information accessible through the Transparency Center will include, among other things, the identity of the organization funding the campaign, all ads that are currently running or have run on Twitter, campaign spend, and targeting demographics for specific ads or campaigns. We plan to launch the Transparency Center as soon as feasible after rolling out our electioneering policy in the first quarter of 2018, and we are continuing to refine the tools we will make available in conjunction launching the Transparency Center to ensure the best experience for our users.

44. Your platform offers a range of advertisement targeting criteria.

- **Which types of targeting criteria, such as demographic, behavioral, lookalike, or email matching, did Russia use for its information operations?**

In connection with our retrospective review of Russian activity on our platform in 2016, we identified nine accounts as being potentially linked to Russia that promoted election-related, English-language content. Of the nine accounts that we identified as being potentially linked to Russia and promoting election-related, English-language content, the most significant use of advertising was by @RT_com and @RT_America. Those two accounts collectively ran 44 different ad campaigns, accounting for nearly all of the relevant advertising we reviewed.

Of all of RT's ad campaigns, 11 were targeted exclusively at English-language speakers, and several others—including all of @RT_America's seven campaigns—used geographic targeting to focus on U.S. users. Though many of the campaigns did not include specialized, non-geographic targeting, a subset of the @RT_com campaigns targeted followers of other RT accounts or followers of other leading news organizations based in the U.S. and other countries. A small number of short "quick promote" campaigns used keyword targeting to attempt to reach audiences searching for particular words or phrases.

The remaining seven accounts, which collectively ran approximately 50 ad campaigns, used a broad range of targeting strategies. We did not identify a trend across the targeting criteria used by those accounts. The accounts sporadically used English-language targeting and location targeting at the country level (including the U.S., Canada, the UK, France, and Ukraine). A handful of campaigns also sought to reach followers of certain accounts.

45. Have you seen any evidence of state-sponsored information operations associated with American elections in 2017, including the gubernatorial elections in Virginia and New Jersey?

Twitter is not aware of any specific state-sponsored attempts to interfere in any American elections in 2017, including the Virginia and New Jersey gubernatorial elections. However, our automated systems for detecting and preventing abuse of our services (including our spam and malicious automation) continually operate with the goal of ensuring that all conversations on Twitter—including those surrounding elections—are spam- and abuse-free. As was publicly reported, we were made aware of a surge in automated followers for a candidate in a recent Senate election, immediately took action, and do not have any indication that the activity was state-sponsored.

46. User reports are an important signal of when an account is not authentic.

- **How frequently do you receive user reports about inauthentic accounts?**
- **What is your process for responding to those reports? How often does that process usually take?**
- **What proportion of those reports result in an account restriction, suspension, or removal?**
- **Among the reports that you decline to take action on, what proportion involve reported accounts that you subsequently identify as inauthentic?**

Twitter receives approximately 5 million reports of spam content or malicious automated Tweets, accounts, or interactions (*e.g.*, follows) per month. The majority of those reports automatically trigger a signal of potential inauthentic behavior by an account seeking to manipulate our platform.

To prevent the misuse of reporting to trigger enforcement actions against users who are not necessarily in violation of the Twitter Rules, user reports are not the sole factor that Twitter considers when taking action against an account. Rather, we use a variety of signals—including overall account behavior and interaction history—to determine whether a report of inauthentic behavior warrants further review or action. Given the broad range of signals Twitter relies on in determining whether an account should be restricted, suspended, or removed, we cannot with any precision assess how many of the 5 million monthly reports directly result in action against the reported account. In addition, Twitter accounts may be reported under different policies, for different Tweets or content, and at different points in the account lifecycle. All of these factors influence Twitter's review and enforcement decisions.

It is not uncommon for an account to be subject to enforcement action later even if Twitter does not initially suspend the account based on the initial report. For example, if Twitter does not take action in response to a user report, the reporting user may be able to submit further information for Twitter to consider during its review. Such supplemental reports may result in Twitter taking action where it may not have previously. In some instances, such as in reports of impersonation or intellectual property infringement, Twitter may require that the report include specific types of information in order to take action against the account. Twitter may not be able to take action until it has received that information. Twitter may also continue to receive reports from the same or other reporters regarding an account or specific content, which may result in Twitter taking action on those new reports at some point after the initial report.

- **How many of the accounts that you have identified as associated with Russian information operations were the subject of a user report? Please provide all the user reports associated with these accounts and the actions that you took in response, including the specific time for the report and each action.**

We received user reports for a small minority of the IRA accounts previously identified to the Committee, prior to the suspension of these accounts from Twitter. A large percentage of those reports related to content from two accounts: @TEN_GOP and @SouthLoneStar. While

many of these reports were not actioned at the time, Twitter has since made substantial changes to its operations and policies to respond more effectively to user reports. For example, in July of 2017, we announced that we are now taking action on 10 times the number of abusive accounts every day compared to the same time last year. We also announced that we now limit account functionality or place suspensions on thousands more abusive accounts each day.

47. Much of the public discussion about state-sponsored information operations on your platforms has centered on the Internet Research Agency. That is not the only group surreptitiously spreading state-sponsored propaganda.

- **What other groups are you tracking that are affiliated with the Russian government?**
- **What other countries do you believe are conducting state-sponsored information operations on your platforms? Please describe the groups that you are tracking for each country, including both government agencies and affiliates.**

As we noted in connection with the Committee hearing, there are technological limits to what we can determine based on the information we can detect regarding a user's origin. Based in part on work conducted by our Information Quality team, we are aware of the fact that, among other things, a high concentration of automated engagement and content originates from data centers and users accessing Twitter via Virtual Private Networks ("VPNs") and proxy servers, which obscure the user's location and affiliation. Twitter's abuse and spam detection and prevention systems and enforcements mechanisms operate without regard to the specific country of origin of an offending Tweet or malicious account. Users who violate the Twitter Rules against abuse, spam, malicious automation, or other forms of prohibited behavior are subject to enforcement, regardless whether they are affiliated with specific state actors.

Information we receive from third parties, including government agencies, security research firms, and NGOs, may allow us to reliably associate certain accounts with particular groups (such as the IRA). And we will continue working with the Committee and other groups to help identify further state-sponsored actors that seek to abuse our services and manipulate activity on our platform.

48. You have confirmed that you have systems for assessing whether a specific account is automated (i.e. a "bot") and whether a specific piece of content is being amplified through automated means.

- **Twitter allows bots to operate on its social network. When and why did Twitter make that decision?**

Automation has not been categorically prohibited on Twitter for years, primarily because we recognize that it often serves a useful and important purpose. Automation is essential for certain informational content, particularly when time is of the essence, including for law enforcement or public safety notifications. Examples include Amber Alerts, earthquake and other storm warnings, and notices to "shelter in place" during active emergency situations. Automation is also used to provide customer service for a range of companies. For example, as of April 11, 2017, users are able to Tweet @TwitterSupport to request assistance from Twitter.

If a user reports a forgotten password or has a question about our rules, the initial triage of those messages is performed by our automated system—a Twitter-developed program to assist users in troubleshooting account issues.

To maintain the integrity of our platform and to ensure a positive user experience, we focus on addressing the spread of *malicious* automation, abusive content, and accounts that engage in such behavior. To that end, we monitor various behavioral signals related to the frequency and timing of Tweets, Retweets, likes, and other such activity, as well as to similarity in behavioral patterns across accounts, in order to identify accounts which are likely to be automated or acting in a malicious automated and coordinated fashion.

- **How does Twitter differentiate between permissible automated activity (i.e. "benign bots") and impermissible automated activity (i.e. "bad bots")?**

Twitter distinguishes between "good" and "bad" automation based on the behavior of the account, using both algorithm-driven behavior detections and manual reviews. Many of our spam enforcement targeting malicious automation take place automatically and look for signals such as high-volume Tweeting, inhuman response times, and coordinated activities across accounts.

Thus, we monitor and review unsolicited targeting of accounts, including accounts that mention or follow other accounts with which they have had no prior engagement. For example, if an account follows 1,000 users within the period of one hour, or mentions 1,000 accounts within a short period of time, our systems are capable of detecting that activity as aberrant and as potentially originating from suspicious accounts. An example of automation that typically does not trigger our detection tools involves automatic customer service responses to user's Tweets that include a company's handle.

- **When a user visits a profile page, Twitter does not currently indicate whether it believes the profile belongs to a bot. Will you commit to providing a visual indication to users that Twitter believes that the account is a bot, so that users can better understand and evaluate the content that they see? If not, why not?**

- **When a user encounters a piece of content, you do not currently indicate whether the content is being amplified through automated means. Will you commit to providing a visual indication to users of whether Twitter believes that the content has been amplified through automation? If not, why not?**

Because automated content can originate with any type of account, such disclosure would necessarily be both over-inclusive and under-inclusive. For example, certain automation tools that do not violate our Rules enable users to schedule their Tweets to post automatically at a particular time or in response to specific activity. Since they may be utilized by individual users, applying a categorical designation to accounts that employ those tools would not accurately characterize such accounts.

We are committed to keeping Twitter a safe environment, and we continue to invest in improving our systems for detecting and preventing malicious uses of our platform to amplify content using automation. We prohibit the use of automation to artificially amplify content.

Once our systems detect an account as generating automated content or spam, we can take action against that account at either the account level or the Tweet level (*e.g.*, hiding the Tweet, revoking a user's ability to post content on the platform until that user deletes the Tweet in question, or temporarily or permanently suspending the account).

49. Inauthentic accounts can be disabled subsequent to automated or manual review.

- **What role do automated and human employee review play in your decision to disable a suspected inauthentic account?**

Our systems are built to detect malicious automation and spam accounts across their lifecycles, including detection at the account creation and login phase and detection based on unusual activity (*e.g.*, patterns of Tweets, likes, and follows). Our ability to detect such activity on our platform is bolstered by internal, manual reviews conducted by Twitter employees. Those efforts are further supplemented by user reports, which we rely on not only to address the content at issue but also to calibrate our detection tools to identify similar content as spam.

Once our systems detect an account as generating malicious automated content or spam, we can take action against that account at either the account level or the Tweet level. Depending on the mode of detection, we have varying levels of confidence about our determination that an account is violating our rules. We have a range of options for enforcement, and generally, the higher our confidence that an account is violating our rules, the stricter our enforcement action will be, with immediate suspension as the harshest penalty. If we are not sufficiently confident to suspend an account on the basis of a given detection technique, we may challenge the account to verify a phone number or to otherwise prove human operation, or we may flag the account for review by Twitter personnel. Until the user completes the challenge, or until the review by our teams has been completed, the account is temporarily suspended; the user cannot produce new content (or perform actions like Retweets or likes), and the account's contents are hidden from other Twitter users.

We also have the capability to detect suspicious activity at the Tweet level and, if certain criteria are met, to internally tag that Tweet as spam otherwise suspicious. Tweets that have been assigned those designations are hidden from searches, do not count toward generating trends, and generally will not appear in feeds unless a user follows that account. Typically, users whose Tweets are designated as spam are also put through the challenges described above and are suspended if they cannot pass.

For safety-related TOS violations, we have a number of enforcement options. For example, we can stop the spread of malicious content by categorizing a Tweet as "restricted pending deletion," which requires a user to delete the Tweet before the user is permitted to continue using the account and engaging with the platform. So long as the Tweet is restricted—and until the user deletes the Tweet—the Tweet remains inaccessible to and hidden from all Twitter users. The user is blocked from Tweeting further unless and until they delete the restricted Tweet. This mechanism is a common enforcement approach to addressing less severe content violations of our TOS outside the spam context; it also promotes education among our users. More serious violations, such as posting child sexual exploitation or promoting terrorism, result in immediate suspension and may prompt interaction with law enforcement.

- **Do you require that a human employee review a suspected inauthentic account before it is disabled?**

Our ability to detect such activity on our platform is bolstered by internal, manual reviews conducted by Twitter employees. Those efforts are further supplemented by user reports, which we rely on not only to address the activity at issue but also to calibrate our detection tools to identify similar content as spam and to enforce the Twitter Terms of Service and Twitter Rules.

While our automated systems provide significant opportunities to scale enforcement activity on spam (though presenting far greater challenges in other areas where account level signals are less direct and user content itself is the focus), they frequently perform better when supplemented by human review of content. For example, our automated systems flag accounts that engage in suspicious activity for further manual review by Twitter personnel. Those systems also assist our staff in prioritizing manual reviews of user reports. However, the majority of enforcement actions against spam and malicious automated accounts are assisted by automated systems. We continue to invest in improving these systems while ensuring that we maintain a low rate of false positives to protect our users. And where we do not have sufficient confidence in an automated assessment to take immediate action against a suspicious account, that account may be reviewed by a Twitter employee.

- **If so, given the rate at which inauthentic accounts can be regenerated, how do you anticipate remaining ahead of the problem?**

- **What are you doing to improve automation in the process of detecting and disabling inauthentic accounts?**

- **What are you doing to make it more difficult to establish inauthentic accounts?**

Twitter is continuing its effort to detect and prevent malicious automation by leveraging our technological capabilities and investing in initiatives aimed at understanding and addressing behavioral patterns associated with such accounts. For example, in early 2017, we launched the Information Quality initiative, an effort aimed at enhancing the strategies we use to detect and stop bad automation, improve machine learning to spot spam, and increase the precision of our tools designed to prevent such content from contaminating our platform.

Since the 2016 election, we have made significant improvements to reduce external attempts to manipulate content visibility. These improvements were driven by investments in methods to detect malicious automation through abuse of our API, limit the ability of malicious actors to create new accounts in bulk, detect coordinated malicious activity across clusters of accounts, and better enforce policies against abusive third-party applications.

In addition, we have developed new techniques for identifying patterns of activity inconsistent with legitimate use of our platform (such as near-instantaneous replies to Tweets, nonrandom Tweet timing, and coordinated engagement), and we are currently implementing these detections across our platform. We have improved our phone verification process and introduced new challenges, including reCAPTCHA (utilizing an advanced risk-analysis engine developed by Google), to give us additional tools to validate that a human is in control of an

account. We have enhanced our capabilities to link together accounts that were formed by the same person or that are working in concert. And we are improving how we detect when accounts may have been hacked or compromised.

With our improved capabilities, we are now detecting and blocking approximately 450,000 suspicious logins each day that we believe to be generated through automation. In September 2017, our systems identified and challenged an average of four million suspicious accounts per week, which represents more than double our rate of detection at this time last year. Over three million of those accounts were challenged upon signup, before their content or engagements could impact other users. Between June and September 2017, we have also suspended more than 117,000 malicious applications for API abuse. Those applications were collectively responsible for more than 1.5 billion Tweets in 2017.

We plan to continue building upon our 2017 improvements, including through collaboration with our peers and investments in machine-learning capabilities that help us detect and mitigate the effect on users of fake, coordinated, and malicious automated account activity.

50. According to recent news reports, Twitter hosted content that was intended to disenfranchise voters in the Virginia gubernatorial election by misleading them about how to vote.

- **What automated and manual processes does Twitter have in place to identify content that is intended to disenfranchise voters?**
- **How quickly does Twitter remove content that is intended to disenfranchise voters? Please provide a histogram or quantile data.**

When Twitter receives reports of illegal voter suppression content, we review the Tweets and accounts in question and, where appropriate, take action to remove the Tweets or suspend the accounts for violating the Twitter Rules. We also employ the use of automated systems to identify "lookalike" posts (*i.e.*, posts which share a known misleading image) which were not directly reported but which should be reviewed.

For example, during the period leading up to the 2016 election, in response to the attempted "vote-by-text" effort and similar voter suppression attempts, Twitter restricted as inaccessible, pending deletion, 918 Tweets from 529 users who proliferated that content. Twitter also permanently suspended 106 accounts that were collectively responsible for 734 "vote-by-text" Tweets. Twitter took action against the first reports of those Tweets within a day or two; once we calibrated our systems to detect the vote-by-text content, our response time decreased and we were able to hide the content rapidly. Because such content removal takes place on a case-by-case basis and involves a fact-specific inquiry and human review, there is not a uniform frequency or pattern to such enforcement actions that we can depict with graphs.

[From Senator McCain]

51. Current campaign finance law establishes disclosure standards for television, radio, and print media. The Pew Research Center recently found that 65 percent of Americans identified an Internet-based source as their leading source of information in the 2016 election.

- **Under current law, to what extent is Twitter responsible for providing a similar quality of disclosure to the public?**

Current campaign finance laws require advertisers to include disclosure language on certain "public communications" and "electioneering communications." Compliance with FEC regulations and guidance from advisory opinions rests with the advertiser, rather than on Twitter or the television, radio, print or digital provider on which an advertiser runs an ad. The Federal Election Commission—through its regulations and advisory opinions—has advised advertisers who disseminate paid communications on digital platforms that they may be able to rely on regulatory exceptions to the disclaimer requirements for "small items" or for communications where including a disclaimer is "impracticable."

Twitter will take further steps to promote transparency and public understanding through the Transparency Center that we publicly announced last year. The goal of the Transparency Center is to offer the public increased visibility into advertising on the platform, and to provide users with tools to share feedback with us. With respect to electioneering ads and the Transparency Center, we intend to better enable users and outside parties to conduct their own research or evaluation regarding particular ads. Electioneering ads information that will be accessible through the Transparency Center will include, among other things, the identity of the organization funding the campaign, all ads that are currently running or have run on Twitter, campaign spend, and targeting demographics for specific ads or campaigns. We plan to launch the Transparency Center as soon as feasible after rolling out our electioneering policy in the first quarter of 2018, and we are continuing to refine the tools we will make available in conjunction with launching the Transparency Center to ensure the best experience for our users.

52. Your platform hosts thousands of tweets per second, or billions of tweets every year.

- **Given the challenge of monitoring such a vast amount of content, to what extent is the monitoring of campaign advertisements automated?**
- **Do you feel that this automation is sufficient in capturing bad actors?**

Twitter relies on two methods to prevent prohibited promoted content from appearing on the platform: a proactive method and a reactive method. Proactively, Twitter relies on custom-built algorithms and models for detecting Tweets or accounts that might violate its advertising policies. Reactively, Twitter takes user feedback through a "Report Ad" process, which flags an ad for manual human review.

On the proactive side, an advertisement and advertiser account that is subject to manual review is first reviewed by a set of machine classifiers that are built to detect Twitter Policy violations; any suspicious ads that those models flag are subsequently reviewed by Twitter

personnel. On the reactive side, when we receive reports through our "Report an Ad" service, those ads are similarly subject to manual review.

We believe the balance of proactive and reactive review allows us to actively enforce our policies through an effective process that incorporates user feedback. We continue to invest in improving our detection tools and developing new machine-learning models to improve detection accuracy and remain up-to-date with new trends and new Twitter policies.

As part of our ads transparency and electioneering ads efforts announced in October 2017, Twitter will require advertisers to go through an onboarding process, which will obligate them to provide information about how they are funding their media buys. For advertisers who do not self-identify but who run electioneering ads, we will use a combination of machine-learning models and human manual review to detect and halt these advertisers until they have correctly onboarded with us as an electioneering advertiser. While it is possible that foreign governments may attempt to purchase ads through consultants or management companies, Twitter's upcoming Transparency Center is intended provide identifying information about any such companies and their other advertising activities on Twitter. That information will better enable users and outside parties to conduct their own research or evaluation regarding particular ads.

With respect to organic content, Twitter dedicates significant resources to addressing and blocking the use of malicious automation, bots, and other coordinated activities on our platform. We believe we have the right resources and strategies in place. We dedicated nearly the entire engineering, product, and design teams to look at these issues at the beginning of 2017, and we regularly reexamine staffing and resources and adjust as needed.

Critical to the continued success of our efforts is our ability to leverage our technological advancements and improvements to tackle this problem; given the scale, this is not something that we or anyone else can review and address by hand. We have been successful at addressing other challenges in other contexts and we believe we can meet this challenge as well. For example, as of September 2017, 95% of account suspensions for promotion of terrorist activity were accomplished using our existing proprietary detection tools—up from 74% in 2016.

We also recognize that computer algorithms alone are not sufficient to address the problem. Accordingly, those tools are complemented by manual review teams, collaboration and information sharing with industry peers and participants, reliance on data and intelligence from third-party security vendors, and partnerships with other companies and civil society.

Twitter understands that, to succeed, we must combine resources, information, knowledge, and effort with industry partners, civil society, and government. We do not compete against other companies on our ability to detect and label malicious content on our platform; instead, we recognize that we will all be stronger if we view this as a shared threat. We are committed to a continued collaborative approach and believe it will prove successful going forward.

- **What sort of appeals process is in place in order to prevent faulty sorting?**

A user suspended from Twitter can file an appeal directly from the Twitter mobile application or from our website. Twitter's Help Center, accessible at http://help.twitter.com, provides additional information to users about how to an appeal of a suspension.

Suspended advertisers are also able to file appeals. In many cases, an advertiser will work with their account representative in order to do so. If an advertiser does not have a Twitter account representative, or if the advertiser prefers to proceed independently, the advertiser can file an appeal through Twitter's advertiser support form.

53. Twitter recently announced efforts to make campaign advertising more transparent, including the development of a "transparency center," and harsher penalties for electioneering advertisers that violate policies.

- **How do you plan to detect false disclosure information and enforce your policies?**

Twitter is developing mechanisms and processes for verifying the information we will ask our advertisers to disclose, and policies governing enforcement of and compliance with the applicable ads policies. For advertisers who do not self-identify, but who run electioneering ads, we will use a combination of machine-learning models and human manual review to detect and halt these advertisers until they have correctly onboarded with us as an electioneering advertiser.

Responses to Questions for the Record for Mr. Kent Walker, Senior Vice President and General Counsel, Google

Senate Select Committee on Intelligence hearing on Social Media Influence in the 2016 U.S. Elections

[From Chairman Burr]

1. What procedures must the Russian government follow to compel the production of customer-created content or personally identifiable information from your company?

We respond to Russian government requests for customer-created or personally identifiable information only pursuant to valid U.S. legal process secured through Mutual Legal Assistance Treaties (MLAT) with the United States and other diplomatic and cooperative arrangements. In extraordinary circumstances, where Google has a good faith belief that disclosure of data without delay is necessary to avert a threat to human life, Google, in consultation with an FBI legal attaché or an attorney with the Department of Justice's Computer Crime and Intellectual Property Section, may also disclose information to the Russian government. In addition, we may produce information pertaining to our Ads users who contract with our Ads business located in Russia pursuant to valid legal process in Russia and according to Russian law.

2. Has the Russian government compelled the production of customer created content or personally identifiable information from your company?

As discussed in response to Question 1 above, other than information pertaining to our Ads users who contract with our Ads business located in Russia, the Russian government may compel production of customer-related content or personally identifiable information only pursuant to valid U.S. legal process secured through an MLAT or other diplomatic and cooperative arrangements.

3. If so, has your company complied with such efforts by the Russian government to compel the production of customer-created content or personally identifiable information?

Our transparency report provides details regarding our compliance with all government requests for customer data, by country, including requests by the Russian government. The latest information is available at https://transparencyreport.google.com/user-data/overview.

4. Has your company ever refused to comply with efforts by the Russian government to compel the production of customer-created content or personally identifiable information? If so, have any of these efforts been successful?

Yes. We review each request we receive to ensure it satisfies applicable legal requirements and our policies. If we feel that a request is overbroad, we seek to narrow it. As you can see in our transparency report, available at https://transparencyreport.google.com/user-data/overview, we have not complied with every request.

5. Has your company provided any content created by a U.S. person or personally identifiable information about a U.S. person to the Russian government?

As stated in response to Question 3, our transparency report provides details regarding our compliance with all government requests for customer data, by country, including requests by the Russian government. The latest information is available at https://transparencyreport.google.com/user-data/overview.

6. More specifically, has your company provided to the Russian government the content of any direct messages sent to or from a U.S. person?

As discussed in response to Question 1 above, other than information pertaining to our Ads users who contract with our Ads business located in Russia, the Russian government may compel production of customer related content or personally identifiable information only pursuant to valid legal process secured through an MLAT or other diplomatic and cooperative arrangements. Our transparency report details our compliance with Russian government requests for customer data and is available at: https://transparencyreport.google.com/user-data/overview.

7. Has your company provided to the Russian government any information that could be used to determine the location of a U.S. person?

As discussed in response to Question 1 above, other than information pertaining to our Ads users who contract with our Ads business located in Russia, the Russian government may compel production of customer-related content or personally identifiable information only pursuant to valid legal process secured through an MLAT or other diplomatic and cooperative arrangements. Our transparency report details our compliance with Russian government requests for customer data and is available at: https://transparencyreport.google.com/user-data/overview.

[From Vice Chairman Warner]

8. Your platform allows for the continuous showing of videos to a user. Once a video is done, YouTube recommends and actually begins playing the next video based on your previous interactions. This seems particularly susceptible to foreign influence - particularly for children or young adults that use YouTube without parental supervision.

- **What are you doing to ensure the Recommendation algorithm - in the same way as the Search algorithm - is not susceptible to malign incursion?**

Google has long had numerous systems in place, both automated and manual, to detect and address manipulative and deceptive behavior across our products, including on YouTube. YouTube employs a sophisticated spam and security-breach detection system to identify anomalous behavior and malignant incursions, including attempts to inflate view counts of videos or numbers of subscribers and other similar metrics used as inputs in recommendation algorithms. In addition, while we do allow "auto-play" on You Tube, we also allow our users to control their YouTube experience. If a user does not want a new video to play after the first video has completed, he/she can turn off the "auto-play" mode with one click. Similarly, if users do not like the recommendations they are receiving, or do not want a certain video to be included as part of their history, they can delete specific videos or clear their watch history entirely.

[From Senator Collins]

9. What provisions in Google's Terms of Service ensure that political advertisements targeted toward the United States are purchased by an American citizen?

Our Terms of Service prohibit the use of our services to engage in activities that violate U.S. laws, including laws that prohibit non-U.S. persons from purchasing election ads.

10. Do your Terms of Service prohibit users from influencing elections in other countries?

Google's Terms of Service specifically prohibit activity on our platforms that violate applicable law. With respect to attempts to undermine democratic elections, we enforce policies that prohibit a range of misconduct, including content that misrepresents the owner's origin or purpose, engages in harassment, or involves posting hateful, extremist, or violent content.

We are committed to working with other governments and with Congress to strengthen protections around elections, ensure the security of users, and help combat disinformation.

11. If a foreign national working on behalf of a foreign intelligence service was an authentic user in real name on your platform, could he post divisive, but non-violent content related to a U.S. election without violating your Terms of Service? Would he be able to purchase political advertising?

Google's Terms of Service specifically require that activity on our platforms complies with U.S. law, including laws that require agents of a foreign government to label any "informational materials" they disseminate on behalf of that foreign government and laws that prohibit non-US persons from purchasing election ads. We also enforce policies that prohibit a range of misconduct by those who place content on our platforms, including content that misrepresents the uploader's origin or purpose.

[From Senator Feinstein]

12. Google has conceded that the number of people exposed to content from foreign groups online is far more pronounced through organic traffic and fake accounts than it is through paid advertising. Troublingly, it does not appear there is a proven method for combating the spread of fake accounts created to sow division in society. Although the Committee has heard testimony indicating that social media platforms have developed a number of ways to detect "bot-like" activity, as recently as August 2017, divisive foreign unpaid content designed to polarize and anger the American people could be found on social media.

- **What specific actions is Google taking to combat this type of divisive unpaid activity on an ongoing basis?**

While the majority of our platforms are not "social media", and we saw only limited use of fake accounts associated with the 2016 elections, we are deeply concerned about any attempts to use our platforms to sow division. Our systems, for example, work hard to prevent the creation of "bad" accounts by relying on a host of inputs about historical use and pattern recognition across various services. In addition, we have developed robust protections to address attempts to manipulate our systems by bots or other schemes, such as link farms. (Our webmaster guidelines provide more information about this: https://support.google.com/webmasters/answer/35769.) We use both algorithmic and manual methods, and we deploy these across our products, including Search and YouTube. We have not, however, seen the same type of social media bots as have been reported on other platforms.

We have also put significant effort into curbing misinformation on our unpaid products. That includes better ranking algorithms in Search that prioritize authoritative sources, tougher policies against the monetization of misrepresentative content by publishers. On Google News, we mark up links with labels that help users understand what they are about to read, whether it is local content, an op-ed, or an in-depth piece, and encourage them to be thoughtful about the content they view. Publishers who review third-party claims or rumors can showcase their work on Google News through fact-check labels and in Google Search through fact-check cards. We will continue to work on promoting the access to high-quality content, including partnering with the journalism industry to help people better understand and contextualize what they see online.

13. One of the more troubling findings from this investigation is the number of targeted voter disengagement efforts promoted through social media.

- **Can you say with certainty that foreign actors did not use U.S. voter registration data to target individuals through both paid and unpaid activity?**

Google did not provide U.S. voter registration data to any advertisers account.

[From Senator Cotton]

14. What type of data have you collected on Internet Research Agency actors who were using your platforms? Please be specific. Have you provided that data to law enforcement? How long is that data retained?

We have conducted an extensive review of this issue including developing a list of actors we know or suspect were involved in this effort from our research of publicly available information, the work of our security team, as well as leads we received from others in the industry, and applying those leads to nearly twenty of Google's products, including all Ads products. We have responded to the law enforcement requests regarding the information we collected as part of our review, and have and will continue to be committed to working with law enforcement and Congress to provide information relevant to their investigations, in compliance with our policies and the law.

15. Do you prevent delivery of ads to a mobile device that may be inside a polling place, where other political ads would be illegal?

We do not allow ads to be targeted to polling places.

16. Have any of Google's companies been breached by foreign actors? How many times in the last five years? What data has or could have been compromised?

Threats to our systems are continuously evolving. While we have not seen successful compromise of Google's systems in the past five years, we have encountered campaigns to gain access to the IP of companies we have acquired, and we continually address challenges from motivated and resourceful attackers. We report attacks to law enforcement and other authorities, as appropriate.

We've built industry-leading security systems and we've put these tools into our consumer products. Back in 2007, we launched the first version of our Safe Browsing tool, which helps protect users from phishing, malware, and other attack vectors. Today, Safe Browsing is used on more than three billion devices worldwide. If we suspect that users are subject to government-sponsored attacks we warn them. And we recently launched our Advanced Protection Program, which integrates physical security keys to protect those at greatest risk of attack, like journalists, business leaders, and politicians. As threats evolve, we will continue to adapt to understand and prevent new attempts to misuse our platforms and will continue to expand our use of cutting-edge technology to protect our users.

17. Have you mapped the WiFi networks on military bases or in other government buildings? Do you collect information on individual Android users that may be in close proximity to, or accessing these networks?

Google's location service collects anonymous data about nearby wifi access points from Android users on an opt-in basis to improve Google's location services. We allow our users, including Governments and military bases, to opt out of that mapping by sending us a 'nomap' request as described in our help page found here: https://support.google.com/maps/answer/1725632?hl=en.

18. You have challenged the NSA for a lack of transparency and oversight, yet you collect large amounts of data and have an opaque privacy policy.

- **What types of information does Google collect?**
- **Does any non-biased third party oversee your use of personal information?**

Google is committed to protecting the privacy of our users and to providing transparency regarding the types of information we collect. In fact, *Time Magazine* and the Center for Plain Language evaluated Google's privacy policy as to be the most accessible and easy to understand of any leading technology company. See http://time.com/3986016/google-facebook-twitter-privacy-policies/. As described in our privacy policy, which you can find here: https://www.google.com/policies/privacy/, we collect information to provide better services to all of our users – from figuring out basic information about our users like which language they speak, to more complex things like which ads they will find most useful or which YouTube videos they might like. That includes information they give us and information about the services they use and how they use them. We provide users with transparency and control through easy-to-use tools that enable users to manage their privacy and security settings.

In addition to our own efforts to ensure our users can trust us with their information, Google is subject to independent, governmental oversight in the jurisdictions within which it operates, including by the Federal Trade Commission in the United States.

19. Have you ever returned revenue that was generated from advertising on webpages that facilitated Russian attempts to influence the 2016 election, terrorist propaganda, or online sex trafficking (like "backpage.com")?

Google enforces policies that prohibit a range of misconduct by those who place content on its platforms, including misrepresenting the owner's origin or purpose, engaging in harassment, or posting hateful, extremist, or violent content. We do not permit that content to be monetized on our systems. With respect to the 2016 election, the activity on our platforms was limited, with only $4700 dollars of revenue associated with ads we identified. We believe that was in large

part due to the controls we had in place prior to the election. Google and Jigsaw have recently donated considerably more funds ($750,000) to the Belfer Center for Science and International Affairs and its Defending Digital Democracy project.

20. Please provide a list of all the sources of user data that your platforms collect. Where is this data stored? How long is it retained?

As discussed in the response to Question 18, Google is committed to protecting the privacy of our users and to providing transparency regarding the types of information we collect. Our privacy policy is available here: https://www.google.com/policies/privacy/. Any data we collect is retained in accordance with our U.S. and international legal requirements.

21. According to Reuters, cyber actors linked to the Russian Government used malware implanted on Android devices to track Ukrainian artillery units. This demonstrates that Russia is not only using your platforms to influence elections, but to gain an advantage on the front lines of a battlefield.

- **How do you believe that Russia was able to accomplish this and what is being done to prevent it from occurring in the future?**

We are aware of this report and we, although with others in the industry, have questioned its accuracy. (See, e.g., https://www.voanews.com/a/cyber-firm-rewrites-part-disputed-russian-hacking-report/3781411.html). For example, that the malware at issue was not distributed through our Play Store. Regardless, as discussed in the response to Question 16, we recognize that we face motivated and resourceful attackers, and we are continually evolving our tools to stay ahead of ever-changing threats.

22. Google processes information on various servers all over the world.

- **Is information collected on U.S. Government employees being processed or stored in countries like Russia and China?**

We do not have data centers that store information collected on U.S.-based government employees in Russia or China.

23. Has Google ever provided the governments of Russia or China access to data that it has not provided to the U.S. Government?

We respond to Russian and Chinese Government requests for customer-created or personally identifiable information only pursuant to valid U.S. legal process secured through Mutual Legal Assistance Treaties (MLATs) with the United States and other diplomatic and cooperative

arrangements. We may produce information pertaining to our Ads users who contract with our local Ads businesses pursuant to valid local legal process and according to local law. In extraordinary circumstances, we may also disclose information to the Russian and Chinese governments where Google has a good faith belief that disclosure of data without delay is necessary to avert a threat to human life, which is conducted in consultation with an FBI legal attaché or an attorney with the Department of Justice's Computer Crime and Intellectual Property Section. Our transparency report details our compliance with Russian and Chinese requests for customer data: https://transparencyreport.google.com/user-data/overview.

24. Do any Google applications or services behave differently in the United States than they do in Russia, China, or another country?

Google strives to provide our products and services in a consistent manner to our users. We may make changes to our products in certain regions based on consumer interest or legal requirements of a particular region.

25. Has Google provided information on a U.S. citizen to the government of China?

As discussed in Question 23, we respond to Chinese Government requests for U.S. customer-created or personally identifiable information only pursuant to valid U.S. legal process secured through Mutual Legal Assistance Treaties (MLATs) with the United States and other diplomatic and cooperative arrangements. Our transparency report details our compliance with Chinese requests for customer data: https://transparencyreport.google.com/user-data/overview.

26. Does Google share the personally identifiable information of its users with other countries' foreign intelligence agencies absent legal process?

As discussed in Question 23, we respond to Russian and Chinese Government requests for customer-created or personally identifiable information, only pursuant to valid legal process and vis-a-vis the U.S. Department of Justice's MLATs, with limited exceptions. Our transparency report details our compliance with these types ofrequests for customer data: https://transparencyreport.google.com/user-data/overview.

27. Is it possible that third party companies controlled by foreign intelligence agencies are purchasing personally identifiable information from Google?

No. We do not sell personally identifiable information.

[From Senator Heinrich]

28. In your testimony, you talked about finding 18 channels likely associated with Russian agents who posted 1,100 misleading and divisive videos to YouTube. These videos received 309,000 views during the election cycle.

- **What systems exist to prevent intentionally misleading or illegal content from appearing at the top of YouTube searches or YouTube video recommendations?**
- **Can the same artificial intelligence or algorithms used to police terrorist propaganda or pornography be used in this space? Why or why not?**

On YouTube, we employ a sophisticated spam and security-breach detection system to identify anomalous behavior and attempts to manipulate our systems. We remove any content that we identify on YouTube that is attempting to spam or scam our users and respond to complaints by our users. We are also working on greater transparency around news sources on our platform, including disclosure of government funding.

While some tools may work for violent extremism and terrorism-related content in a scalable way, the problem is very different for misleading or inauthentic content. Many times, the misleading content looks identical to content uploaded by genuine activists. We are dealing with difficult questions that require the balancing of free expression, access to information, and the need to provide high quality content to our users. There are no easy answers here, but we are deeply committed to getting this right.

29. The New York Times reported that YouTube played a crucial role in helping build and expand RT. Until recently, RT was included in Google's "preferred" news lineups, which granted them access to guaranteed revenue from premium advertisers.

- **Why did Google favor RT content?**

RT was available on YouTube's Preferred Lineup because it met our standard Preferred Lineup criteria available at: https://www.youtube.com/yt/lineups/united-states.html. Those criteria include factors such as the number of view counts of a particular channel, the number of that channel's subscribers, and the language of the channel. RT is no longer available on YouTube's Preferred Lineup.

30. What percent of Google content reviews are conducted by an actual human being rather than via automated review?

We have a global team of thousands of policy experts, reviewers, product managers, and data scientists focused on creating, maintaining, and enforcing our policies. We serve billions of

users every day, so our solutions need to work at scale. We rely on highly-trained individuals from our Trust and Safety and Security teams who work closely with machine learning tools and our algorithms to ensure our platforms are protected and there is adherence to our policies. Through a combination of sophisticated algorithms and other technologies and human review, we both proactively look for violations and respond to complaints. Technology has helped us accelerate and scale our removal process, with human review assisted by computerized classifiers and computer classifiers informed by the results of human review.

31. Are Google's content review processes the same now as they were during the 2016 election? If not, how have they changed?

We are constantly working to improve our processes and better ensure compliance with our policies. Google enforces policies that prohibit a range of misconduct by those who place content on our platforms, including misrepresenting the owner's origin or purpose, engaging in harassment, or posting hateful, extremist, or violent content.

Over the past 18 months, we have undertaken a broad effort to highlight authoritative sources and minimize the spread of misinformation on our platforms. On Google News, we mark up links with labels that help users understand what they are about to read, whether it is local content, an op-ed, or an in-depth piece, and encourage them to be thoughtful about the content they are looking at. Publishers who review third-party claims or rumors can showcase their work on Google News through fact-check labels and in Google Search through fact-check cards. To help ensure Google does not monetize content designed to mislead users, we have implemented a new policy for our AdSense publishers that explicitly bans ads on sites that misrepresent, misstate, or conceal information about the publisher, the publisher's content, or the primary purpose of the site. For Google Search, we updated our Search Quality Rater Guidelines and our evaluation test sets to help identify misleading information and unexpected offensive results, and have used this data to improve our search algorithms. This results in higher quality and more authoritative Search results.

As we announced in 2017, we are also enhancing the transparency of election ads by permitting users to find the name of any advertiser running an election ad on Search, YouTube, and the Google Display Network. We also will be releasing a transparency report for election ads, sharing data about who is buying election ads on our platforms and how much money is being spent. We will pair our transparency report with a publicly available repository of election ad creatives from across our Ads products.

We will continue to work on preventing the spread of misinformation by partnering with the journalism industry to help people understand what they see online and to support the creation of quality content.

32. In hiring more content reviewers, are your companies simply throwing bodies at a specific problem, or are you fundamentally rethinking how to prioritize which user interactions require additional human oversight and review. If so, how? What other changes have you made in this regard?

We agree with the suggestion that it is important to thoughtfully triage various threats to the content available on our platforms. Google was founded with a mission of organizing the world's information and making it universally accessible and useful. The abuse of the tools and platforms we build is antithetical to that mission. Google serves billions of users every day and our solutions need to work at scale. We rely not only on the thousands of human reviewers we have hired and trained, but we've also dedicated some of our top engineers to develop machine learning tools and algorithms to protect our platforms and promote adherence to our policies, focusing on key risk areas.

We face motivated and resourceful attackers, and we are continually evolving our tools to stay ahead of ever-changing threats, but we are committed to putting our talent and technology behind addressing these problems, and will continue to build industry-leading security systems and deploy those tools in our products.

[From Senator Manchin]

33. Does Google or any Google affiliate use the information security products or services of Kaspersky Lab or any Kaspersky Lab affiliate?

Kaspersky Lab products have not been approved for use on our corporate systems. Google's policy requires that before installation of software like that offered by Kaspersky Lab, the software be reviewed by Google's security and privacy team. A review of our systems has not detected any installation of Kaspersky Lab products.

34. Does Google or any Google affiliate sell network space to RT or Sputnik news agencies?

Both RT and Sputnik do purchase ads from Google. Like all other advertisers RT and Sputnik are subject to our strict ads policies and community guidelines, including policies against advertisers misrepresenting their origin or purpose. To date, we've seen no evidence that they are violating these policies, but we continue to monitor all of our platforms to guard against potential abuse.

35. If you recently terminated any agreements with RT or Sputnik, on what date did the termination become effective?

We have not terminated any agreements with RT or Sputnik. RT was once available on You Tube's Preferred Lineup because it met our standard Preferred Lineup criteria available at: https://www.youtube.com/yt/lineups/united-states.html. Those criteria include factors such as the number of view counts of a particular channel, the number of that channel's subscribers, and the language of the channel. RT is no longer in our Preferred Lineup. That did not, however, involve the termination of any agreement with RT.

36. Do either RT or Sputnik need to purchase advertising space on your platforms, or can they freely maintain a presence or distribute web content via their own or affiliated accounts?

RT and Sputnik do not need to purchase advertising space on our platforms. Google's mission is to organise the world's information and make it universally accessible and useful. For example, on Search, we index websites such as RT and Sputnik just as we do others. We are, however, actively working to provide users and advertisers with more information about the content they are seeing to allow them to make educated choices. We have labels on Search describing RT's relationship with the Russian Government and we are working on disclosures to provide similar transparency on YouTube.

37. Does Google prohibit, or have any concern about, foreign state-sponsored news organizations posting content via any Google platform?

The aim of our content platforms, like Search and YouTube, is to bring users a diverse range of news views and opinions from across the ecosystem. Our Search results, for example, contain a variety of partly or wholly government-backed news outlets, such as BBC or France Television.

As discussed above, we are actively working to provide users and advertisers with more information about the content they are seeing to allow them to make educated choices, including whether they advertise on specific sites, such as RT. We take misinformation on our platforms very seriously, and we have put significant effort into curbing misinformation in our products. That includes a policy against news content by foreign state-sponsored news organization that conceal their affiliations with foreign governments.

[From Senator Harris]

38. Your company has produced information about Russian propaganda advertisements. Your company has also produced information about Russian propaganda that appeared as ordinary user content. You have not, however, provided information about the legitimate advertisements that accompanied Russian content.

- **How long do you retain placement and billing records for advertisements on your services?**
- **Have you instructed your relevant business units to retain the records of advertisements that accompanied Russian propaganda? If you have not, will you immediately issue that instruction?**
- **How much revenue do you estimate that you earned from the advertising that accompanied Russian propaganda?**
- **Have you notified the advertisers whose advertisements accompanied Russian propaganda?**
- **What do you plan to do with the revenue that you earned from the advertisements that accompanied Russian propaganda?**

We retain our Ads billing data and will continue to do so as is required by law, or when requested by law enforcement, and in accordance with our policies. With respect to Ads revenues associated with this effort, our extensive investigation identified very limited activity on our platforms: we identified two accounts that purchased approximately $4700 of Google ad inventory. We paid less than $35 of revenue to those actors for ads served on their published content; our earnings were a fraction of that amount. In addition, Google and Jigsaw recently donated approximately $750,000 to the Belfer Center for Science and International Affairs and its Defending Digital Democracy Project as part of our commitment to enhance the protections surrounding our democratic process.

39. The problems of inauthentic, false, and hyper-partisan content are much broader than Russian propaganda.

- **How many of the accounts on your service do you estimate are inauthentic?**
- **How much of the activity on your service do you estimate is inauthentic or false?**
- **How much of your annual revenue do you estimate is attributable to inauthentic or false content?**
- **Do you have a policy of notifying advertisers when their advertisements accompany "inauthentic or false content?**
- **What do you do with the revenue that you earn from advertisements that accompany inauthentic or false content?**

- **If you are aware of independent estimates of inauthentic or false content on your platforms, please provide those estimates. If you disagree with the estimates, please explain why.**
- **If the independent estimates were accurate, how much of your annual revenue would be attributable to inauthentic or false content?**
- **How much of the news content that is shared on your services do you estimate is false?**
- **How much of the news content that is shared on your services do you estimate is hyper-partisan?**
- **Have you conducted any studies of how false content performs on your services? If yes, please describe those studies and provide copies.**
- **Have you conducted any studies of how hyper-partisan content performs on your services? If yes, please describe those studies and provide copies.**

Google serves billions of users every day. People watch over a billion hours of YouTube content a day, we index billions of web pages on Google Search, and there are billions of emails sent each day using Gmail. It is, therefore, effectively impossible to identify every single piece of content that might be false or inauthentic. Inauthentic, false and misleading content is, however, antithetical to Google's mission, and we are committed to preventing this type of content on our platforms. Our systems rely on a host of methods to help ensure the legitimacy of accounts and content on our platforms. Those methods include:

- Assessing historical use and pattern recognition across various services in an effort to detect if an account creation or login is likely to be abusive and to prevent or detect and close "bad" accounts.
- Preventing users from creating a large number of Google Accounts in a short time period and, if we detect suspicious conduct, requiring verification.
- Curbing misinformation in our products–from better ranking algorithms that prioritize authoritative sources, to tougher policies against the monetization of misrepresentative content.
- On Google News, marking-up links with labels that help users understand what they are about to read, whether it is local content, an op-ed, or an in-depth piece, and encourage them to be thoughtful about the content they are looking at. Publishers who review third-party claims or rumors can showcase their work on Google News through fact-check labels and in Google Search through fact-check cards.
- Preventing monetization of content designed to mislead users by implementing our new policy for our AdSense publishers that explicitly bans ads on any site that misrepresents, misstates, or conceals information about the publisher, the publisher's content, or the primary purpose of the site.

- Updating our Search Quality Rater Guidelines and our evaluation test sets to help identify misleading information and unexpected offensive results, and using this data to improve our search algorithms.
- Increasing transparency for our users, including adding "nutrition labels" on Search and similar disclosures on YouTube and our recent transparency efforts around election ads.

40. In the area of state-sponsored hacking, each of your companies has a responsible senior executive and dedicated technical experts.

> **• Who is the senior executive responsible for countering state-sponsored information operations? When did that executive assume that responsibility, and what is the scope of the responsibility?**
> **• As of November 2016, how many of your technical employees had the primary day-to-day task of countering state-sponsored information operations?**
> **• As of today, how many of your technical employees have the primary day-to-day task of countering state-sponsored information operations?**

Protecting our platforms from state-sponsored interference is a challenge we began tackling as a company long before the 2016 presidential election. We've dedicated significant resources to help protect our platforms from such attacks by maintaining cutting-edge defensive systems and by building advanced security tools directly into our consumer products.

We have a global team of thousands of policy experts, reviewers, product managers, and data scientists focused on creating, maintaining, and enforcing our policies and, as Senior Vice President and General Counsel of Google, leading our Legal, Policy, Trust & Safety and Philanthropy teams, I oversee many of those efforts. While the activity on our platforms associated with this effort was relatively limited — which we believe that was in large part due to the controls we had in place prior to the 2016 election — we understand the importance of maintaining and enhancing those controls as we go into the 2018 election season.

41. Much of what we now know about Russian propaganda is because of academic researchers and investigative journalists. These groups do not currently have access to the data that they need to inform the public and to build tools for detecting state-sponsored information operations. For example, these groups generally cannot assess the full set of public user activity associated with a specific topic, nor can they analyze the behavior of accounts associated with state-sponsored information operations. Providing access to this data need not come at the expense of user privacy, since these groups could be bound by non-disclosure agreements and use privacy-preserving algorithms to conduct their studies.

- **Will you commit to, by the end of the year, providing five or more independent, non-profit entities with access to the data they need to understand and counter state-sponsored information operations? If you will, please provide specifics and a timeline for bow you plan to honor the commitment. If you will not, please explain why.**

We agree that combating disinformation campaigns requires efforts from across the industry and the public sector, and we are collaborating with technology and NGO partners to research and address disinformation and, more broadly, election integrity. That includes our partnership with the Belfer Center for Science and International Affairs on its Defending Digital Democracy Project, to which Jigsaw and Google recently donated $750,000. We will continue our long-established policy of routinely sharing threat information with our peers and work with them to better protect the collective digital ecosystem. We also welcome input from law enforcement, Congress, and independent entities.

In addition, our enhancements to transparency around election ads on our platforms will include a transparency report for election ads, sharing data about who is buying election ads on our platforms and how much money is being spent and a publicly available repository of election ad creatives from across our Ads products. We will make that database available for public research to all who are interested in learning or using it to conduct research, including NGOs.

42. Similarly, much of what we now know about inauthentic, false, or hyper-partisan content is because of independent groups.

- **Will you commit to, by the end of the year, providing five or more independent, non-profit entities with access to the data they need to understand the prevalence and performance of inauthentic, false, or hyper-partisan content on your services? If you will, please provide specifics and a timeline for how you plan to honor the commitment. If you will not, please explain why.**

We take misinformation on our platforms very seriously, and we have put a lot of effort into curbing misinformation in our products, including partnering with NGOs through our trusted flagger programs, programs like the Trust Project, and our partnership with the Belfer Center for Science and International Affairs on its Defending Digital Democracy Project. We will continue to work on preventing the spread of misinformation by partnering with the journalism industry to help people understand what they see online and to support the creation of quality content. We look forward to continuing to collaborate with non-profit entities to tackle disinformation and, more broadly, election integrity.

43. Addressing state-sponsored information operations will continue to require cooperation among private sector entities and with the government.

- **Have you established a formal mechanism for promptly sharing actionable information about state-sponsored information operations with other online services, similar to the mechanisms that already exist for sharing information about state-sponsored cybersecurity threats? If not, will you commit to developing such a mechanism?**
- **The FBI is the federal agency responsible for countering foreign propaganda. Do you have a written policy of promptly sharing what you learn about state-sponsored information operations with the FBI? If not, will you commit to developing such a policy?**

We are committed to working with Congress, law enforcement, others in industry, and the NGO community to strengthen protections around elections, whether in a formal or informal setting.

44. You currently have automated systems in place to detect spam and abuse.

- **Do you have an automated system in place to detect state-sponsored information operations? If yes, will you provide this Committee with private briefing on the system's design and performance? If no, why not?**

Protecting our platforms from state-sponsored interference is a challenge we began tackling as a company long before the 2016 presidential election. We've dedicated significant resources to help protect our platforms from such attacks by maintaining cutting-edge defensive systems and by building advanced security tools directly into our consumer products. We have previously provided a detailed briefing to Committee staff on this issue and are happy to provide additional briefings as requested.

45. You have promised to adopt additional transparency and verification requirements for political advertising.

- **Please detail the new requirements and your timeline for implementing those requirements.**

Google is concerned about attempts to undermine democratic elections and we continue our ongoing efforts in this area. We have updated our advertising guidelines to prohibit ads on sites that misrepresent themselves. We are committed to working with Congress, law enforcement, others in our industry, and the NGO community to strengthen protections around elections, ensure the security of users, and help combat disinformation.

In addition, we have announced a number of measures to enhance transparency within election advertising:

- ***Transparency Report.*** In 2018, we'll release a transparency report for election ads, which will share data about who is buying election-related ads on our platforms and how much money is being spent.
- ***Creative Library.*** We'll also introduce a publicly accessible repository of election ads purchased on AdWords and YouTube (with information about who bought each ad). That means people will not only be able to learn more about who's buying election-related ads on our platforms, they'll be able to see the ads themselves, regardless of to whom they were shown.
- ***In-ad disclosures.*** Going forward, we'll identify the names of advertisers running election-related campaigns on Search, YouTube, and the Google Display Network.
- ***Verification program.*** U.S. law restricts entities outside the United States from running election-related ads. We'll reinforce our existing protections by requiring that advertisers proactively identify who they are and where they are based before running any election-related ads. As they do, we'll verify that they are permitted to run U.S. election campaigns through our own checks.

- **How do you define the political advertisements that are covered by the new requirements? Why did you adopt the definition that you did?**

We will apply the new requirements to political advertisements that either constitute "express advocacy" or contain a reference to a clearly identified candidate, as each of those terms is defined by the Federal Election Commission.

- **Will you commit to including within your definition, at a minimum, advertisements that advocate for or against a specific candidate, political party, piece of legislation, regulatory action, or ballot referendum? If not, why not?**

As stated above, our political advertisement definition will reflect current FEC definitions of express advocacy and electioneering communications.

46. Your platform offers a range of advertisement targeting criteria.

- **Which types of targeting criteria, such as demographic, behavioral, lookalike, or email matching, did Russia use for its information operations?**

The $4,700 of ads attributable to suspected state-sponsored Russian actors were not narrowly targeted to specific groups of users: for example, we found no evidence of targeting by geography (e.g., certain states) or by users' inferred political preferences (e.g., right- or left-leaning).

47. Have you seen any evidence of state-sponsored information operations associated with American elections in 2017, including the gubernatorial elections in Virginia and New Jersey?

Protecting our platforms from state-sponsored interference is a challenge we began tackling as a company long before the 2016 presidential election. While we have not specifically detected any abuse of our platforms in connection with the 2017 state elections, our work is ongoing and we will continue to develop tools and processes to combat evolving threats.

48. User reports are an important signal of when an account is not authentic.

- **How frequently do you receive user reports about inauthentic accounts?**
- **What is your process for responding to those reports? How often does that process usually take?**
- **What proportion of those reports result in an account restriction, suspension, or removal?**
- **Among the reports that you decline to take action on, what proportion involve reported accounts that you subsequently identify as inauthentic?**
- **How many of the accounts that you have identified as associated with Russian information operations were the subject of a user report? Please provide all the user reports associated with these accounts and the actions tbat you took in response, including the specific time for the report and each action.**

We are unaware of any inauthentic accounts linked to Russian information operations flagged by our users. Our systems do rely on a host of inputs about historical use and pattern recognition across various services in an effort to detect if an account creation or login is likely to be abusive. The system operates to block "bad" account creation or to close groups of such accounts. We prevent users from creating a large number of Google Accounts in a short time period if our systems detect that the user might be abusive. If we detect suspicious conduct, we also require verification, aimed at detecting if a bot is attempting to access or create an account. We have also developed robust protections over the years to address attempts to manipulate our systems by bots or other schemes, like link farms. (Our webmaster guidelines provide more information about this: https://support.google.com/webmasters/answer/35769.) We use both algorithmic and manual methods, and we deploy these across our products including Search and YouTube. We have not, however, seen the same type of social media bots that have been reported on other

platforms.

49. Much of the public discussion about state-sponsored information operations on your platforms has centered on the Internet Research Agency. That is not the only group surreptitiously spreading state-sponsored propaganda.

- **What other groups are you tracking that are affiliated with the Russian government?**
- **What other countries do you believe are conducting state-sponsored information operations on your platforms? Please describe the groups that you are tracking for each country, including both government agencies and affiliates.**

The 2016 election is not the first time we have encountered state-sponsored entities trying to abuse our systems. We face motivated and resourceful attackers, and we are continually evolving our tools to stay ahead of ever-changing threats. We will continue to build industry-leading security systems and deploy those tools in our products. Our tools will be aimed at protecting our physical and network security, but also detecting and preventing the artificial boosting of content, spam, and other attempts to manipulate our systems. As threats evolve, we will continue to adapt to understand and prevent new attempts to misuse our platforms and will continue to expand our use of cutting-edge technology to protect our users. We are happy to continue working with law enforcement and the Committee on these matters.

50. Inauthentic accounts can be disabled subsequent to automated or manual review.

- **What role do automated and human employee review play in your decision to disable a suspected inauthentic account?**
- **Do you require that a human employee review a suspected inauthentic account before it is disabled?**
- **If so, given the rate at which inauthentic accounts can be regenerated, how do you anticipate remaining ahead of the problem?**
- **What are you doing to improve automation in the process of detecting and disabling inauthentic accounts?**
- **What are you doing to make it more difficult to establish inauthentic accounts?**

Technology has helped us accelerate and scale our removal of content that violates our policies, but we also rely on highly-trained individuals from our Trust and Safety and Security teams who work closely with machine learning tools and our algorithms to ensure our platforms are protected and there is adherence to our policies. We both proactively look for violations and

respond to complaints. We take this work very seriously; in 2016 alone we removed 1.7B ads for violating policies.

As discussed in the answer to Question 48, our systems rely on a host of inputs about historical use and pattern recognition across various services in an effort to detect if an account creation or login is likely to be abusive. We have not seen the same type of social media bots that have been reported on other platforms. We understand, however, that these types of threats to our systems are continuously evolving.

51. According to news reports, Google Search and YouTube results often surface false content in response to public safety emergencies. For example, after the tragic mass shooting in Sutherland Springs, Google Search highlighted false social media content and YouTube featured false videos describing the shooter's motives.

- **What processes does Google have in place to identify and address false content following public safety emergencies?**
- **Has Google conducted any studies of false content following public safety emergencies? If yes, please describe those studies and provide copies. If no, will you commit to conducting such a study?**
- **Have you identified any state-sponsored information campaigns that distributed false content in response to a public safety emergency in the United States? If yes, please describe the campaigns and provide the associated content.to the Committee.**

We take misinformation on our platforms very seriously, and we have put a lot of effort into curbing misinformation in our products–from better ranking algorithms that prioritize authoritative sources, to tougher policies against the monetization of misrepresentative content. We are aware of recent issues regarding content that has appeared in the immediate aftermath of public safety events, although we have not found this material to be related to state-sponsored efforts. That said, these results should not have appeared, and we continue to make algorithmic improvements to improve the quality of our results and reduce the likelihood of this happening in the future.

Specifically regarding Google Search, we updated our Search Quality Rater Guidelines and our evaluation test sets to help identify misleading information and unexpected offensive results, and have used this data to improve our search algorithms. We regular monitor results on our products after public safety events. In the last few months, we have altered our algorithm once again to ensure irrelevant or unverified results are replaced by more relevant results.

[From Senator McCain]

52. Current campaign finance law establishes disclosure standards for television, radio, and print media. The Pew Research Center recently found that 65 percent of Americans identified an internet-based source as their leading source of information about the 2016 election.

- **Under current law, to what extent is Google responsible for providing a similar quality of disclosure to the public?**

We are committed to working with the FEC in order to enhance the transparency of digital political advertising. In a 2010 Advisory Opinion, the FEC stated that advertisers are not required to include a disclosure on the small format of AdWords because of the size of the ad or impractical nature of including additional language. (In practice, the vast majority of advertisers provide a disclosure on the landing page for the ads.) We are, however, in favor of making election advertising more transparent by implementing the following measures:

- ***Transparency Report.*** In 2018, we'll release a transparency report for election ads, which will share data about who is buying election-related ads on our platforms and how much money is being spent.
- ***Creative Library.*** We'll also introduce a publicly accessible database of election ads purchased on AdWords and YouTube (with information about who bought each ad). That means people will not only be able to learn more about who's buying election-related ads on our platforms; they'll be able to see the ads themselves, regardless of to whom they were shown.
- ***In-ad disclosures.*** Going forward, we'll identify the names of advertisers running election-related campaigns on Search, YouTube, and the Google Display Network.
- ***Verification program.*** U.S. law restricts entities outside the United States from running election-related ads. We'll reinforce our existing protections by requiring that advertisers proactively identify who they are and where they are based before running any election-related ads. As they do, we'll verify that they are permitted to run U.S. election campaigns through our own checks.

In addition to these steps, we will continue working with the FEC and Congress to promote transparency and better protect the integrity of U.S. elections.

53. In your prepared testimony, you stated that Google was committed to enhancing existing safeguards to ensure that only U.S. nationals can buy U.S. election advertisements.

- **Please describe the vetting mechanism that will be used to determine the purchaser of such advertisements.**

As discussed above, we are committed to reinforcing our existing protections and requiring increased transparency in election ads. This will include the requirement that advertisers proactively identify who they are and where they are based before running any election-related ads. We will also verify that they are permitted to run U.S. election campaigns through our own checks of FEC reporting and registration.

54. In your prepared testimony, you announced Google's intention to release in 2018 a transparency report on election advertisements.

- **What information will be shared via this report?**

The purpose of our report is to provide increased transparency with respect to election ads on our platforms. To that end, we plan to share data about who is buying election-related ads on our platforms and how much money is spent.

- **Will the accompanying database be continuously updated for current and future elections?**

Yes. We intend to update the database for current and future elections.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2016

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from _____ to _____.

Commission file number: **001-37580**

Alphabet Inc.

(Exact name of registrant as specified in its charter)

Delaware	**61-1767919**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

1600 Amphitheatre Parkway
Mountain View, CA 94043

(Address of principal executive offices) (Zip Code)

(650) 253-0000

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Class A Common Stock, $0.001 par value	**Nasdaq Stock Market LLC (Nasdaq Global Select Market)**
Class C Capital Stock, $0.001 par value	**Nasdaq Stock Market LLC (Nasdaq Global Select Market)**

Securities registered pursuant to Section 12(g) of the Act:

Title of each class
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer (Do not check if a smaller reporting company)	☐	Smaller reporting company	☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of June 30, 2016, the aggregate market value of shares held by non-affiliates of the registrant (based upon the closing sale prices of such shares on the Nasdaq Global Select Market on June 30, 2016) was approximately $413.8 billion. For purposes of calculating the aggregate market value of shares held by non-affiliates, we have assumed that all outstanding shares are held by non-affiliates, except for shares held by each of our executive officers, directors and 5% or greater stockholders. In the case of 5% or greater stockholders, we have not deemed such stockholders to be affiliates unless there are facts and circumstances which would indicate that such stockholders exercise any control over our company, or unless they hold 10% or more of our outstanding common stock. These assumptions should not be deemed to constitute an admission that all executive officers, directors and 5% or greater stockholders are, in fact, affiliates of our company, or that there are not other persons who may be deemed to be affiliates of our company. Further information concerning shareholdings of our officers, directors and principal stockholders is included or incorporated by reference in Part III, Item 12 of this Annual Report on Form 10-K.

As of January 26, 2017, there were 297,117,506 shares of the registrant's Class A common stock outstanding, 47,369,687 shares of the registrant's Class B common stock outstanding, and 346,933,134 shares of the registrant's Class C capital stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for the 2017 Annual Meeting of Stockholders are incorporated herein by reference in Part III of this Annual Report on Form 10-K to the extent stated herein. Such proxy statement will be filed with the Securities and Exchange Commission within 120 days of the registrant's fiscal year ended December 31, 2016.

Alphabet Inc.
Form 10-K
For the Fiscal Year Ended December 31, 2016

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NOTE ABOUT FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. These statements include, among other things, statements regarding:

- the growth of our business and revenues and our expectations about the factors that influence our success and trends in our business;
- our plans to continue to invest in new businesses, products, services and technologies, systems, facilities, and infrastructure, to continue to hire aggressively and provide competitive compensation programs, as well as to continue to invest in acquisitions;
- seasonal fluctuations in internet usage and advertiser expenditures, underlying business trends such as traditional retail seasonality, and macroeconomic conditions, which are likely to cause fluctuations in our quarterly results;
- our expectation related to our renewable energy efforts;
- the potential for declines in our revenue growth rate;
- our expectation that we will continue to take steps to improve the relevance of the ads we deliver and to reduce the number of accidental clicks;
- fluctuations in the rate of change in revenue and revenue growth, as well as the rate of change in paid clicks and average cost-per-click and various factors contributing to such fluctuations;
- our expectation that our foreign exchange risk management program will not fully offset our net exposure to fluctuations in foreign currency exchange rates;
- the expected variability of costs related to hedging activities under our foreign exchange risk management program;
- our expectation that our cost of revenues, research and development expenses, sales and marketing expenses, and general and administrative expenses will increase in dollars and may increase as a percentage of revenues;
- our potential exposure in connection with pending investigations, proceedings, and other contingencies;
- our expectation that our monetization trends will fluctuate, which could affect our revenues and margins in the future;
- our expectation that our traffic acquisition costs will increase in the future;
- our expectation that our results will be impacted by our performance in international markets as users in developing economies increasingly come online;
- our expectation that the portion of our revenues that we derive from non-advertising revenues will continue to increase;
- our expectation that our other income (loss), net, will fluctuate in the future as it is largely driven by market dynamics;
- estimates of our future compensation expenses;
- fluctuations in our effective tax rate;
- the sufficiency of our sources of funding;
- our payment terms to certain advertisers, which may increase our working capital requirements;
- fluctuations in our capital expenditures;
- our expectations related to the new operating structure implemented pursuant to the Alphabet holding company reorganization;
- the expected timing and amount of Alphabet Inc.'s stock repurchases;

as well as other statements regarding our future operations, financial condition and prospects, and business strategies. Forward-looking statements may appear throughout this report, including without limitation, the following sections: Item 1 "Business," Item 1A "Risk Factors," and Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations." Forward-looking statements generally can be identified by words such as "anticipates," "believes," "estimates," "expects," "intends," "plans," "predicts," "projects," "will be," "will continue," "will likely result," and similar expressions. These forward-looking statements are based on current expectations and assumptions that are subject to risks and uncertainties, which could cause our actual results to differ materially from those reflected in the forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in this Annual Report on Form 10-K, and in particular, the risks discussed under the caption "Risk Factors" in Item 1A of this report and those discussed in other documents we file with the Securities and Exchange Commission (SEC). We undertake no obligation to revise or publicly release the results of any revision to these forward-looking statements, except as required by law. Given these risks and uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements.

As used herein, "Alphabet," "the company," "we," "us," "our," and similar terms include Alphabet Inc. and its subsidiaries, unless the context indicates otherwise.

"Alphabet," "Google," and other trademarks of ours appearing in this report are our property. This report contains additional trade names and trademarks of other companies. We do not intend our use or display of other companies' trade names or trademarks to imply an endorsement or sponsorship of us by such companies, or any relationship with any of these companies.

PART I

ITEM 1. BUSINESS

Overview

As our founders Larry and Sergey wrote in the original founders' letter, "Google is not a conventional company. We do not intend to become one." That unconventional spirit has been a driving force throughout our history -- inspiring us to do things like rethink the mobile device ecosystem with Android and map the world with Google Maps. As part of that, our founders also explained that you could expect us to make "smaller bets in areas that might seem very speculative or even strange when compared to our current businesses." From the start, the company has always strived to do more, and to do important and meaningful things with the resources we have.

Alphabet is a collection of businesses -- the largest of which, of course, is Google. It also includes businesses that are generally pretty far afield of our main Internet products such as Access, Calico, CapitalG, GV, Nest, Verily, Waymo, and X. We report all non-Google businesses collectively as Other Bets. Our Alphabet structure is about helping each of our businesses prosper through strong leaders and independence.

Access and technology for everyone

The Internet is one of the world's most powerful equalizers, and we see it as our job to make it available to as many people as possible. At its core, Google has always been an information company. We believe that technology is a democratizing force, empowering people through information. We are helping people get online by tailoring hardware and software experiences that suit the needs of emerging markets, primarily through Android and Chrome. We're also making sure our core Google products are fast and useful, especially for users in areas where speed and connectivity are central concerns. Other Alphabet companies are also pursuing initiatives with similar goals.

Moonshots

Many companies get comfortable doing what they have always done, making only incremental changes. This incrementalism leads to irrelevance over time, especially in technology, where change tends to be revolutionary, not evolutionary. People thought we were crazy when we acquired YouTube and Android and when we launched Chrome, but those efforts have matured into major platforms for digital video and mobile devices and a safer, popular browser. We continue to look toward the future and continue to invest for the long-term. We won't become complacent, relying solely on small tweaks. As we said in the original founders' letter, we will not shy away from high-risk, high-reward projects that we believe in because they are the key to our long-term success.

The power of machine learning

Across the company, machine learning and artificial intelligence (AI) are increasingly driving many of our latest innovations. Within Google, our investments in machine learning over a decade are what have enabled us to build Google products that get better over time, making them smarter and more useful -- it's what allows you to use your voice to search for information, to translate the web from one language to another, to see better YouTube recommendations, and to search for people and events that are important to you in Google Photos. Machine learning is also showing great promise in helping us tackle big issues, like dramatically improving the energy efficiency of our data centers. Across Other Bets, machine learning helps self-driving cars better detect and respond to others on the road, and can also aid clinicians in detecting diabetic retinopathy.

Google

Serving our users

We have always been a company committed to making big bets that have the potential to improve the lives of millions of people. As the majority of Alphabet's big bets continue to reside within Google, an important benefit of the shift to Alphabet has been the tremendous focus that we're able to have on Google's many extraordinary opportunities. Our innovations in areas like search and advertising have made our services widely used, and our brand one of the most recognized in the world. We generate revenues primarily by delivering online advertising that consumers find relevant and that advertisers find cost-effective.

Google's core products such as Search, Android, Maps, Chrome, YouTube, Google Play, and Gmail each have over one billion monthly active users. But most important, we believe we are just beginning to scratch the surface. Our vision is to remain a place of incredible creativity and innovation that uses our technical expertise to tackle big problems.

Google's mission to organize the world's information and make it universally accessible and useful has always been our North Star, and our products have come a long way since the company was founded nearly two decades

ago. We used to show just ten blue links in our results, which you had to click through to find your answers. Now we are increasingly able to provide direct answers -- even if you're speaking your question using Voice Search -- which makes it quicker, easier and more natural to find what you're looking for. We also introduced the Google Assistant, which allows you to type or talk with Google in a natural conversational way to help you get things done. Over time, we have also added other services that let you access information quickly and easily -- like Google Maps, which helps you navigate to a store while showing you current traffic conditions, or Google Photos, which helps you store and organize all of your photos.

This drive to make information more accessible has led us over the years to improve the discovery and creation of digital content, on the web and through platforms like Google Play and YouTube. And with the migration to mobile, people are consuming more digital content by watching more videos, playing more games, listening to more music, reading more books, and using more apps than ever before.

Fueling all of these great digital experiences are powerful platforms and hardware. That's why we continue to invest in platforms like our Chrome browser, Android mobile operating system, Chrome operating system, and Daydream virtual reality platform, as well as a new family of great hardware devices like the Pixel phone and Google Home.

Google was a company built in the cloud and has been investing in infrastructure, data management, analytics, and AI from the very beginning. We've taken those long-term investments and offer many of the same cloud services to our enterprise customers. Because more and more of today's great digital experiences are being built in the cloud, our enterprise cloud products help businesses of all sizes take advantage of the latest technology advances to operate more efficiently.

How we make money

The goal of our advertising business is to deliver relevant ads at just the right time and to give people useful commercial information, regardless of the device they're using. We also provide advertisers with tools that help them better attribute and measure their advertising campaigns across screens. Our advertising solutions help millions of companies grow their businesses, and we offer a wide range of products across screens and devices. We generate revenues primarily by delivering both performance advertising and brand advertising.

- **Performance advertising** creates and delivers relevant ads that users will click on, leading to direct engagement with advertisers. Most of our performance advertisers pay us when a user engages in their ads. Performance advertising lets our advertisers connect with users while driving measurable results.

  For performance advertisers, AdWords, our primary auction-based advertising program, helps create simple text-based ads that appear on Google properties and the properties of Google Network Members. In addition, Google Network Members use our AdSense program to display relevant ads on their properties, generating revenues when site visitors view or click on the ads. We continue to invest in our advertising programs and make significant upgrades.

- **Brand advertising** helps enhance users' awareness of and affinity with advertisers' products and services, through videos, text, images, and other interactive ads that run across various devices. We help brand advertisers deliver digital videos and other types of ads to specific audiences for their brand-building marketing campaigns.

  We have built a world-class ad technology platform for brand advertisers, agencies, and publishers to power their digital marketing businesses. We aim to ensure great user experiences by serving the right ads at the right time and by building deep partnerships with brands and agencies. We also seek to improve the measurability of brand advertising so advertisers know when their campaigns are effective.

Furthermore, we have invested significantly in programmatic advertising to help advertisers reach users when and where it matters through automated ad buying, giving them access to top-tier inventory across screens and formats, as well as the real-time insights that advertisers need to make their buys count.

We have allocated substantial resources to stopping bad advertising practices and protecting users on the web. We focus on creating the best advertising experiences for our users and advertisers in many ways, ranging from removing hundreds of millions of bad ads from our systems every year to closely monitoring the sites and apps that show our ads and blacklisting them when necessary to ensure that our ads do not fund bad content.

Beyond our advertising business, we also generate revenues in emerging areas, such as digital content, cloud services, and hardware.

Other Bets

Throughout Alphabet, we are also using technology to try and solve big problems across many industries. Alphabet's Other Bets are early-stage businesses, which come with considerable uncertainty, but they are already making important strides in their industries. Our goal is for them to become thriving, successful businesses in the medium to long term. For instance, Nest products, led by their learning thermostat, remain top sellers in their categories, and the team continues to successfully launch new products like the Nest Cam Outdoor. Also, life sciences and healthcare company Verily has forged several partnerships with industry leaders as it works to create new solutions in areas including diabetes and robotic surgery. Our self-driving car company, Waymo, is also making important progress and is currently testing cars in four cities. We continue to build out these businesses thoughtfully and systematically to capitalize on the opportunities ahead.

Competition

Our business is characterized by rapid change as well as new and disruptive technologies. We face formidable competition in every aspect of our business, particularly from companies that seek to connect people with online information and provide them with relevant advertising. We face competition from:

- General purpose search engines and information services, such as Microsoft's Bing, Yahoo, Yandex, Baidu, Naver, and Seznam.
- Vertical search engines and e-commerce websites, such as Amazon and eBay (e-commerce), Kayak (travel queries), LinkedIn (job queries), and WebMD (health queries). Some users will navigate directly to such content, websites, and apps rather than go through Google.
- Social networks, such as Facebook and Twitter. Some users are increasingly relying on social networks for product or service referrals, rather than seeking information through traditional search engines.
- Other forms of advertising, such as television, radio, newspapers, magazines, and billboards. Our advertisers typically advertise in multiple media, both online and offline.
- Other online advertising platforms and networks, including Facebook, Criteo, and AppNexus, that compete for advertisers with AdWords, our primary auction-based advertising program.
- Providers of digital video services, such as Facebook, Netflix, Amazon, and Hulu.
- Companies that design, manufacture, and market consumer electronics products, including businesses that have developed proprietary platforms.
- Providers of enterprise cloud services, including Amazon and Microsoft.
- Digital assistant providers, such as Apple, Amazon, Facebook, and Microsoft.

Competing successfully in our advertising-related businesses depends heavily on our ability to deliver and distribute innovative products and technologies to the marketplace so that we can attract and retain:

- Users, for whom other products and services are literally one click away, primarily on the basis of the relevance and usefulness of our search results and the features, availability, and ease of use of our products and services.
- Advertisers, primarily based on our ability to generate sales leads, and ultimately customers, and to deliver their advertisements in an efficient and effective manner across a variety of distribution channels.
- Content providers (Google Network Members, the parties who use our advertising programs to deliver relevant ads alongside their search results and content, as well as other content providers for whom we distribute or license content), primarily based on the quality of our advertiser base, our ability to help these partners generate revenues from advertising, and the terms of our agreements with them.

Intellectual Property

We rely on various intellectual property laws, confidentiality procedures and contractual provisions to protect our proprietary technology and our brand. We have registered, and applied for the registration of, U.S. and international trademarks service marks, domain names and copyrights. We have also filed patent applications in the U.S. and foreign countries covering certain of our technology, and acquired patent assets to supplement our portfolio. We have licensed in the past, and expect that we may license in the future, certain of our rights to other parties.

Culture and Employees

We take great pride in our culture. We embrace collaboration and creativity, and encourage the iteration of ideas to address complex technical challenges. Transparency and open dialogue are central to how we work, and we like to ensure that company news reaches our employees first through internal channels.

Despite our rapid growth, we still cherish our roots as a startup and wherever possible empower employees to act on great ideas regardless of their role or function within the company. We strive to hire great employees, with backgrounds and perspectives as diverse as those of our global users. We work to provide an environment where these talented people can have fulfilling careers addressing some of the biggest challenges in technology and society.

Our employees are among our best assets and are critical for our continued success. We expect to continue investing in hiring talented employees and to provide competitive compensation programs to our employees. As of December 31, 2016, we had 72,053 full-time employees: 27,169 in research and development, 20,902 in sales and marketing, 14,287 in operations, and 9,695 in general and administrative functions. Although we have work councils and statutory employee representation obligations in certain countries, our U.S. employees are not represented by a labor union. Competition for qualified personnel in our industry is intense, particularly for software engineers, computer scientists, and other technical staff.

Seasonality

Our business is affected by seasonal fluctuations in Internet usage, advertising expenditures, and underlying business trends such as traditional retail seasonality (e.g., commercial queries typically increase in the fourth quarter of each year).

Other Items

Climate change is one of the most significant global challenges of our time, and we've long been committed to improving our energy consumption. In 2012, we set a long term goal to reach 100% renewable energy for our operations, and we expect to achieve that goal in 2017.

We continue to invest in our existing products and services as well as developing new products and services through research and product development. We often release early-stage products. We then use data and user feedback to decide if and how to invest further in those products. Research and development expenses include the vast majority of engineering and technical headcount responsible for research and development of our existing and new products and services, as well as their associated costs. For more information please refer to the Consolidated Statements of Income included in Part II of this Annual Report on Form 10-K.

For information about segments and geographic areas, please refer to Note 15 of the Notes to Consolidated Financial Statements included in Part II of this Annual Report on Form 10-K.

As part of the Alphabet reorganization, we expect to convert Google Inc. into a limited liability company.

Available Information

Our website is located at www.abc.xyz, and our investor relations website is located at www.abc.xyz/investor. Our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, and our Proxy Statements are available through our investor relations website, free of charge, after we file them with the SEC. We also provide a link to the section of the SEC's website at www.sec.gov that has all of the reports that we file or furnish with the SEC. You may read and copy any materials we file with the SEC at the SEC's Public Reference Room at 100 F Street, NE, Washington, D.C. 20549. You can get information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330.

We webcast via our investor relations website our earnings calls and certain events we participate in or host with members of the investment community. Our investor relations website also provides notifications of news or announcements regarding our financial performance, including SEC filings, investor events, press and earnings releases, and blogs. Further corporate governance information, including our certificate of incorporation, bylaws, governance guidelines, board committee charters, and code of conduct, is also available on our investor relations website under the heading "Other." The content of our websites are not incorporated by reference into this Annual Report on Form 10-K or in any other report or document we file with the SEC, and any references to our websites are intended to be inactive textual references only.

ITEM 1A. RISK FACTORS

Our operations and financial results are subject to various risks and uncertainties, including but not limited to those described below, which could adversely affect our business, financial condition, results of operations, cash flows, and the trading price of our common and capital stock.

Risks Related to Our Businesses and Industries

We face intense competition. If we do not continue to innovate and provide products and services that are useful to users, we may not remain competitive, and our revenues and operating results could be adversely affected.

Our businesses are rapidly evolving, intensely competitive, and subject to changing technologies, shifting user needs, and frequent introductions of new products and services. Competing successfully depends heavily on our ability to accurately anticipate technology developments and deliver innovative products and technologies to the marketplace rapidly and, for Google, provide products and services that make our search results and ads relevant and useful for our users. As our businesses evolve, the competitive pressure to innovate will encompass a wider range of products and services, including products and services that may be outside of our historical core business. As a result, we must continue to invest significant resources in research and development, including through acquisitions, in order to enhance our search technology and our existing products and services, and introduce new products and services that people can easily and effectively use.

We have many competitors in different industries, including general purpose search engines and information services; vertical search engines and e-commerce websites; social networks; other forms of advertising and online advertising platforms and networks; companies that design, manufacture, and market consumer electronic products; providers of enterprise cloud services and digital video services; and digital assistant providers. Our current and potential domestic and international competitors range from large and established companies to emerging start-ups. Some large companies have longer operating histories and more established relationships with customers and users, and they can use their experiences and resources in ways that could affect our competitive position, including by making acquisitions, continuing to invest heavily in research and development, aggressively initiating intellectual property claims (whether or not meritorious), and continuing to compete aggressively for advertisers and websites. Emerging start-ups may be able to innovate and provide products and services faster than we can or may foresee the consumer need for products and services before us.

In addition, new products and services can sometimes present new and difficult technological and legal challenges, which may negatively impact our brands and demand for our products and services and adversely impact our revenues and operating results. Our operating results would also suffer if our innovations are not responsive to the needs of our users, advertisers, and Google Network Members; are not appropriately timed with market opportunities; or are not effectively brought to market. As technology continues to develop, our competitors may be able to offer user experiences that are, or that are seen to be, substantially similar to or better than ours. This may force us to compete in different ways and expend significant resources in order to remain competitive. If our competitors are more successful than we are in developing compelling products or in attracting and retaining users, advertisers, and content providers, our revenues and operating results could be adversely affected.

We generate substantially all of our revenues from advertising, and reduced spending by advertisers or a loss of partners could harm our business.

We generated 88% of total revenues from advertising in 2016. Many of our advertisers, companies that distribute our products and services, digital publishers, and content partners can terminate their contracts with us at any time. Those partners may not continue to do business with us if we do not create more value (such as increased numbers of users or customers, new sales leads, increased brand awareness, or more effective monetization) than their available alternatives. If we do not provide superior value or deliver advertisements efficiently and competitively, we could see a decrease in revenue and other adverse impacts to our business. In addition, expenditures by advertisers tend to be cyclical, reflecting overall economic conditions and budgeting and buying patterns. Adverse macroeconomic conditions can also have a material negative impact on user activity and the demand for advertising and cause our advertisers to reduce the amounts they spend on advertising, which could adversely affect our revenues and business.

Our ongoing investment in new businesses and new products, services, and technologies is inherently risky, and could disrupt our current operations.

We have invested and expect to continue to invest in new businesses, products, services, and technologies. The creation of Alphabet as a new holding company in 2015 and the investments that we are making across various areas in Google and Other Bets are a reflection of our ongoing efforts to innovate and provide products and services that

are useful to users. Such endeavors may involve significant risks and uncertainties, including insufficient revenues from such investments to offset any new liabilities assumed and expenses associated with these new investments, inadequate return of capital on our investments, distraction of management from current operations, use of alternative investment or compensation structures, and unidentified issues not discovered in our due diligence of such strategies and offerings that could cause us to fail to realize the anticipated benefits of such investments and incur unanticipated liabilities. Because these new ventures are inherently risky, no assurance can be given that such strategies and offerings will be successful and will not adversely affect our reputation, financial condition, and operating results.

More people are using devices other than desktop computers to access the Internet and accessing new devices to make search queries. If manufacturers and users do not widely adopt versions of our search technology, products, or operating systems developed for these devices, our business could be adversely affected.

The number of people who access the Internet through devices other than desktop computers, including mobile phones, smartphones, handheld computers such as laptops and tablets, video game consoles, digital assistants, and television set-top devices, is increasing dramatically. The functionality and user experience associated with some alternative devices may make the use of our products and services through such devices more difficult (or just different) and the versions of our products and services developed for these devices may not be compelling to users, manufacturers, or distributors of alternative devices. Each manufacturer or distributor may establish unique technical standards for its devices, and our products and services may not work or be viewable on these devices as a result. Some manufacturers may also elect not to include our products on their devices. In addition, search queries are increasingly being undertaken via "apps" tailored to particular devices or social media platforms, which could affect our search and advertising business over time. As new devices and platforms are continually being released, it is difficult to predict the problems we may encounter in adapting our products and services and developing competitive new products and services. We expect to continue to devote significant resources to the creation, support, and maintenance of products and services across multiple platforms and devices. If we are unable to attract and retain a substantial number of alternative device manufacturers, suppliers, distributors, developers, and users to our products and services, or if we are slow to develop products and technologies that are more compatible with alternative devices and platforms, we will fail to capture the opportunities available as consumers and advertisers continue to exist in a dynamic, multi-screen environment.

Our revenue growth rate could decline over time, and we anticipate downward pressure on our operating margin in the future.

Our revenue growth rate could decline over time as a result of a number of factors, including:

- increasing competition,
- changes in property mix, platform mix, device mix, and geographical mix,
- the challenges in maintaining our growth rate as our revenues increase to higher levels,
- the evolution of the online advertising market, including the increasing variety of online platforms for advertising, and the other markets in which we participate, and
- the rate of user adoption of our products, services, and technologies.

We believe our margins could experience downward pressure as a result of increasing competition and increased costs for many aspects of our business as well as the continuing shift to mobile, changes in device mix, and the contribution of new businesses to overall revenue. For instance, the margin on revenues we generate from our Google Network Members is significantly less than the margin on revenues we generate from advertising on Google properties. Consequently, our margins will experience downward pressure if a greater percentage of our revenues comes from ads placed on our Google Network Members' properties compared to revenues generated through ads placed on Google properties. Additionally, the margin we earn on revenues generated from our Google Network Members could decrease in the future if we pay an even larger percentage of advertising fees to our Google Network Members.

Furthermore, in our multi-device world, we generate our advertising revenues increasingly from mobile and newer advertising formats, and the margins from the advertising revenues from these sources have generally been lower than those from traditional desktop search. We also expect our traffic acquisition costs (TAC) paid to our distribution partners to increase due to changes in device mix between mobile, desktop, and tablet, partner mix, partner agreement terms, and the percentage of queries channeled through paid access points.

Additionally, our margins could experience downward pressure because the margin on the sale of digital content, hardware products, and cloud-based services have generally been lower than those from traditional desktop search. Further, our margins could be impacted adversely if we spend a proportionately larger amount to promote new products and services or distribute certain products or if we invest more heavily in our innovation efforts across the Company (such as our Other Bets businesses) than we have historically.

We are subject to increasing regulatory scrutiny that may negatively impact our business. Additionally, changes in policies governing a wide range of topics may adversely affect our business.

The growth of our company and our expansion into a variety of new fields involves a variety of new regulatory issues, and we have experienced increased regulatory scrutiny as we have grown. For instance, various regulatory agencies are reviewing aspects of our search and other businesses. We continue to cooperate with the European Commission and other regulatory authorities around the world in investigations they are conducting with respect to our business.

Legislators and regulators may make legal and regulatory changes, or interpret and apply existing laws or policies, in ways that make our products and services less useful to our users, require us to incur substantial costs, expose us to unanticipated civil or criminal liability, or cause us to change our business practices. Additionally, changes in social, political, and regulatory conditions or in laws and policies governing a wide range of topics may disrupt our business practices. These changes could negatively impact our business and results of operations in material ways.

A variety of new and existing laws could subject us to claims or otherwise harm our business.

We are subject to numerous U.S. and foreign laws and regulations covering a wide variety of subject matters. New laws and regulations (or new interpretations of existing laws and regulations) may also impact our business. For example, current and new patent laws such as U.S. patent laws and European patent laws may affect the ability of companies, including us, to protect their innovations and defend against claims of patent infringement. Similarly, changes to copyright laws being considered in Europe and elsewhere may increase costs or require companies, including us, to change or cease offering certain existing services. The costs of compliance with these laws and regulations are high and are likely to increase in the future.

Claims have been, or may be, threatened and filed against us under both U.S. and foreign laws for defamation, invasion of privacy and other tort claims, unlawful activity, patent, copyright and trademark infringement, product liability, or other theories based on the nature and content of the materials searched and the ads posted by our users, our products and services, or content generated by our users. Furthermore, many of these laws do not contemplate or address the unique issues raised by a number of our new businesses, products, services and technologies. In addition, the applicability and scope of these laws, as interpreted by the courts, remain uncertain. For example, the laws relating to the liability of providers of online services are currently unsettled both within the U.S. and abroad.

In addition, other laws that could subject us to claims or otherwise harm our business include, among others:

- We rely on statutory safe harbors, as set forth in the Digital Millennium Copyright Act in the United States and the E-Commerce Directive in Europe, against copyright liability for various linking, caching, and hosting activities. Any legislation or court rulings impacting these safe harbors may adversely impact us.
- The General Data Protection Regulation, coming into effect in Europe in May of 2018, which creates a range of new compliance obligations, and increases financial penalties for noncompliance significantly.
- Court decisions such as the 'right to be forgotten' ruling issued by the European court, which allows individuals to demand that Google remove search results about them in certain instances, may limit the content we can show to our users and impose significant operational burdens.
- Various U.S. and international laws that restrict the distribution of materials considered harmful to children and impose additional restrictions on the ability of online services to collect information from minors.
- Data protection laws passed by many states and by certain countries outside the U.S. that require notification to users when there is a security breach for personal data, such as California's Information Practices Act.
- Data localization laws, which generally mandate that certain types of data collected in a particular country be stored and/or processed within that country.

We face risks and costs overseas as our products and services are offered in international markets and may be subject to additional regulations. Any failure on our part to comply with these laws and regulations can result in negative publicity and diversion of management time and effort and may subject us to significant liabilities and other penalties.

We are regularly subject to claims, suits, government investigations, and other proceedings that may result in adverse outcomes.

We are regularly subject to claims, suits, and government investigations involving competition, intellectual property, privacy, consumer protection, tax, labor and employment, commercial disputes, content generated by our users, goods and services offered by advertisers or publishers using our platforms, and other matters. The manufacturing and sale of an expanded suite of hardware products further exposes us to the risk of product liability and other litigation as well as consumer protection concerns related to product defects, as well as health and safety, hazardous materials usage, and other environmental concerns. We may also be subject to claims, including product warranty claims, if users experience service disruptions, failures, or other issues. In addition, our businesses face intellectual property litigation,

as further discussed later, that exposes us to the risk of exclusion and cease and desist orders, which could limit our ability to sell products and services.

Such claims, suits, and government investigations are inherently uncertain and their results cannot be predicted with certainty. Regardless of the outcome, any of these types of legal proceedings can have an adverse impact on us because of legal costs, diversion of management resources, and other factors. Determining reserves for our pending litigation is a complex, fact-intensive process that requires significant judgment. It is possible that a resolution of one or more such proceedings could result in substantial fines and penalties that could adversely affect our business, consolidated financial position, results of operations, or cash flows in a particular period. These proceedings could also result in reputational harm, criminal sanctions, consent decrees, or orders preventing us from offering certain features, functionalities, products, or services, requiring a change in our business practices or product recalls or corrections, or requiring development of non-infringing or otherwise altered products or technologies. Any of these consequences could adversely affect our business and results of operations.

We may be subject to legal liability associated with providing online services or content.

We host and provide a wide variety of services and products that enable users to exchange information, advertise products and services, conduct business, and engage in various online activities both domestically and internationally. The law relating to the liability of providers of these online services and products for activities of their users is still somewhat unsettled both within the U.S. and internationally. Claims have been threatened and have been brought against us for defamation, negligence, breaches of contract, copyright or trademark infringement, unfair competition, unlawful activity, tort, including personal injury, fraud, or other theories based on the nature and content of information that we publish or to which we provide links or that may be posted online or generated by us or by third parties, including our users. In addition, we are and have been and may again in the future be subject to domestic or international actions alleging that certain content we have generated or third-party content that we have made available within our services violates U.S. and non-U.S. law.

We also place advertisements which are displayed on third-party publishers and advertising networks properties, and we offer third-party products, services, or content. We may be subject to claims concerning these products, services, or content by virtue of our involvement in marketing, branding, broadcasting, or providing access to them, even if we do not ourselves host, operate, provide, or provide access to these products, services, or content. Defense of any such actions could be costly and involve significant time and attention of our management and other resources, may result in monetary liabilities or penalties, and may require us to change our business in an adverse manner.

Privacy concerns relating to our technology could damage our reputation and deter current and potential users from using our products and services.

From time to time, concerns have been expressed about whether our products, services, or processes compromise the privacy of users and others. Concerns about our practices with regard to the collection, use, disclosure, or security of personal information or other privacy related matters, even if unfounded, could damage our reputation and adversely affect our operating results.

In addition, as nearly all of our products and services are web-based, the amount of data we store for our users on our servers (including personal information) has been increasing. Any systems failure or compromise of our security that results in the release of our users' data could seriously harm our reputation and brand and, therefore, our business, and impair our ability to attract and retain users. We expect to continue to expend significant resources to create world-class security protections that shield against theft and security breaches. The risk that these types of events could seriously harm our business is likely to increase as we expand the number of web-based products and services we offer and operate in more countries, and as cyber attacks by third parties become more sophisticated and targeted.

Regulatory authorities around the world are considering a number of legislative and regulatory proposals concerning data protection, including measures to ensure that our encryption of users' data does not hinder law enforcement agencies' access to that data. In addition, the interpretation and application of consumer and data protection laws in the U.S., Europe and elsewhere are often uncertain and in flux. It is possible that these laws may be interpreted and applied in a manner that is inconsistent with our data practices. If so, in addition to the possibility of fines, this could result in an order requiring that we change our data practices, which could have an adverse effect on our business and results of operations. Complying with these various laws could cause us to incur substantial costs or require us to change our business practices in a manner adverse to our business.

Recent legal developments in Europe have created compliance uncertainty regarding certain transfers of information from Europe to the U.S. For example, the European Union and U.S. Privacy Shield framework was designed to allow for legal certainty regarding transfers of data. However, the agreement itself faces a number of legal challenges

and is subject to annual review. This has resulted in some uncertainty, and compliance obligations could cause us to incur costs or require us to change our business practices in a manner adverse to our business.

If our security measures are breached resulting in the improper use and disclosure of user data, or if our services are subject to attacks that degrade or deny the ability of users to access our products and services, our products and services may be perceived as not being secure, users and customers may curtail or stop using our products and services, and we may incur significant legal and financial exposure.

Our products and services involve the storage and transmission of users' and customers' proprietary information, and theft and security breaches expose us to a risk of loss of this information, improper use and disclosure of such information, litigation, and potential liability. We experience cyber attacks of varying degrees on a regular basis. Our security measures may also be breached due to employee error, malfeasance, system errors or vulnerabilities, including vulnerabilities of our vendors, or otherwise. Such breach or unauthorized access, increased government surveillance, or attempts by outside parties to fraudulently induce employees, users, or customers to disclose sensitive information in order to gain access to our data or our users' or customers' data could result in significant legal and financial exposure, damage to our reputation, and a loss of confidence in the security of our products and services that could potentially have an adverse effect on our business. Because the techniques used to obtain unauthorized access, disable or degrade service, or sabotage systems change frequently and often are not recognized until launched against a target, we may be unable to anticipate these techniques or to implement adequate preventative measures. If an actual or perceived breach of our security occurs, the market perception of the effectiveness of our security measures could be harmed and we could lose users and customers.

We are, and may in the future be, subject to intellectual property or other claims, which are costly to defend, could result in significant damage awards, and could limit our ability to use certain technologies in the future.

Internet, technology, media, and other companies own large numbers of patents, copyrights, trademarks, and trade secrets and frequently enter into litigation based on allegations of infringement or other violations of intellectual property rights. In addition, patent holding companies may continue to seek to monetize patents they have purchased or otherwise obtained. As we have grown, the intellectual property rights claims against us have increased and may continue to increase as we develop new products, services, and technologies.

We have had patent, copyright, and trademark infringement lawsuits filed against us claiming that certain of our products, services, and technologies infringe the intellectual property rights of others. Third parties have also sought broad injunctive relief against us by filing claims in U.S. and international courts and the U.S. International Trade Commission (ITC) for exclusion and cease and desist orders, which could limit our ability to sell our products or services in the U.S. or elsewhere if our products or services or those of our customers or suppliers are found to infringe the intellectual property subject to the claims. Adverse results in any of these lawsuits may include awards of substantial monetary damages, costly royalty or licensing agreements (if licenses are available at all), or orders preventing us from offering certain features, functionalities, products, or services, and may also cause us to change our business practices, and require development of non-infringing products or technologies, which could result in a loss of revenues for us and otherwise harm our business.

Many of our agreements with our customers and partners, including certain suppliers, require us to indemnify them for certain intellectual property infringement claims against them, which could increase our costs as a result of defending such claims, and may require that we pay significant damages if there were an adverse ruling in any such claims. Such customers and partners may also discontinue the use of our products, services, and technologies, as a result of injunctions or otherwise, which could result in loss of revenues and adversely impact our business. Moreover, intellectual property indemnities provided to us by our suppliers, when obtainable, may not cover all damages and losses suffered by us and our customers from covered products. Furthermore, in connection with our divestitures, we have agreed, and may in the future agree, to provide indemnification for certain potential liabilities.

Regardless of the merits of the claims, intellectual property claims are often time consuming, expensive to litigate or settle, and cause significant diversion of management attention. To the extent such intellectual property infringement claims are successful, they may have an adverse effect on our business, consolidated financial position, results of operations, or cash flows.

Our intellectual property rights are valuable, and any inability to protect them could reduce the value of our products, services, and brand.

Our patents, trademarks, trade secrets, copyrights, and other intellectual property rights are important assets for us. Various events outside of our control pose a threat to our intellectual property rights, as well as to our products, services and technologies. For example, effective intellectual property protection may not be available in every country

in which our products and services are distributed or made available through the Internet. Also, the efforts we have taken to protect our proprietary rights may not be sufficient or effective. Although we seek to obtain patent protection for our innovations, it is possible we may not be able to protect some of these innovations. Moreover, we may not have adequate patent or copyright protection for certain innovations that later turn out to be important. Furthermore, there is always the possibility, despite our efforts, that the scope of the protection gained will be insufficient or that an issued patent may be deemed invalid or unenforceable.

We also seek to maintain certain intellectual property as trade secrets. The secrecy could be compromised by outside parties, or by our employees, which could cause us to lose the competitive advantage resulting from these trade secrets. We also face risks associated with our trademarks. For example, there is a risk that the word "Google" could become so commonly used that it becomes synonymous with the word "search." If this happens, we could lose protection for this trademark, which could result in other people using the word "Google" to refer to their own products, thus diminishing our brand.

Any significant impairment of our intellectual property rights could harm our business and our ability to compete. Also, protecting our intellectual property rights is costly and time consuming. Any increase in the unauthorized use of our intellectual property could make it more expensive to do business and harm our operating results.

Acquisitions, joint ventures, investments, and divestitures could result in operating difficulties, dilution, and other consequences that may adversely impact our business and results of operations.

Acquisitions, joint ventures, investments and divestitures, are important elements of our overall corporate strategy and use of capital, and these transactions could be material to our financial condition and results of operations. We expect to continue to evaluate and enter into discussions regarding a wide array of potential strategic transactions. Effecting these potential strategic transactions could create unforeseen operating difficulties and expenditures. The areas where we face risks include:

- Diversion of management time and focus from operating our business to challenges related to acquisitions and other strategic transactions.
- Failure to successfully further develop the acquired business or technology.
- Implementation or remediation of controls, procedures, and policies at the acquired company.
- Integration of the acquired company's accounting, human resource, and other administrative systems, and coordination of product, engineering, and sales and marketing functions.
- Transition of operations, users, and customers onto our existing platforms.
- Failure to obtain required approvals on a timely basis, if at all, from governmental authorities, or conditions placed upon approval that could, among other things, delay or prevent us from completing a transaction, or otherwise restrict our ability to realize the expected financial or strategic goals of an acquisition or other strategic transaction.
- In the case of foreign acquisitions, the need to integrate operations across different cultures and languages and to address the particular economic, currency, political, and regulatory risks associated with specific countries.
- Cultural challenges associated with integrating employees from the acquired company into our organization, and retention of employees from the businesses we acquire.
- Liability for activities of the acquired company before the acquisition, including patent and trademark infringement claims, privacy issues, violations of laws, commercial disputes, tax liabilities, and other known and unknown liabilities.
- Litigation or other claims in connection with the acquired company, including claims from terminated employees, customers, former stockholders, or other third parties.

Our failure to address these risks or other problems encountered in connection with our past or future acquisitions and other strategic transactions could cause us to fail to realize their anticipated benefits, incur unanticipated liabilities, and harm our business generally.

Our acquisitions could also result in dilutive issuances of our equity securities, the incurrence of debt, contingent liabilities, or amortization expenses, or impairment of goodwill and/or purchased long-lived assets, and restructuring charges, any of which could harm our financial condition or results. Also, the anticipated benefits or value of our acquisitions and other strategic transactions may not materialize. In connection with our divestitures, we have agreed, and may in the future agree, to provide indemnification for certain potential liabilities, which may adversely impact our financial condition or results.

Our business depends on strong brands, and failing to maintain and enhance our brands would hurt our ability to expand our base of users, advertisers, Google Network Members, and other partners.

Our strong brands have significantly contributed to the success of our business. Maintaining and enhancing the brands of both Google and Other Bets increases our ability to enter new categories and launch new and innovative products that better serve the needs of our users. Our brands may be negatively impacted by a number of factors, including, among others, reputational issues and product/technical performance failures. Further, if we fail to maintain and enhance equity in the Google brand, our business, operating results, and financial condition may be materially and adversely affected. Maintaining and enhancing our brands will depend largely on our ability to remain a technology leader and continue to provide high-quality, innovative products and services that are truly useful and play a meaningful role in people's everyday lives.

We face a number of manufacturing and supply chain risks that, if not properly managed, could adversely impact our financial results and prospects.

We face a number of risks related to manufacturing and supply chain management. We may enter into long term contracts that commit us to significant terms and conditions of supply. We may be liable for material and product that is not consumed due to market acceptance, technological change, obsolescences, quality, product recalls, and warranty issues. For instance, the products we sell may have quality issues resulting from the design or manufacture of the product, or from the software used in the product. Sometimes, these issues may be caused by components we purchase from other manufacturers or suppliers. If the quality of our products does not meet our customers' expectations or our products are found to be defective, then our sales and operating earnings, and ultimately our reputation, could be negatively impacted.

We rely on third parties to manufacture many of our assemblies and finished products, and we have third-party arrangements for the design of some components and parts. Our business could be negatively affected if we are not able to engage third parties with the necessary capabilities or capacity on reasonable terms, or if those we engage fail to meet their obligations (whether due to financial difficulties or other reasons), or make adverse changes in the pricing or other material terms of our arrangements with them.

We have in the past, and may experience in the future, supply shortages and price increases driven by raw material availability, manufacturing capacity, labor shortages, industry allocations, natural disasters and significant changes in the financial or business condition of our suppliers. We may experience shortages or other supply chain disruptions in the future that could negatively impact our operations. In addition, some of the components we use in our products are available only from a single source or limited sources, and we may not be able to find replacement vendors on favorable terms or at all in the event of a supply chain disruption.

Additionally, because many of our supply contracts have volume-based pricing or minimum purchase requirements, if the volume of our hardware sales decreases or does not reach projected targets, we could face increased materials and manufacturing costs or other financial liabilities that could make our products more costly per unit to manufacture and therefore less competitive and negatively impact our financial results. Further, certain of our competitors may negotiate more favorable contractual terms based on volume and other commitments that may provide them with competitive advantages and may impact our supply.

We also require our suppliers and business partners to comply with law and company policies regarding workplace and employment practices, data security, environmental compliance and intellectual property licensing, but we do not control them or their practices. If any of them violates laws or implements practices regarded as unethical, we could experience supply chain disruptions, canceled orders, terminations of or damage to key relationships, and damage to our reputation. If any of them fails to procure necessary license rights to third-party intellectual property, legal action could ensue that could impact the saleability of our products and expose us to financial obligations to third parties.

The Dodd-Frank Wall Street Reform and Consumer Protection Act includes disclosure requirements regarding the use of certain minerals mined from the Democratic Republic of Congo and adjoining countries (DRC) and procedures pertaining to a manufacturer's efforts regarding the source of such minerals. SEC rules implementing these requirements may have the effect of reducing the pool of suppliers who can supply DRC "conflict free" components and parts, and we may not be able to obtain DRC conflict free products or supplies in sufficient quantities for our operations. Since our supply chain is complex, we may face reputational challenges with our customers, stockholders and other stakeholders if we are unable to sufficiently verify the origins for the minerals used in our products.

Web spam and content farms could decrease our search quality, which could damage our reputation and deter our current and potential users from using our products and services.

"Web spam" refers to websites that attempt to violate a search engine's quality guidelines or that otherwise seek to rank higher in search results than a search engine's assessment of their relevance and utility would rank them.

Although English-language web spam in our search results has been significantly reduced, and web spam in most other languages is limited, we expect web spammers will continue to seek ways to improve their rankings inappropriately. We continuously combat web spam, including through indexing technology that makes it harder for spam-like, less useful web content to rank highly. We face challenges from low-quality and irrelevant content websites, including "content farms", which are websites that generate large quantities of low-quality content to help them improve their search rankings. We are continually launching algorithmic changes focused on low-quality websites. If our search results display an increasing number of web spam and content farms, this could hurt our reputation for delivering relevant information or reduce user traffic to our websites. In addition, as we continue to take actions to improve our search quality and reduce low-quality content, this may in the short run reduce our AdSense revenues, since some of these websites are AdSense partners.

Interruption or failure of our information technology and communications systems could hurt our ability to effectively provide our products and services, which could damage our reputation and harm our operating results.

The availability of our products and services depends on the continuing operation of our information technology and communications systems. Our systems are vulnerable to damage or interruption from earthquakes, terrorist attacks, natural disasters, the effects of climate change (such as sea level rise, drought, flooding, wildfires, and increased storm severity), power loss, telecommunications failures, computer viruses, computer denial of service attacks, or other attempts to harm our systems. Some of our data centers are located in areas with a high risk of major earthquakes. Our data centers are also subject to break-ins, sabotage, and intentional acts of vandalism, and to potential disruptions if the operators of certain of these facilities have financial difficulties. Some of our systems are not fully redundant, and our disaster recovery planning cannot account for all eventualities. The occurrence of a natural disaster, a decision to close a facility we are using, or other unanticipated problems at our data centers could result in lengthy interruptions in our service. In addition, our products and services are highly technical and complex and may contain errors or vulnerabilities, which could result in interruptions in our services or the failure of our systems.

Our international operations expose us to additional risks that could harm our business, operating results, and financial condition.

Our international operations are significant to our revenues and net income, and we plan to continue to grow internationally. International revenues accounted for approximately 53% of our consolidated revenues in 2016. In certain international markets, we have limited operating experience and may not benefit from any first-to-market advantages or otherwise succeed.

In addition to risks described elsewhere in this section, our international operations expose us to other risks, including the following:

- Restrictions on foreign ownership and investments, and stringent foreign exchange controls that might prevent us from repatriating cash earned in countries outside the U.S.
- Import and export requirements, tariffs, trade disputes and barriers, and customs classifications that may prevent us from offering products or providing services to a particular market and may increase our operating costs.
- Longer payment cycles in some countries, increased credit risk, and higher levels of payment fraud.
- Still developing foreign laws and legal systems.
- Uncertainty regarding liability for services and content, including uncertainty as a result of local laws and lack of legal precedent.
- Different employee/employer relationships, existence of workers' councils and labor unions, and other challenges caused by distance, language, and cultural differences, making it harder to do business in certain jurisdictions.

Additionally, changes in international local political, economic, regulatory, tax, social, and labor conditions may adversely harm our business and compliance with complex foreign and U.S. laws and regulations that apply to our international operations increases our cost of doing business. These numerous and sometimes conflicting laws and regulations include, among others, internal control and disclosure rules, privacy and data protection requirements, anti-corruption laws, such as the U.S. Foreign Corrupt Practices Act, and other local laws prohibiting corrupt payments to governmental officials, and competition regulations, among others. Violations of these laws and regulations could result in fines and penalties, criminal sanctions against us, our officers, or our employees, prohibitions on the conduct of our business and on our ability to offer our products and services in one or more countries, and could also materially affect our brand, our international growth efforts, our ability to attract and retain employees, our business, and our operating results. Although we have implemented policies and procedures designed to ensure compliance with these laws and regulations, there can be no assurance that our employees, contractors, or agents will not violate our policies.

Finally, since we conduct business in currencies other than U.S. dollars but report our financial results in U.S. dollars, we face exposure to fluctuations in currency exchange rates. Although we hedge a portion of our international currency exposure, significant fluctuations in exchange rates between the U.S. dollar and foreign currencies may adversely affect our revenues and earnings. Additionally, hedging programs are inherently risky and could expose us to additional risks that could adversely affect our financial condition and results of operations.

Our operating results may fluctuate, which makes our results difficult to predict and could cause our results to fall short of expectations.

Our operating results may fluctuate as a result of a number of factors, many outside of our control. As a result, comparing our operating results on a period-to-period basis may not be meaningful, and you should not rely on our past results as an indication of our future performance. Our quarterly, year-to-date, and annual expenses as a percentage of our revenues may differ significantly from our historical or projected rates. Our operating results in future quarters may fall below expectations. Any of these events could cause our stock price to fall. Each of the risk factors listed in this section in addition to the following factors may affect our operating results:

- Our ability to continue to attract users to our websites and retain existing users on our websites.
- Our ability to monetize (or generate revenues from) traffic on Google properties and our Google Network Members' properties across various devices.
- Advertising revenue fluctuations caused by changes in property mix, platform mix, device mix, and geographical mix.
- The amount of revenues and expenses generated and incurred in currencies other than U.S. dollars, and our ability to manage the resulting risk through our foreign exchange risk management program.
- The amount and timing of operating costs and expenses and capital expenditures related to the maintenance and expansion of our businesses, operations, and infrastructure.
- Our focus on long-term goals over short-term results.
- The results of our acquisitions, divestitures, and our investments in risky projects, including new businesses, products, services, and technologies.
- Our ability to keep our websites operational at a reasonable cost and without service interruptions.
- Our ability to generate significant revenues from new products and services in which we have invested considerable time and resources.

Because our businesses are changing and evolving, our historical operating results may not be useful to you in predicting our future operating results. In addition, advertising spending has historically been cyclical in nature, reflecting overall economic conditions, as well as budgeting and buying patterns. Also, user traffic tends to be seasonal. Our rapid growth has tended to mask the cyclicality and seasonality of our business. As our growth rate has slowed, the cyclicality and seasonality in our business has become more pronounced and caused our operating results to fluctuate.

If we were to lose the services of Larry, Sergey, Eric, Sundar, or other key personnel, we may not be able to execute our business strategy.

Our future success depends in a large part upon the continued service of key members of our senior management team. In particular, Larry Page and Sergey Brin are critical to the overall management of Alphabet and its subsidiaries, and they, along with Sundar Pichai, the Chief Executive Officer of Google, play an important role in the development of our technology. Along with our Executive Chairman Eric E. Schmidt, they also play a key role in maintaining our culture and setting our strategic direction. All of our executive officers and key employees are at-will employees, and we do not maintain any key-person life insurance policies. The loss of key personnel could seriously harm our business.

We rely on highly skilled personnel and, if we are unable to retain or motivate key personnel, hire qualified personnel, or maintain our corporate culture, we may not be able to grow effectively.

Our performance largely depends on the talents and efforts of highly skilled individuals. Our future success depends on our continuing ability to identify, hire, develop, motivate, and retain highly skilled personnel for all areas of our organization. Competition in our industry for qualified employees is intense, and certain of our competitors have directly targeted our employees. In addition, our compensation arrangements, such as our equity award programs, may not always be successful in attracting new employees and retaining and motivating our existing employees. Our continued ability to compete effectively depends on our ability to attract new employees and to retain and motivate our existing employees.

In addition, we believe that our corporate culture fosters innovation, creativity, and teamwork. As our organization grows, and we are required to implement more complex organizational management structures, particularly in light of our holding company structure, we may find it increasingly difficult to maintain the beneficial aspects of our corporate culture. This could negatively impact our future success.

Our business depends on continued and unimpeded access to the Internet by us and our users. Internet access providers may be able to restrict, block, degrade, or charge for access to certain of our products and services, which could lead to additional expenses and the loss of users and advertisers.

Our products and services depend on the ability of our users to access the Internet, and certain of our products require significant bandwidth to work effectively. Currently, this access is provided by companies that have significant market power in the broadband and internet access marketplace, including incumbent telephone companies, cable companies, mobile communications companies, and government-owned service providers. Some of these providers have taken, or have stated that they may take measures, including legal actions, that could degrade, disrupt, or increase the cost of user access to certain of our products by restricting or prohibiting the use of their infrastructure to support or facilitate our offerings, or by charging increased fees to us or our users to provide our offerings. In addition, in some jurisdictions, our products and services have been subject to government-initiated restrictions or blockages. Such interference could result in a loss of existing users and advertisers, and increased costs, and could impair our ability to attract new users and advertisers, thereby harming our revenues and growth.

New and existing technologies could block ads online, which would harm our business.

Technologies have been developed that can block the display of ads online and that provide tools to users to opt out of seeing ads online. Most of our Google revenues are derived from fees paid to us in connection with the display of ads online. As a result, such technologies and tools could adversely affect our operating results.

We are exposed to fluctuations in the market values of our investments.

Given the global nature of our business, we have investments both domestically and internationally. Credit ratings and market values of these investments can be negatively impacted by liquidity, credit deterioration or losses, financial results, foreign exchange rates, changes in interest rates, or other factors. As a result, the value or liquidity of our cash equivalents and marketable securities could decline and result in a material impairment, which could materially adversely affect our financial condition and operating results.

We could be subject to changes in tax rates, the adoption of new U.S. or international tax legislation, or exposure to additional tax liabilities.

Our future income taxes could be adversely affected by earnings being lower than anticipated in jurisdictions that have lower statutory tax rates and higher than anticipated in jurisdictions that have higher statutory tax rates, the net gains and losses recognized by legal entities on certain hedges and related hedged intercompany and other transactions under our foreign exchange risk management program, changes in the valuation of our deferred tax assets or liabilities, or changes in tax laws, regulations, or accounting principles, as well as certain discrete items. Due to shifting economic and political conditions, tax policies or rates in various jurisdictions may be subject to significant change.

In addition, we are subject to regular review and audit by both domestic and foreign tax authorities. As a result, we have received, and may in the future receive, assessments in multiple jurisdictions on various tax-related assertions, including transfer pricing adjustments or permanent establishment. Any adverse outcome of such a review or audit could have a negative effect on our operating results and financial condition. In addition, the determination of our worldwide provision for income taxes and other tax liabilities requires significant judgment, and there are many transactions and calculations where the ultimate tax determination is uncertain. Although we believe our estimates are reasonable, the ultimate tax outcome may differ from the amounts recorded in our financial statements and may materially affect our financial results in the period or periods for which such determination is made.

Risks Related to Ownership of Our Stock

The trading price for our Class A common stock and non-voting Class C capital stock may continue to be volatile.

The trading price of our stock has at times experienced substantial price volatility and may continue to be volatile. For example, from January 1, 2016 through December 31, 2016, the closing price of our Class A common stock ranged from $681.14 per share to $835.74 per share, and the closing price of our Class C capital stock ranged from $668.26 to $813.11 per share.

In addition to the factors discussed in this Annual Report on Form 10-K, the trading price of our Class A common stock and Class C capital stock may fluctuate widely in response to various factors, many of which are beyond our control, including, among others:

- Quarterly variations in our results of operations or those of our competitors.
- Announcements by us or our competitors of acquisitions, divestitures, investments, new products, significant contracts, commercial relationships, or capital commitments.
- Recommendations by securities analysts or changes in earnings estimates.

- Announcements about our earnings that are not in line with analyst expectations, the risk of which is enhanced because it is our policy not to give guidance on earnings.
- Announcements by our competitors of their earnings that are not in line with analyst expectations.
- Commentary by industry and market professionals about our products, strategies, and other matters affecting our business and results, regardless of its accuracy.
- The volume of shares of Class A common stock and Class C capital stock available for public sale.
- Sales of Class A common stock and Class C capital stock by us or by our stockholders (including sales by our directors, executive officers, and other employees).
- Short sales, hedging, and other derivative transactions on shares of our Class A common stock and Class C capital stock.
- The perceived values of Class A common stock and Class C capital stock relative to one another.
- Our stock repurchase program.

In addition, the stock market in general, and the market for technology companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of those companies. These broad market and industry factors may harm the market price of our Class A common stock and our Class C capital stock regardless of our actual operating performance.

We cannot guarantee that our stock repurchase program will be fully consummated or that our stock repurchase program will enhance long-term stockholder value, and stock repurchases could increase the volatility of the price of our stock and could diminish our cash reserves.

In October 2016, our board of directors authorized our company to repurchase up to $7,019,340,976.83 of our Class C capital stock. The repurchase program does not have an expiration date. Although our board of directors has authorized a stock repurchase program, the share repurchase program does not obligate Alphabet to repurchase any specific dollar amount or to acquire any specific number of shares. The stock repurchase program could affect the price of our stock and increase volatility and may be suspended or terminated at any time, which may result in a decrease in the trading price of our stock.

The concentration of our stock ownership limits our stockholders' ability to influence corporate matters.

Our Class B common stock has 10 votes per share, our Class A common stock has one vote per share, and our Class C capital stock has no voting rights. As of December 31, 2016, Larry, Sergey, and Eric beneficially owned approximately 92.4% of our outstanding Class B common stock, which represented approximately 56.8% of the voting power of our outstanding capital stock. Larry, Sergey, and Eric therefore have significant influence over management and affairs and over all matters requiring stockholder approval, including the election of directors and significant corporate transactions, such as a merger or other sale of our company or our assets, for the foreseeable future. In addition, because our Class C capital stock carries no voting rights (except as required by applicable law), the issuance of the Class C capital stock, including in future stock-based acquisition transactions and to fund employee equity incentive programs, could prolong the duration of Larry and Sergey's current relative ownership of our voting power and their ability to elect all of our directors and to determine the outcome of most matters submitted to a vote of our stockholders. Together with Eric, they would also continue to be able to control any required stockholder vote with respect to certain change in control transactions involving Alphabet (including an acquisition of Alphabet by another company).

This concentrated control limits or severely restricts our stockholders' ability to influence corporate matters and, as a result, we may take actions that our stockholders do not view as beneficial. As a result, the market price of our Class A common stock and our Class C capital stock could be adversely affected.

Provisions in our charter documents and under Delaware law could discourage a takeover that stockholders may consider favorable.

Provisions in Alphabet's certificate of incorporation and bylaws may have the effect of delaying or preventing a change of control or changes in our management. These provisions include the following:

- Our certificate of incorporation provides for a tri-class capital stock structure. As a result of this structure, Larry, Sergey, and Eric have significant influence over all matters requiring stockholder approval, including the election of directors and significant corporate transactions, such as a merger or other sale of our company or our assets. This concentrated control could discourage others from initiating any potential merger, takeover, or other change of control transaction that other stockholders may view as beneficial. As noted above, the issuance of the Class C capital stock could have the effect of prolonging the influence of Larry, Sergey, and Eric.
- Our board of directors has the right to elect directors to fill a vacancy created by the expansion of the board of directors or the resignation, death, or removal of a director, which prevents stockholders from being able to fill vacancies on our board of directors.

- Our stockholders may not act by written consent. As a result, a holder, or holders, controlling a majority of our capital stock would not be able to take certain actions without holding a stockholders' meeting.
- Our certificate of incorporation prohibits cumulative voting in the election of directors. This limits the ability of minority stockholders to elect director candidates.
- Stockholders must provide advance notice to nominate individuals for election to the board of directors or to propose matters that can be acted upon at a stockholders' meeting. These provisions may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of our company.
- Our board of directors may issue, without stockholder approval, shares of undesignated preferred stock. The ability to issue undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to acquire us.

As a Delaware corporation, we are also subject to certain Delaware anti-takeover provisions. Under Delaware law, a corporation may not engage in a business combination with any holder of 15% or more of its outstanding voting stock unless the holder has held the stock for three years or, among other things, the board of directors has approved the transaction. Our board of directors could rely on Delaware law to prevent or delay an acquisition of us.

Risks Related to Our Holding Company Reorganization

As a holding company, Alphabet is dependent on the operations and funds of its subsidiaries.

On October 2, 2015, we completed a reorganization pursuant to which Alphabet became a holding company with no business operations of its own. Alphabet's only significant assets are the outstanding equity interests in Google and any other current or future subsidiaries of Alphabet. As a result, we rely on cash flows from subsidiaries to meet our obligations, including to service any debt obligations of Alphabet.

We may not obtain the anticipated benefits of our reorganization into a holding company structure.

We believe that our holding company reorganization and the current operating structure increases management scale and allows us to focus on running our diverse businesses independently with the goal of maximizing each of the business' potential. The benefits of this reorganization may not be obtained if circumstances prevent us from taking advantage of the strategic and business opportunities that we expect it may afford us. As a result, we may incur the costs of a holding company structure without realizing the benefits, which could adversely affect our reputation, financial condition, and operating results.

Alphabet's management is dedicating significant effort to the Alphabet operating structure. These efforts may divert management's focus and resources from Alphabet's business, corporate initiatives, or strategic opportunities, which could have an adverse effect on our businesses, results of operations, financial condition, or prospects. Additionally, our subsidiaries may be restricted in their ability to pay cash dividends or to make other distributions to Alphabet, as the new holding company.

ITEM 1B. UNRESOLVED STAFF COMMENTS

There are no unresolved staff comments at December 31, 2016.

ITEM 2. PROPERTIES

Our headquarters are located in Mountain View, California. We also own and lease office and building space in the surrounding areas near our headquarters, which in the aggregate (including our headquarters) represent approximately 7.86 million square feet of office/building space and approximately forty-five acres of developable land to accommodate anticipated future growth. In addition, we own and lease office/building space and research and development sites, around the world - primarily in North America, Europe, South America, and Asia. We operate and own data centers in the U.S., Europe, South America, and Asia pursuant to various lease agreements and co-location arrangements. We believe our existing facilities, both owned and leased, are in good condition and suitable for the conduct of our business.

ITEM 3. LEGAL PROCEEDINGS

For a description of our material pending legal proceedings, please see Note 10 "Commitments and Contingencies - Legal Matters" of the Notes to Consolidated Financial Statements included in Item 8 of this Annual Report on Form 10-K, which is incorporated herein by reference.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

As of October 2, 2015, Alphabet Inc. became the successor issuer of Google Inc. pursuant to Rule 12g-3(a) under the Exchange Act.

Price Range of Common Stock and Capital Stock

Our Class A common stock has been listed on the Nasdaq Global Select Market under the symbol "GOOG" since August 19, 2004 and under the symbol "GOOGL" since April 3, 2014. Prior to August 19, 2004, there was no public market for our stock. The following table sets forth for the indicated periods the high and low sales prices per share for our Class A common stock on the Nasdaq Global Select Market.

Fiscal Year 2016 Quarters Ended:	High	Low
March 31, 2016	$ 780.91	$ 701.02
June 30, 2016	787.68	681.14
September 30, 2016	815.95	704.89
December 31, 2016	835.74	753.22

Fiscal Year 2015 Quarters Ended:	High	Low
March 31, 2015	$ 581.44	$ 497.06
June 30, 2015	573.66	532.74
September 30, 2015	699.62	541.70
December 31, 2015	793.96	642.00

Our Class B common stock is neither listed nor traded.

Our Class C capital stock has been listed on the Nasdaq Global Select Market under the symbol "GOOG" since April 3, 2014. The following table sets forth for the indicated periods the high and low sales prices per share for our Class C capital stock on the Nasdaq Global Select Market.

Fiscal Year 2016 Quarters Ended:	High	Low
March 31, 2016	$ 764.65	$ 678.11
June 30, 2016	766.61	668.26
September 30, 2016	787.21	694.49
December 31, 2016	813.11	736.08

Fiscal Year 2015 Quarters Ended:	High	Low
March 31, 2015	$ 575.33	$ 492.55
June 30, 2015	565.06	520.51
September 30, 2015	672.93	516.83
December 31, 2015	776.60	611.29

Holders of Record

As of December 31, 2016, there were approximately 2,178 and 2,183 stockholders of record of our Class A common stock and Class C capital stock, respectively, and the closing prices of our Class A common stock and Class C capital stock were $792.45 and $771.82 per share, respectively, as reported by the NASDAQ Global Select Market. Because many of our shares of Class A common stock and Class C capital stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders represented by these record holders. As of December 31, 2016, there were approximately 67 stockholders of record of our Class B common stock.

Dividend Policy

We have never declared or paid any cash dividend on our common or capital stock. We intend to retain any future earnings and do not expect to pay any cash dividends in the foreseeable future.

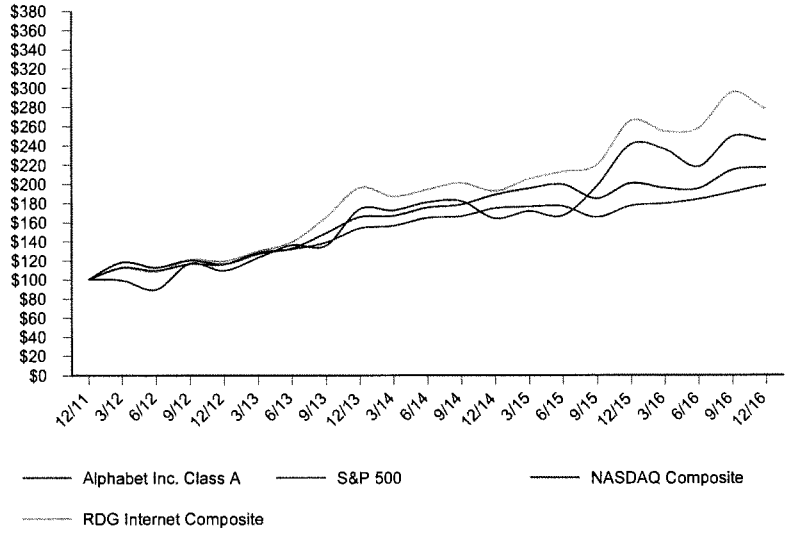
Stock Performance Graph

The following graph compares the 5-year cumulative total return to shareholders on Alphabet Inc.'s common stock relative to the cumulative total returns of the S&P 500 index, the RDG Internet Composite index, and the NASDAQ Composite index. An investment of $100 (with reinvestment of all dividends) is assumed to have been made in the company's Class A common stock and in each index on December 31, 2011 and its relative performance is tracked through December 31, 2016. The returns shown are based on historical results and are not intended to suggest future performance.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among Alphabet Inc., the S&P 500 Index, the

NASDAQ Composite Index, and the RDG Internet Composite Index



*$100 invested on December 31, 2011 in stock or index, including reinvestment of dividends. Fiscal year ending December 31.

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This performance graph shall not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the Exchange Act), or incorporated by reference into any filing of Alphabet under the Securities Act of 1933, as amended, or the Exchange Act, except as shall be expressly set forth by specific reference in such filing.

ITEM 6. SELECTED FINANCIAL DATA

The following selected consolidated financial data should be read in conjunction with Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our consolidated financial statements and the related notes appearing in Item 8 "Financial Statements and Supplementary Data" of this Annual Report on Form 10-K. The historical results are not necessarily indicative of the results to be expected in any future period.

	Year Ended December 31,				
	2012	2013	2014	2015	2016
	(in millions, except per share amounts)				
Consolidated Statements of Income Data:					
Revenues	$ 46,039	$ 55,519	$ 66,001	$ 74,989	$ 90,272
Income from operations	13,834	15,403	16,496	19,360	23,716
Net income from continuing operations	11,435	13,160	13,620	16,348	19,478
Net income (loss) from discontinued operations	(816)	(427)	516	0	0
Net income	10,619	12,733	14,136	16,348	19,478
Basic net income (loss) per share of Class A and B common stock:					
Continuing operations	$ 17.47	$ 19.77	$ 20.15	$ 23.11	$ 28.32
Discontinued operations	(1.25)	(0.64)	0.76	0.00	0.00
Basic net income per share of Class A and B common stock	$ 16.22	$ 19.13	$ 20.91	$ 23.11	$ 28.32
Basic net income (loss) per share of Class C capital stock:					
Continuing operations	$ 17.47	$ 19.77	$ 20.15	$ 24.63	$ 28.32
Discontinued operations	(1.25)	(0.64)	0.76	0.00	0.00
Basic net income per share of Class C capital stock	$ 16.22	$ 19.13	$ 20.91	$ 24.63	$ 28.32
Diluted net income (loss) per share of Class A and B common stock:					
Continuing operations	$ 17.21	$ 19.42	$ 19.82	$ 22.84	$ 27.85
Discontinued operations	(1.23)	(0.63)	0.75	0.00	0.00
Diluted net income per share of Class A and B common stock	$ 15.98	$ 18.79	$ 20.57	$ 22.84	$ 27.85
Diluted net income (loss) per share of Class C capital stock:					
Continuing operations	$ 17.21	$ 19.42	$ 19.82	$ 24.34	$ 27.85
Discontinued operations	(1.23)	(0.63)	0.75	0.00	0.00
Diluted net income per share of Class C capital stock	$ 15.98	$ 18.79	$ 20.57	$ 24.34	$ 27.85

	As of December 31,				
	2012	2013	2014	2015	2016
	(in millions)				
Consolidated Balance Sheet Data:					
Cash, cash equivalents, and marketable securities	$ 48,088	$ 58,717	$ 64,395	$ 73,066	$ 86,333
Total assets	92,711	109,050	129,187	147,461	167,497
Total long-term liabilities	6,662	6,165	8,548	7,820	11,705
Total stockholders' equity	71,570	86,977	103,860	120,331	139,036

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Please read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and related notes included under Item 8 of this Annual Report on Form 10-K.

Trends in Our Business

The following trends have contributed to the results of our consolidated operations, and we anticipate that they will continue to impact our future results:

- **Users' behaviors and advertising continue to shift online as the digital economy evolves.**

The continuing shift from an offline to online world has contributed to the growth of our business since inception, resulting in increasing revenues, and we expect that this online shift will continue to benefit our business.

- **As online advertising evolves, we continue to expand our product offerings which may impact our monetization.**

As interactions between users and advertisers change, we continue to expand and evolve our product offerings to serve their changing needs. Over time, we expect our monetization trends to fluctuate. For example, we have seen an increase in YouTube engagement ads, which monetize at a lower rate than traditional desktop search ads. Additionally, we continue to see a shift to programmatic buying which presents opportunities for advertisers to connect with the right user, in the right moment, in the right context. Programmatic buying has a different monetization profile than traditional advertising buying on Google properties. These trends will continue to affect our revenues and margins in the future.

- **Users are increasingly using multiple devices to access our products and services, and our advertising revenues are increasingly coming from mobile and other new formats.**

Our users are accessing the Internet via multiple devices and want to feel connected no matter where they are or what they are doing. We seek to expand our products and services to stay in front of this shift in order to maintain and grow our business.

In this multi-device world, we generate our advertising revenues increasingly from mobile and newer advertising formats, and the margins from the advertising revenues from these sources have generally been lower than those from traditional desktop search. We also expect traffic acquisition costs (TAC) paid to our distribution partners to increase due to changes in device mix between mobile, desktop, and tablet, partner mix, partner agreement terms, and the percentage of queries channeled through paid access points. We expect these trends to continue to put pressure on our overall margins.

- **As users in developing economies increasingly come online, our revenues from international markets continue to increase and movements in foreign exchange rates impact such revenues.**

The shift to online, as well as the advent of the multi-device world, has brought opportunities outside of the U.S., including in emerging markets, and we continue to develop localized versions of our products and relevant advertising programs useful to our users in these markets. This has led to a trend of increased revenues from international markets over time and we expect that our results will continue to be impacted by our performance in these markets, particularly as low-cost mobile devices become more available.

Our international revenues represent a significant portion of our revenues and are subject to fluctuations in foreign currency exchange rates relative to the U.S. dollar. While we have a foreign exchange risk management program designed to reduce our exposure to these fluctuations, this program does not fully offset their effect on our revenues and earnings.

- **The portion of our revenues that we derive from non-advertising revenues is increasing.**

Non-advertising revenues have grown over time. We expect this trend to continue as we focus on expanding our Google offerings to our users through products and services like Google Cloud, Google Play, and hardware products. Across these initiatives, we currently derive non-advertising revenues primarily from hardware sales, sales of apps, in-app purchases and digital content products, and service and licensing fees; the margins on these non-advertising businesses vary significantly and may be lower than the margins on our advertising business. A number of our Other Bets initiatives are in their initial development stages, and as such, the sources of revenues from these businesses could change over time and the revenues could be volatile.

- **As we continue to look for new ways to serve our users and expand our businesses, we will invest heavily in R&D and our capital expenditures will continue to fluctuate.**

We continue to make significant research and development (R&D) investments in areas of strategic focus for Google, such as search, advertising, and machine learning, as well as in new products and services across both Google and Other Bets. The amount of our capital expenditures has fluctuated and may continue to fluctuate in the long term as we invest heavily in our systems, data centers, real estate and facilities, and information technology infrastructure.

In addition, acquisitions remain an important part of our strategy and use of capital, and we expect to continue to spend cash on acquisitions and other investments. These acquisitions generally enhance the breadth and depth of our offerings, as well as expand our expertise in engineering and other functional areas.

- **Our employees are critical to our success and we expect to continue investing in them.**

Our employees are among our best assets and are critical for our continued success. Their energy and talent drive Alphabet and create our success. We expect to continue hiring talented employees around the globe and to provide competitive compensation programs to our employees.

Executive Overview of Results

Here are our key financial results for the fiscal year ended December 31, 2016 (consolidated unless otherwise noted):

- Revenues of $90.3 billion and revenue growth of 20% year over year, constant currency revenue growth of 24% year over year.
- Google segment revenues of $89.5 billion with revenue growth of 20% year over year and Other Bets revenues of $0.8 billion with revenue growth of 82% year over year.
- Revenues from the United States, the United Kingdom, and Rest of the world were $42.8 billion, $7.8 billion, and $39.7 billion, respectively.
- Cost of revenues was $35.1 billion, consisting of traffic acquisition costs of $16.8 billion and other cost of revenues of $18.3 billion. Our traffic acquisition costs as a percentage of advertising revenues was 21%.
- Operating expenses (excluding cost of revenues) were $31.4 billion.
- Income from operations was $23.7 billion.
- Effective tax rate was 19%.
- Net income was $19.5 billion with diluted net income per share of $27.85.
- Operating cash flow was $36.0 billion.
- Capital expenditures were $10.2 billion.
- Headcount increased to 72,053 as of December 31, 2016.

Information about Segments

We operate our business in multiple operating segments. Google is our only reportable segment. None of our other segments meet the quantitative thresholds to qualify as reportable segments; therefore, the other operating segments are combined and disclosed below as Other Bets.

Our reported segments are described below:

- Google – Google includes our main internet products such as Search, Ads, Commerce, Maps, YouTube, Google Cloud, Android, Chrome, and Google Play as well as our hardware initiatives. Our technical infrastructure and some newer efforts like virtual reality are also included in Google. Google generates revenues primarily from advertising, sales of digital content, apps and cloud offerings, and sales of hardware products.
- Other Bets – Other Bets is a combination of multiple operating segments that are not individually material. Other Bets includes businesses such as Access, Calico, CapitalG, GV, Nest, Verily, Waymo, and X. Revenues from the Other Bets are derived primarily through the sales of internet and TV services through Google Fiber, sales of Nest products and services, and licensing and R&D services through Verily.

Please refer to Note 15 of the Notes to Consolidated Financial Statements included in Part II of this Annual Report on Form 10-K for further information. Prior period segment information has been recast to conform to the current period segment presentation.

Consolidated Revenues

The following table presents our consolidated revenues, by segment and revenue source, for the periods presented (in millions):

	Year Ended December 31,		
	2014	2015	2016
Google segment			
Google properties	$ 45,085	$ 52,357	$ 63,785
Google Network Members' properties	14,539	15,033	15,598
Google advertising revenues	59,624	67,390	79,383
Google other revenues	6,050	7,154	10,080
Google segment revenues	$ 65,674	$ 74,544	$ 89,463
Other Bets			
Other Bets revenues	$ 327	$ 445	$ 809
Consolidated revenues	$ 66,001	$ 74,989	$ 90,272

Google segment

The following table presents our Google segment revenues (in millions), and changes in our aggregate paid clicks and cost-per-click (expressed as a percentage) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Google segment revenues	$ 65,674	$ 74,544	$ 89,463
Google segment revenues as a percentage of consolidated revenues	99.5%	99.4 %	99.1 %
Aggregate paid clicks change		22 %	32 %
Aggregate cost-per-click change		(11)%	(11)%

Use of Monetization Metrics

When assessing our advertising revenue performance, we present information regarding the percentage change in the number of "paid clicks" and "cost-per-click" for our Google properties and Google Network Members' properties. Management views these as important metrics for understanding our business. We periodically review, refine and update our methodologies for monitoring, gathering, and counting the number of paid clicks and for identifying the revenues generated by click activity.

Paid clicks for our Google properties represent engagement by users and include clicks on advertisements by end-users related to searches on Google.com, clicks related to advertisements on other owned and operated properties including Gmail, Maps, and Google Play; and viewed YouTube engagement ads like TrueView (counted as an engagement when the user chooses not to skip the ad) and certain trial ad formats. Paid clicks for our Google Network Members' properties include clicks by end-users related to advertisements served on Google Network Members' properties participating in our AdSense for Search, AdSense for Content and AdMob businesses. In some cases, such as programmatic and reservation based advertising buying, we charge advertisers by impression; while growing, this represents a small part of our revenue base.

Cost-per-click is defined as click-driven revenue divided by our total number of paid clicks and represents the average amount we charge advertisers for each engagement by users.

Revenue growth and the change in revenue growth, as well as the change in paid clicks and cost-per-click on Google properties and Google Network Members' properties and the correlation between these items, has fluctuated and may continue to fluctuate because of various factors, including:

- growth rates of our revenues from Google properties, including YouTube, compared to those of our revenues from Google Network Members' properties;
- advertiser competition for keywords;
- changes in foreign currency exchange rates;
- seasonality;

- the fees advertisers are willing to pay based on how they manage their advertising costs;
- changes in advertising quality or formats;
- changes in device mix;
- traffic growth in emerging markets compared to more mature markets and across various advertising verticals and channels;
- a shift in the proportion of non-click based revenue generated on Google properties and Google Network Members' properties, including an increase in programmatic and reservation based advertising buying; and
- general economic conditions.

Our advertising revenue growth rate has fluctuated over time as a result of a number of factors, including increasing competition, query growth rates, challenges in maintaining our growth rate as our revenues increase to higher levels, the evolution of the online advertising market, our investments in new business strategies, changes in our product mix, and shifts in the geographic mix of our revenues. We also expect that our revenue growth rate will continue to be affected by evolving user preferences, the acceptance by users of our products and services as they are delivered on diverse devices, our ability to create a seamless experience for both users and advertisers, and movements in foreign currency exchange rates.

Google properties

The following table presents our Google properties revenues (in millions), and changes in our paid clicks and cost-per-click (expressed as a percentage) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Google properties	$ 45,085	$ 52,357	$ 63,785
Google properties as a percentage of Google segment revenues	68.6%	70.2 %	71.3 %
Paid clicks change		33 %	40 %
Cost-per-click change		(15)%	(13)%

Google properties revenues consist primarily of advertising revenue that is generated on:

- Google search properties. This includes revenue from traffic generated by search distribution partners who use Google.com as their default search in browsers, toolbars, etc.;
- Other Google owned and operated properties like Gmail, Maps, and Google Play; and
- YouTube, including but not limited to, YouTube TrueView and Google Preferred.

Our Google properties revenues increased $11,428 million from 2015 to 2016 and also increased as a percentage of Google segment revenues. The growth was primarily driven by increases in mobile search most notably due to ongoing improvements in ad formats and delivery launched during 2016. We also experienced growth in YouTube revenue driven primarily by video advertising across TrueView with a growing contribution from ad buying on DoubleClick Bid Manager, as well as improvements in ad formats and delivery. The growth was partially offset by the general strengthening of the U.S. dollar compared to certain foreign currencies.

The number of paid clicks through our advertising programs on Google properties increased from 2015 to 2016 due to growth in the adoption of YouTube engagement ads, improvements we have made in ad formats and delivery, and continued global expansion of our products, advertisers and user base across all platforms, particularly mobile. The positive impact on our revenues from paid clicks was partially offset by a decrease in the cost-per-click paid by our advertisers. The decrease in cost-per-click was primarily driven by continued growth in YouTube engagement ads where cost-per-click remains lower than on our other advertising platforms, and also impacted by changes in device mix, property mix, product mix, geographic mix, and ongoing product changes, and the general strengthening of the U.S. dollar compared to certain foreign currencies.

Our Google properties revenues increased $7,272 million from 2014 to 2015 and also increased as a percentage of Google segment revenues. Our Google properties revenue growth was primarily driven by increases in mobile search due to ongoing improvements in ad formats, as well as growth in YouTube video advertising across TrueView and Google Preferred, partially offset by the general strengthening of the U.S. dollar compared to certain foreign currencies.

The number of paid clicks through our advertising programs on Google properties increased from 2014 to 2015 due to an increase in aggregate traffic on Google owned properties, the adoption of advertising formats such as YouTube engagement ads, and continued global expansion of our products, advertisers, and user base across all platforms, particularly mobile. The positive impact on our revenues from paid clicks was partially offset by a decrease

in the cost-per-click paid by our advertisers. The decrease was primarily driven by continued growth in YouTube engagement ads where cost-per-click remains lower than on our other advertising platforms, as well as changes in property and device mix, product mix, geographic mix, and ongoing product changes, and the general strengthening of the U.S. dollar compared to certain foreign currencies.

Google Network Members' properties

The following table presents our Google Network Members' properties revenues (in millions) and changes in our paid clicks and cost-per-click (expressed as a percentage) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Google Network Members' properties	$ 14,539	$ 15,033	$ 15,598
Google Network Members' properties revenues as a percentage of Google segment revenues	22.1%	20.2 %	17.4 %
Paid clicks change		(7)%	3 %
Cost-per-click change		(3)%	(13)%

Google Network Members' properties revenues consist primarily of advertising revenues generated from ads placed on Google Network Member properties through:

- AdSense (such as AdSense for Search, AdSense for Content, etc.);
- AdMob; and
- DoubleClick AdExchange.

Our Google Network Members' properties revenues increased $565 million from 2015 to 2016. The growth was primarily driven by strength in programmatic advertising buying as well as strength in AdMob, offset by a decline in our traditional AdSense business and the general strengthening of the U.S. dollar compared to certain foreign currencies.

The increase in paid clicks from 2015 to 2016 resulted from the growth in AdMob offset by declines in AdSense. The decrease in cost-per-click paid by our advertisers from 2015 to 2016 resulted from changes in the product mix of Google Network Members advertising revenues, ongoing product and policy changes, changes in property and device mix, geographic mix, and relative fluctuations of the U.S. dollar compared to certain foreign currencies.

Our Google Network Members' properties revenues increased $494 million from 2014 to 2015. The increase was primarily driven by strength in programmatic advertising buying, offset by our continued AdSense advertising policy changes aimed at enriching the experience for users and the general strengthening of the U.S. dollar compared to certain foreign currencies. The decrease in Google Network Members' properties revenues as a percentage of Google segment revenues is due to relatively slower growth of Google Network Members' properties revenues compared to that of Google properties revenues as well as Google other revenues.

The decreases in both paid clicks and cost-per-click paid by our advertisers from 2014 to 2015 were primarily driven by ongoing product and policy changes designed to reduce lower quality inventory on AdSense for Search, changes in property and device mix, product mix, and geographic mix, and the general strengthening of the U.S. dollar compared to certain foreign currencies.

Google other revenues

The following table presents our Google other revenues (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Google other revenues	$ 6,050	$ 7,154	$ 10,080
Google other revenues as a percentage of Google segment revenues	9.3%	9.6%	11.3%

Google other revenues consist primarily of revenues and sales from:

- Apps, in-app purchases, and digital content in the Google Play store;
- Hardware;
- Licensing-related revenue; and
- Service fees received for our Google Cloud offerings.

Our Google other revenues increased $2,926 million from 2015 to 2016 and increased as a percentage of Google segment revenues. These increases were primarily due to the growth in revenues from Google Play, primarily relating to in-app purchases (revenues which we recognize net of payout to developers), hardware sales, and Google Cloud offerings.

Our Google other revenues increased $1,104 million from 2014 to 2015 and increased as a percentage of Google segment revenues. These increases were primarily due to the growth of our sales of digital content products in the Google Play store, primarily apps (revenues which we recognize net of payout to partners). In addition, there was an increase in revenues from service fees received for Google Cloud offerings. These increases were partially offset by the general strengthening of the U.S. dollar compared to certain foreign currencies.

Other Bets

The following table presents our Other Bets revenues (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Other Bets revenues	$ 327	$ 445	$ 809
Other Bets revenues as a percentage of consolidated revenues	0.5%	0.6%	0.9%

Other Bets revenues consist primarily of revenues and sales from:

- Internet and TV services;
- Licensing and R&D services; and
- Nest branded hardware.

Our Other Bets revenues increased $364 million from 2015 to 2016 and increased as a percentage of consolidated revenues. These increases were primarily driven by sales of Nest branded hardware and revenues from Fiber internet and TV services. There was also an increase in revenues from Verily licensing and R&D services from 2015 to 2016.

Our Other Bets revenues increased $118 million from 2014 to 2015 and remained relatively flat as a percentage of consolidated revenues. The increase was primarily due to increases in revenues from sales of Nest branded hardware and revenues from internet and TV services, partially offset by a decrease in licensing revenues. As Nest was acquired in February 2014, the increase in our Nest revenues is impacted by a partial year of revenues in 2014 as compared to a full year in 2015.

Due to the early stage of our Other Bets businesses and because their revenues aggregates a number of businesses operating in different industries, our Other Bets revenues may fluctuate in future periods. Additionally, our Other Bets revenues may fluctuate due to one-time items.

Consolidated Revenues by Geography

The following table presents our domestic and international revenues as a percentage of consolidated revenues, determined based on the billing addresses of our customers:

	Year Ended December 31,		
	2014	2015	2016
United States	45%	46%	47%
United Kingdom	10%	10%	9%
Rest of the world	45%	44%	44%

For the amounts of revenues by geography, please refer to Note 15 of the Notes to Consolidated Financial Statements included in Part II of this Annual Report on Form 10-K.

Use of Constant Currency Revenues and Constant Currency Revenue Growth

The impact of currency exchange rates on our business is an important factor in understanding period to period comparisons. Our international revenues are favorably impacted as the U.S. dollar weakens relative to other foreign currencies, and unfavorably impacted as the U.S dollar strengthens relative to other foreign currencies. We use non-GAAP constant currency revenues and constant currency revenue growth for financial and operational decision-making and as a means to evaluate period-to-period comparisons. We believe the presentation of results on a constant currency basis in addition to GAAP results helps improve the ability to understand our performance because they exclude the effects of foreign currency volatility that are not indicative of our core operating results.

Constant currency information compares results between periods as if exchange rates had remained constant period over period. We define constant currency revenues as total revenues excluding the impact of foreign exchange rate movements and hedging activities, and use it to determine the constant currency revenue growth on a year-on-year basis. Constant currency revenues are calculated by translating current period revenues using prior period exchange rates, as well as excluding any hedging impacts realized in the current period.

Constant currency revenue growth (expressed as a percentage) is calculated by determining the increase in current period revenues over prior period revenues where current period foreign currency revenues are translated using prior period exchange rates and hedging benefits are excluded from revenues of both periods.

These results should be considered in addition to, not as a substitute for, results reported in accordance with GAAP. Results on a constant currency basis, as we present them, may not be comparable to similarly titled measures used by other companies and are not a measure of performance presented in accordance with GAAP.

The following table presents our foreign exchange impact on United Kingdom revenues, Rest of the world revenues, and total consolidated revenues for the current period (in millions):

	Year Ended December 31,		
	2014	2015	2016
United Kingdom revenues	$ 6,483	$ 7,067	$ 7,787
Exclude: Foreign exchange impact on current year revenues using prior period rates	N/A	N/A	$ 826
Exclude: Hedging (gains) recognized	$ (3)	$ (133)	$ (297)
Constant currency United Kingdom revenues	$ 6,480	$ 6,934	$ 8,316
United Kingdom revenue growth rate		9%	10%
United Kingdom constant currency revenue growth rate		15%	20%
Rest of the world revenues	$ 30,036	$ 33,112	$ 39,704
Exclude: Foreign exchange impact on current year revenues using prior period rates	N/A	N/A	447
Exclude: Hedging (gains) recognized	(169)	(1,267)	(242)
Constant currency Rest of the world revenues	$ 29,867	$ 31,845	$ 39,909
Rest of the world revenue growth rate		10%	20%
Rest of the world constant currency revenue growth rate		24%	25%
United States revenues	$ 29,482	$ 34,810	$ 42,781
United States revenue growth rate		18%	23%
Total consolidated revenues	$ 66,001	$ 74,989	$ 90,272
Constant currency total consolidated revenues	$ 65,829	$ 73,589	$ 91,006
Total consolidated revenue growth rate		14%	20%
Constant currency total consolidated revenue growth rate		20%	24%

In 2016 and in 2015, our revenues from the United Kingdom were unfavorably impacted by changes in foreign currency exchange rates over the prior year, primarily as the British pound weakened relative to the U.S. dollar.

In 2016, our revenues from the Rest of the world (excluding the United Kingdom) were unfavorably impacted by changes in foreign currency exchange rates, primarily because the U.S. dollar strengthened relative to certain currencies including the Euro and Argentine peso, partially offset by the impact of the U.S. dollar weakening relative to the Japanese yen.

In 2015, our revenues from the Rest of the world (excluding the United Kingdom) were unfavorably impacted by changes in foreign currency exchange rates, primarily because the U.S. dollar strengthened relative to the Euro, Brazilian real, Australian dollar, and Japanese yen.

Consolidated Costs and Expenses

Cost of Revenues

Cost of revenues consists of traffic acquisition costs (TAC) which are paid to Google Network Members primarily for ads displayed on their properties and amounts paid to our distribution partners who make available our search access points and services. Our distribution partners include browser providers, mobile carriers, original equipment manufacturers, and software developers.

Additionally, other cost of revenues (which is the cost of revenues excluding traffic acquisition costs) includes the following:

- The expenses associated with the operation of our data centers (including depreciation, labor, energy, bandwidth, and other equipment costs);
- Content acquisition costs primarily related to payments to certain content providers from whom we license their video and other content for distribution on YouTube and Google Play (we pay fees to these content providers based on revenues generated or a flat fee);
- Credit card and other transaction fees related to processing customer transactions;
- Stock-based compensation expense;
- Inventory related costs for hardware we sell; and
- Amortization of certain intangible assets.

The following tables present our cost of revenues, including traffic acquisition costs, for the periods presented (in millions):

	Year Ended December 31,		
	2014	2015	2016
Traffic acquisition costs	$ 13,497	$ 14,343	$ 16,793
Other cost of revenues	12,194	13,821	18,345
Total cost of revenues	$ 25,691	$ 28,164	$ 35,138
Total cost of revenues as a percentage of revenues	38.9%	37.6%	38.9%

	Year Ended December 31,		
	2014	2015	2016
Traffic acquisition costs to distribution partners	$ 3,633	$ 4,101	$ 5,894
Traffic acquisition costs to distribution partners as a percentage of Google properties revenues (Google properties TAC rate)	8.1%	7.8%	9.2%
Traffic acquisition costs to Google Network Members	$ 9,864	$ 10,242	$ 10,899
Traffic acquisition costs to Google Network Members as a percentage of Google Network Members' properties revenues (Network Members TAC rate)	67.8%	68.1%	69.9%
Traffic acquisition costs	$ 13,497	$ 14,343	$ 16,793
Traffic acquisition costs as a percentage of advertising revenues (Aggregate TAC rate)	22.6%	21.3%	21.2%

The cost of revenues that we incur related to revenues generated from ads placed on the properties of our Google Network Members are significantly higher than the costs of revenues we incur related to revenues generated from ads placed on Google properties because most of the advertiser revenues from ads served on Google Network Members' properties are paid as TAC to our Google Network Members.

Cost of revenues increased $6,974 million from 2015 to 2016 due to various factors including traffic acquisition costs, data center costs, content acquisition costs, and hardware costs. The increase in traffic acquisition costs of $2,450 million was due to increases in advertising revenues primarily from the growth of mobile search and programmatic ad buying which carry higher TAC. The increase in other cost of revenues of $4,524 million was primarily due to increases in (1) data centers costs including depreciation, labor, energy, bandwidth, and other equipment costs as a result of business growth, (2) content acquisition costs as a result of increased activities related to YouTube, (3) hardware costs associated with new hardware launches, and (4) stock-based compensation.

The aggregate TAC rate remained relatively flat from 2015 to 2016 primarily as a result of a shift of mix from Google Network Members' properties revenue to Google properties revenue. Our aggregate TAC rate was also impacted by the increase in mobile and programmatic advertising buying, which generally carry overall higher TAC.

The increase in Google properties TAC rate was primarily driven by a shift to mobile and more mobile searches are subject to TAC. The increase in Network Members' TAC rate was primarily driven by the shift in advertising buying from our traditional network business to programmatic advertising buying.

Cost of revenues increased $2,473 million from 2014 to 2015. The increase was primarily due to data center costs and an increase in content acquisition costs as a result of increased activities related to YouTube and digital content. The remaining increase was driven by increases in traffic acquisition costs of $846 million, resulting from more advertiser fees generated through our AdSense program driven primarily by an increase in advertising revenues, as well as more fees paid to our distribution partners for additional traffic directed to our websites. Additionally, there was an impairment charge of $378 million recognized in 2014 related to a patent licensing royalty asset acquired in connection with the Motorola acquisition that did not recur in 2015.

The decrease in aggregate TAC rate from 2014 to 2015 was primarily a result of a shift of mix from Google Network Members' properties revenue to Google properties revenue.

We expect cost of revenues to increase in dollar amount and as a percentage of total revenues in 2017 and future periods based on a number of factors, including the following:

- The relative revenue growth rates of Google properties and our Google Network Members' properties;
- Traffic acquisition costs paid to our distribution partners, which are affected by changes in device mix between mobile, desktop, and tablet, partner mix, partner agreement terms such as revenue share arrangements, and the percentage of queries channeled through paid access points;
- Traffic acquisition costs paid to Google Network Members, which are affected by ongoing adoption of programmatic advertising buying and changes in partner agreement terms;
- The growth rates of expenses associated with our data center operations, content acquisition costs, as well as our hardware inventory and related costs; and
- Increased proportion of non-advertising revenues as part of our total revenues.

Research and Development

The following table presents our R&D expenses (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Research and development expenses	$ 9,832	$ 12,282	$ 13,948
Research and development expenses as a percentage of revenues	14.9%	16.3%	15.5%

R&D expenses consist primarily of:

- Labor and facilities-related costs for employees responsible for R&D of our existing and new products and services;
- Depreciation and equipment-related expenses; and
- Stock-based compensation expense.

R&D expenses increased $1,666 million from 2015 to 2016. The increase was primarily due to an increase in stock-based compensation expense of $667 million and an increase in labor and facilities-related costs of $326 million both largely as a result of a 16% increase in R&D headcount partially offset by higher expenses resulting from project milestones in Other Bets in 2015. In addition, there was an increase in depreciation and equipment-related expenses of approximately $388 million and an increase in professional services of $267 million due to additional expenses incurred for consulting, outsourced services, and temporary services.

R&D expenses increased $2,450 million and increased as a percentage of revenues from 2014 to 2015. These increases were primarily due to an increase in labor and facilities-related costs of $1,502 million and an increase in stock-based compensation expense of $487 million, both largely as a result of a 16% increase in R&D headcount. The increase in labor and facilities-related costs was also impacted by expenses resulting from project milestones in Other Bets established several years ago. In addition, there was an increase in depreciation and equipment-related expenses of approximately $248 million and an increase in professional services of $174 million due to additional expenses incurred for consulting and outsourced services.

We expect that R&D expenses will increase in dollar amount and may fluctuate as a percentage of revenues in 2017 and future periods.

Sales and Marketing

The following table presents our sales and marketing expenses (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Sales and marketing expenses	$ 8,131	$ 9,047	$ 10,485
Sales and marketing expenses as a percentage of revenues	12.3%	12.1%	11.6%

Sales and marketing expenses consist primarily of:

- Labor and facilities-related costs for employees engaged in sales and marketing, sales support, and certain customer service functions;
- Advertising and promotional expenditures related to our products and services; and
- Stock-based compensation expense.

Sales and marketing expenses increased $1,438 million from 2015 to 2016. The increase was primarily due to an increase in advertising and promotional expenses of $679 million largely due to increases in marketing and promotion related expenses for our hardware products. Additionally, there was an increase in labor and facilities-related costs of $482 million and stock-based compensation expense of $179 million, both largely resulting from a 10% increase in sales and marketing headcount.

Sales and marketing expenses increased $916 million and remained relatively flat as a percentage of revenues from 2014 to 2015. The increase in dollar amount was primarily due to an increase in labor and facilities-related costs of $329 million and an increase in stock-based compensation expense of $184 million, largely resulting from a 12% increase in sales and marketing headcount. In addition, there was an increase in advertising and promotional expenses of $184 million and an increase in professional service fees of $158 million due to additional expenses incurred for consulting and outsourced services.

We expect that sales and marketing expenses will increase in dollar amount and may fluctuate as a percentage of revenues in 2017 and future periods.

General and Administrative

The following table presents our general and administrative expenses (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
General and administrative expenses	$ 5,851	$ 6,136	$ 6,985
General and administrative expenses as a percentage of revenues	8.9%	8.2%	7.7%

General and administrative expenses consist primarily of:

- Labor and facilities-related costs for employees in our facilities, finance, human resources, information technology, and legal organizations;
- Depreciation and equipment-related expenses;
- Professional services fees primarily related to outside legal, audit, information technology consulting, and outsourcing services;
- Amortization of certain intangible assets; and
- Stock-based compensation expense.

General and administrative expenses increased $849 million from 2015 to 2016. The increase was primarily due to increases in labor and facilities-related costs of $460 million and stock-based compensation expense of $421 million, both largely resulting from a 15% increase in general and administrative headcount, as well as increases in other miscellaneous expenses. These increases were offset by a decrease in professional service fees of $194 million due to lower legal-related costs.

General and administrative expenses increased $285 million and decreased as a percentage of revenues from 2014 to 2015. The increase in dollar amount was primarily due to an increase in stock-based compensation expense of $136 million and an increase in labor and facilities-related costs of $69 million, both largely resulting from a 15% increase in general and administrative headcount. In addition, there was an increase in depreciation and equipment-

related expenses of $121 million and an increase of $80 million of miscellaneous general and administrative expenses. These factors were partially offset by a decrease in professional services fees and expenses of $128 million, primarily due to lower legal-related costs.

We expect general and administrative expenses will increase in dollar amount and may fluctuate as a percentage of revenues in 2017 and future periods.

Stock-Based Compensation

The following table presents stock-based compensation expense for awards we expect to settle in equity (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Stock-based compensation	$ 4,175	$ 5,203	$ 6,703
Stock-based compensation as a percentage of revenues	6.3%	6.9%	7.4%

Stock-based compensation related to awards we expected to settle in equity increased $1,500 million from 2015 to 2016 and $1,028 million from 2014 to 2015. These increases were primarily driven by headcount growth.

We estimate stock-based compensation expense related to awards we expect to settle in equity to be approximately $6.3 billion in 2017 and $8.3 billion thereafter related to stock-based awards outstanding as of December 31, 2016. These estimates do not include expense related to stock-based awards granted after December 31, 2016.

Consolidated Other Income (Expense), Net

The following table presents other income (expense), net, (in millions) for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Other income (expense), net	$ 763	$ 291	$ 434
Other income (expense), net, as a percentage of revenues	1.1%	0.4%	0.5%

Other income (expense), net, increased $143 million from 2015 to 2016. This increase was primarily driven by an increase in interest income and decreased losses on non-marketable investments, partially offset by increased losses from our foreign currency transactions and impairments for certain assets.

Other income (expense), net, decreased $472 million from 2014 to 2015. This decrease was primarily related to a writedown of securities received in conjunction with the sale of a business as well as reduced gains on non-marketable investments as compared to 2014. These decreases were partially offset by an increase in interest income as a result of increased cash and fixed income investments.

The costs of our foreign exchange hedging activities recognized in other income (expense), net, are primarily a function of the notional amount of the option and forward contracts and their related duration, the movement of foreign exchange rates relative to the contract prices, the volatility of foreign exchange rates and forward points. As we began using foreign currency forward contracts to hedge our forecasted revenues in the fourth quarter of 2016, we expect the hedging costs expensed in other income (expense), net, will decrease in 2017 and future periods as a result of less option premiums paid.

Consolidated Provision for Income Taxes

The following table presents our provision for income taxes (in millions) and effective tax rate for the periods presented:

	Year Ended December 31,		
	2014	2015	2016
Provision for income taxes	$ 3,639	$ 3,303	$ 4,672
Effective tax rate	21.1%	16.8%	19.3%

Our provision for income taxes and our effective tax rate increased from 2015 to 2016, largely due to proportionately more earnings generated in jurisdictions that have higher statutory tax rates and discrete items in 2015 and 2016, partially offset by the stock-based compensation benefits recognized resulting from the adoption of Accounting Standards Update No. 2016-09 (ASU 2016-09).

Our provision for income taxes and our effective tax rate decreased from 2014 to 2015, largely due to a discrete benefit recognized in 2015 as a result of the resolution of a multi-year U.S. tax audit related to prior years and proportionately more earnings generated in jurisdictions that have lower statutory tax rates.

Our future effective tax rate could be adversely affected by earnings being lower than anticipated in countries that have lower statutory rates and higher than anticipated in countries that have higher statutory rates, the net gains and losses recognized by legal entities on certain hedges and related hedged intercompany and other transactions under our foreign exchange risk management program, changes in the valuation of our deferred tax assets or liabilities, or changes in tax laws, regulations, or accounting principles, as well as certain discrete items.

Quarterly Results of Operations

The following tables presenting our quarterly results of operations should be read in conjunction with the consolidated financial statements and related notes included in Item 8 of this Annual Report on Form 10-K. We have prepared the unaudited information on the same basis as our audited consolidated financial statements. Our operating results for any quarter are not necessarily indicative of results for any future quarters or for a full year.

The following table presents our unaudited quarterly results of operations for the eight quarters ended December 31, 2016. This table includes all adjustments, consisting only of normal recurring adjustments, that we consider necessary for a fair presentation of our consolidated financial position and operating results for the quarters presented. Both seasonal fluctuations in internet usage, advertising expenditures and underlying business trends such as traditional retail seasonality have affected, and are likely to continue to affect, our business. Commercial queries typically increase significantly in the fourth quarter of each year. These seasonal trends have caused, and will likely continue to cause, fluctuations in our quarterly results, including fluctuations in sequential revenue growth rates.

	Quarter Ended							
	Mar 31, 2015	Jun 30, 2015	Sep 30, 2015	Dec 31, 2015	Mar 31, 2016	Jun 30, 2016	Sep 30, 2016	Dec 31, 2016
	(In millions, except per share amounts) (unaudited)							
Consolidated Statements of Income Data:								
Revenues	$17,258	$17,727	$18,675	$21,329	$20,257	$21,500	$22,451	$26,064
Costs and expenses:								
Cost of revenues	6,356	6,583	7,037	8,188	7,648	8,130	8,699	10,661
Research and development	2,753	2,789	3,230	3,510	3,367	3,363	3,596	3,622
Sales and marketing	2,065	2,080	2,223	2,679	2,387	2,415	2,565	3,118
General and administrative	1,637	1,450	1,477	1,572	1,513	1,624	1,824	2,024
Total costs and expenses	12,811	12,902	13,967	15,949	14,915	15,532	16,684	19,425
Income from operations	4,447	4,825	4,708	5,380	5,342	5,968	5,767	6,639
Other income (expense), net	157	131	183	(180)	(213)	151	278	218
Income from continuing operations before income taxes	4,604	4,956	4,891	5,200	5,129	6,119	6,045	6,857
Provision for income taxes	1,089	1,025	912	277	922	1,242	984	1,524
Net income	$ 3,515	$ 3,931	$ 3,979	$ 4,923	$ 4,207	$ 4,877	$ 5,061	$ 5,333
Less: Adjustment Payment to Class C capital stockholders	0	522	0	0	0	0	0	0
Net income available to all stockholders	$ 3,515	$ 3,409	$ 3,979	$ 4,923	$ 4,207	$ 4,877	$ 5,061	$ 5,333
Basic net income per share of Class A and B common stock	$ 5.16	$ 4.99	$ 5.80	$ 7.16	$ 6.12	$ 7.11	$ 7.36	$ 7.73
Basic net income per share of Class C capital stock	$ 5.16	$ 6.51	$ 5.80	$ 7.16	$ 6.12	$ 7.11	$ 7.36	$ 7.73
Diluted net income per share of Class A and B common stock	$ 5.10	$ 4.93	$ 5.73	$ 7.06	$ 6.02	$ 7.00	$ 7.25	$ 7.56
Diluted net income per share of Class C capital stock	$ 5.10	$ 6.43	$ 5.73	$ 7.06	$ 6.02	$ 7.00	$ 7.25	$ 7.56

Capital Resources and Liquidity

As of December 31, 2016, we had $86.3 billion of cash, cash equivalents, and marketable securities. Cash equivalents and marketable securities are comprised of time deposits, money market and other funds, highly liquid debt instruments of the U.S. government and its agencies, debt instruments issued by foreign governments, debt instruments issued by municipalities in the U.S., corporate debt securities, agency mortgage-backed securities, and asset-backed securities. From time to time, we may hold marketable equity securities obtained through acquisitions or strategic investments in private companies that subsequently go public.

As of December 31, 2016, $52.2 billion of the $86.3 billion of cash, cash equivalents, and marketable securities was held by our foreign subsidiaries. If these funds were needed for our operations in the U.S., we would be required to accrue and pay U.S. taxes to repatriate these funds. However, our intent is to permanently reinvest these funds outside of the U.S. and our current plans do not demonstrate a need to repatriate them to fund our U.S. operations.

Our principal sources of liquidity are our cash, cash equivalents, and marketable securities, as well as the cash flow that we generate from our operations. We have a short-term debt financing program of up to $5.0 billion through the issuance of commercial paper. Net proceeds from this program are used for general corporate purposes. We had no commercial paper outstanding as of December 31, 2016. In conjunction with this program, we have a $4.0 billion revolving credit facility expiring in February 2021. The interest rate for the credit facility is determined based on a formula using certain market rates. As of December 31, 2016, no amounts were outstanding under the credit facility. We believe that our sources of funding will be sufficient to satisfy our currently anticipated cash requirements including capital expenditures, working capital requirements, potential acquisitions and other liquidity requirements through at least the next 12 months.

As of December 31, 2016, we have unsecured senior notes outstanding due in 2021, 2024, and 2026 with a total carrying value of $3.9 billion and a total estimated fair value of $3.9 billion.

In August 2013, we entered into a capital lease obligation on certain property expiring in 2028. In September 2016, we exercised our option to purchase the property for approximately $220 million.

In October 2015, the board of directors of Alphabet authorized the company to repurchase up to $5,099,019,513.59 of its Class C capital stock, commencing in the fourth quarter of 2015. In January 2016, the board of directors of Alphabet authorized the company to repurchase an additional amount of approximately 514 thousand shares. We completed all authorized share repurchases under this repurchase program.

In October 2016, the board of directors of Alphabet authorized the company to repurchase up to $7,019,340,976.83 of its Class C capital stock. The repurchases are expected to be executed from time to time, subject to general business and market conditions and other investment opportunities, through open market purchases or privately negotiated transactions, including through Rule 10b5-1 plans. No shares were repurchased in 2016 under this program.

In January 2017, Temasek, a Singapore-based investment company, signed a binding commitment to purchase a non-controlling interest in Verily for an aggregate of $800 million in cash. We closed the first tranche of the investment in February 2017 and anticipate closing the second and final tranche upon completion of certain terms in the second half of 2017.

The following table presents our cash flows (in millions) for the periods presented.

	Year Ended December 31,		
	2014 [1]	2015 [1]	2016
Net cash provided by operating activities	$ 23,024	$ 26,572	$ 36,036
Net cash used in investing activities	(21,055)	(23,711)	(31,165)
Net cash used in financing activities	(2,087)	(4,225)	(8,332)

[1] Prior period amounts have been adjusted for the impact of the adoption of ASU 2016-09. Refer to Note 1 of the Notes to Consolidated Financial Statements included in Part II of this Annual Report on Form 10-K for further information.

Cash Provided by Operating Activities

Our largest source of cash provided by our operations are advertising revenues generated by Google properties and Google Network Members' properties. Additionally, we generate cash through sales of apps, in-app purchases and digital content, hardware products, licensing arrangements, and service fees received for Google Cloud offerings.

Our primary uses of cash from our operating activities include payments to our Google Network Members and distribution partners, and payments for content acquisition costs. In addition, uses of cash from operating activities include compensation and related costs, hardware costs, other general corporate expenditures, and income taxes.

Net cash provided by operating activities increased from 2015 to 2016 primarily due to increases in cash received from advertising revenues and Google other revenues, offset by increases in cash paid for cost of revenues and operating expenses. Additionally, the timing of tax payments and refunds had a favorable impact to our cash flows from operations for 2016 compared to 2015.

Net cash provided by operating activities increased from 2014 to 2015 primarily due to increased net income adjusted for depreciation and stock-based compensation expense, and loss on sales of marketable and non-marketable securities. This was partially offset by a net decrease in cash from changes in working capital.

Cash Used in Investing Activities

Cash provided by or used in investing activities primarily consists of purchases of property and equipment, purchases, maturities, and sales of marketable securities in our investment portfolio, investments in reverse repurchase agreements and the cash collateral received or returned from our securities lending program, as well as acquisitions and divestitures of businesses and intangible assets.

Net cash used in investing activities increased from 2015 to 2016 primarily due to increases in purchases of marketable securities, increases in cash collateral paid related to securities lending and increases in spend related to acquisitions partially offset by increases in maturities and sales of marketable securities and decreases in purchases of non-marketable investments.

Net cash used in investing activities increased from 2014 to 2015 primarily due to net increases in purchases of marketable securities, activities related to securities lending and purchases of non-marketable investments. This increase was partially offset by lower spend related to acquisitions, lower investments in reverse repurchase agreements, and a decrease in capital expenditures related to our production equipment, data centers, and real estate purchases.

Cash Used in Financing Activities

Cash used in financing activities consists primarily of net proceeds or payments from issuance or repayments of debt, repurchases of capital stock, and net proceeds or payments from stock-based award activities.

Net cash used in financing activities increased from 2015 to 2016 primarily driven by decreases in proceeds from issuance of debt, and increases in the repurchases of capital stock and net payments related to stock-based award activities, partially offset by a decrease in debt repayments.

Net cash used in financing activities increased from 2014 to 2015 primarily driven by the repurchases of capital stock and an increase in net payments related to stock-based award activities.

Contractual Obligations as of December 31, 2016

The following summarizes our contractual obligations, excluding open orders for purchases that support normal operations, as of December 31, 2016 (in millions):

	Payments Due By Period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Operating lease obligations, net of sublease income amounts[1]	$ 7,937	$ 828	$ 1,801	$ 1,615	$ 3,693
Purchase obligations[2]	2,494	1,907	274	99	214
Long-term debt obligations[3]	4,816	110	220	1,202	3,284
Other long-term liabilities reflected on our balance sheet[4]	2,093	261	601	525	706
Total contractual obligations	$ 17,340	$ 3,106	$ 2,896	$ 3,441	$ 7,897

(1) For further information, refer to Note 10 of the Notes to Consolidated Financial Statements included in Part II of this Annual Report on Form 10-K.

(2) Purchase obligations represent non-cancelable contractual obligations primarily related to data center operations and facility build-outs, video and other content licensing revenue sharing arrangements, as well as purchases of inventory.

(3) For further information, refer to Note 4 of the Notes to Consolidated Financial Statements included in Part II of this Annual Report on Form 10-K.

(4) Other long-term liabilities represent cash obligations recorded on our consolidated balance sheets, including the short-term portion of these long-term liabilities and consist primarily of payments owed in connection with certain commercial agreements, investments, and asset retirement obligations. In addition to the amounts above, we had long-term tax payable of $4.7 billion as of December 31, 2016 primarily related to uncertain tax positions. At this time, we are unable to make a reasonably reliable

estimate of the timing of payments in individual years beyond 12 months due to uncertainties in the timing of tax audit outcomes. As a result, this amount is not included in the above table.

Off-Balance Sheet Arrangements

As of December 31, 2016, we did not have any off-balance sheet arrangements, as defined in Item 303(a)(4)(ii) of Regulation S-K promulgated by the SEC, that have or are reasonably likely to have a current or future effect on our financial condition, changes in our financial condition, revenues, or expenses, results of operations, liquidity, capital expenditures, or capital resources that is material to investors.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in accordance with U.S. Generally Accepted Accounting Principles (GAAP). In doing so, we have to make estimates and assumptions that affect our reported amounts of assets, liabilities, revenues, and expenses, as well as related disclosure of contingent assets and liabilities. In some cases, we could reasonably have used different accounting policies and estimates. In some cases, changes in the accounting estimates are reasonably likely to occur from period to period. Accordingly, actual results could differ materially from our estimates. To the extent that there are material differences between these estimates and actual results, our financial condition or results of operations will be affected. We base our estimates on past experience and other assumptions that we believe are reasonable under the circumstances, and we evaluate these estimates on an ongoing basis. We refer to accounting estimates of this type as critical accounting policies and estimates, which we discuss further below. We have reviewed our critical accounting policies and estimates with the audit committee of our board of directors.

Please see Note 1 of Part II, Item 8 of this Annual Report on Form 10-K for the summary of significant accounting policies.

Income Taxes

We are subject to income taxes in the U.S. and numerous foreign jurisdictions. Significant judgment is required in evaluating our uncertain tax positions and determining our provision for income taxes.

Although we believe we have adequately reserved for our uncertain tax positions, no assurance can be given that the final tax outcome of these matters will not be different. We adjust these reserves in light of changing facts and circumstances, such as the closing of a tax audit or the refinement of an estimate. To the extent that the final tax outcome of these matters is different than the amounts recorded, such differences will impact the provision for income taxes and the effective tax rate in the period in which such determination is made. The provision for income taxes includes the impact of reserve provisions and changes to reserves that are considered appropriate, as well as the related net interest and penalties. In addition, we are subject to the continuous examination of our income tax returns by the IRS and other tax authorities which may assert assessments against us. We regularly assess the likelihood of adverse outcomes resulting from these examinations and assessments to determine the adequacy of our provision for income taxes.

Loss Contingencies

We are regularly subject to claims, suits, government investigations, and other proceedings involving competition and antitrust, intellectual property, privacy, indirect taxes, labor and employment, commercial disputes, content generated by our users, goods and services offered by advertisers or publishers using our platforms, and other matters. Certain of these matters include speculative claims for substantial or indeterminate amounts of damages. We record a liability when we believe that it is probable that a loss has been incurred and the amount can be reasonably estimated. If we determine that a loss is reasonably possible and the loss or range of loss can be estimated, we disclose the possible loss in the Notes to the Consolidated Financial Statements.

We evaluate, on a regular basis, developments in our legal matters that could affect the amount of liability that has been previously accrued, and the matters and related reasonably possible losses disclosed, and make adjustments and changes to our disclosures as appropriate. Significant judgment is required to determine both likelihood of there being and the estimated amount of a loss related to such matters. Until the final resolution of such matters, there may be an exposure to loss in excess of the amount recorded, and such amounts could be material. Should any of our estimates and assumptions change or prove to have been incorrect, it could have a material impact on our business, consolidated financial position, results of operations, or cash flows. See Note 10 of Notes to Consolidated Financial Statements included in Item 8 of this Annual Report on Form 10-K for additional information regarding contingencies.

Business Combinations

We allocate the fair value of purchase consideration to the tangible assets acquired, liabilities assumed and intangible assets acquired based on their estimated fair values. The excess of the fair value of purchase consideration over the fair values of these identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions, especially with respect to intangible assets.

Critical estimates in valuing certain intangible assets include but are not limited to future expected cash flows from customer relationships and acquired patents and developed technology and discount rates. Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates.

Other estimates associated with the accounting for acquisitions may change as additional information becomes available regarding the assets acquired and liabilities assumed, as more fully discussed in Note 6 of Notes to Consolidated Financial Statements included in Item 8 of this Annual Report on Form 10-K.

Goodwill

Goodwill is allocated to reporting units expected to benefit from the business combination. We evaluate our reporting units when changes in our operating structure occur, and if necessary, reassign goodwill using a relative fair value allocation approach. We test goodwill for impairment at the reporting unit level at least annually, or more frequently if events or changes in circumstances indicate that the asset may be impaired. Goodwill impairment tests require judgment, including the identification of reporting units, assignment of assets and liabilities to reporting units, assignment of goodwill to reporting units, and determination of the fair value of each reporting unit.

Long-lived Assets

Long-lived assets, including property and equipment, long-term prepayments, and intangible assets, excluding goodwill, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. The evaluation is performed at the lowest level of identifiable cash flows independent of other assets. An impairment loss would be recognized when estimated undiscounted future cash flows generated from the assets are less than their carrying amount. Measurement of an impairment loss would be based on the excess of the carrying amount of the asset group over its fair value.

Impairment of Marketable and Non-Marketable Securities

We periodically review our marketable and non-marketable securities for impairment. If we conclude that any of these investments are impaired, we determine whether such impairment is other-than-temporary. Factors we consider to make such determination include the duration and severity of the impairment, the reason for the decline in value and the potential recovery period and our intent to sell. For marketable debt securities, we also consider whether (1) it is more likely than not that we will be required to sell the security before recovery of its amortized cost basis, and (2) the amortized cost basis cannot be recovered as a result of credit losses. If any impairment is considered other-than-temporary, we will write down the asset to its fair value and record the corresponding charge as other income (expense), net.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to financial market risks, including changes in currency exchange rates and interest rates.

Foreign Currency Exchange Risk

We transact business globally in multiple currencies. Our international revenues, as well as costs and expenses denominated in foreign currencies, expose us to the risk of fluctuations in foreign currency exchange rates against the U.S. dollar. We are a net receiver of foreign currencies and therefore benefit from a weakening of the U.S. dollar and are adversely affected by a strengthening of the U.S. dollar relative to the foreign currency. As of December 31, 2016, our most significant currency exposures are the British pound, Euro, and Japanese yen.

In the fourth quarter of 2016, we began using foreign exchange forward contracts in addition to the existing foreign exchange option contracts, to protect our forecasted U.S. dollar-equivalent earnings from changes in foreign currency exchange rates. When the U.S. dollar strengthens, gains from foreign currency options and forwards reduce the foreign currency losses related to our earnings. When the U.S. dollar weakens, losses from foreign currency forwards offset the foreign currency gains related to our earnings. These hedging contracts reduce, but do not entirely eliminate, the impact of currency exchange rate movements. We designate these contracts as cash flow hedges for accounting purposes. We record spot-to-spot foreign currency exchange rate changes of these

contracts as a component of accumulated other comprehensive income (AOCI) and subsequently reclassify them into revenues to offset the hedged exposures as they occur. We exclude the change in the time value and forward points of these contracts from our assessment of hedge effectiveness. These excluded components are recognized in other income (expense), net.

We considered the historical trends in currency exchange rates and determined that it was reasonably possible that changes in exchange rates of 10% could be experienced in the near term. If the U.S. dollar weakened by 10% as of December 31, 2015 and December 31, 2016, the amount recorded in AOCI reflecting spot-to-spot foreign currency rate changes related to our foreign exchange contracts before tax effect would have been approximately $221 million and $920 million lower as of December 31, 2015 and December 31, 2016, and the total amount of expense recorded as other income (expense), net, would have been approximately $203 million higher in the year ended December 31, 2015 and $14 million lower in the year ended December 31, 2016. If the U.S. dollar strengthened by 10% as of December 31, 2015 and December 31, 2016, the amount recorded in accumulated AOCI related to our foreign exchange contracts before tax effect would have been approximately $1.5 billion and $1.0 billion higher as of December 31, 2015 and December 31, 2016, and the total amount of expense recorded as other income (expense), net, would have been approximately $313 million and $13 million higher in the years ended December 31, 2015 and December 31, 2016. In both scenarios, the change in the value recorded in in AOCI would be expected to offset a corresponding foreign currency change in forecasted hedged revenues when recognized.

In addition, we use foreign exchange forward contracts to offset the foreign exchange risk on our assets and liabilities denominated in currencies other than the local currency of the subsidiary. These forward contracts reduce, but do not entirely eliminate, the impact of currency exchange rate movements on our assets and liabilities. The foreign currency gains and losses on the assets and liabilities are recorded in other income (expense), net, which are offset by the gains and losses on the forward contracts.

We considered the historical trends in currency exchange rates and determined that it was reasonably possible that adverse changes in exchange rates of 10% for all currencies could be experienced in the near term. These reasonably possible adverse changes in exchange rates of 10% were applied to total monetary assets and liabilities denominated in currencies other than the local currencies at the balance sheet dates to compute the adverse impact these changes would have had on our income before income taxes in the near term. These changes would have resulted in an adverse impact on income before income taxes of approximately $61 million and $40 million as of December 31, 2015 and December 31, 2016. The adverse impact as of December 31, 2015 and December 31, 2016 is after consideration of the offsetting effect of approximately $539 million and $554 million from foreign exchange contracts in place for the months of December 31, 2015 and December 31, 2016.

Interest Rate Risk

Our investment strategy is to achieve a return that will allow us to preserve capital and maintain liquidity requirements. We invest primarily in debt securities including those of the U.S. government and its agencies, corporate debt securities, agency mortgage-backed securities, money market and other funds, municipal securities, time deposits, asset backed securities, and debt instruments issued by foreign governments. By policy, we limit the amount of credit exposure to any one issuer. Our investments in both fixed rate and floating rate interest earning securities carry a degree of interest rate risk. Fixed rate securities may have their fair market value adversely impacted due to a rise in interest rates, while floating rate securities may produce less income than predicted if interest rates fall. As of December 31, 2015 and December 31, 2016, unrealized losses on our marketable debt securities were primarily due to temporary interest rate fluctuations as a result of higher market interest rates compared to interest rates at the time of purchase. We account for both fixed and variable rate securities at fair value with changes on gains and losses recorded in AOCI until the securities are sold. We use interest rate derivative contracts to hedge gains and losses on our securities. These derivative contracts are accounted for as hedges at fair value with changes in fair value recorded in other income (expense), net.

We considered the historical volatility of short-term interest rates and determined that it was reasonably possible that an adverse change of 100 basis points could be experienced in the near term. A hypothetical 1.00% (100 basis points) increase in interest rates would have resulted in a decrease in the fair value of our marketable securities of approximately $1.3 billion and $2.2 billion as of December 31, 2015 and December 31, 2016.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Alphabet Inc.

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The supplementary financial information required by this Item 8 is included in Item 7 under the caption "Quarterly Results of Operations."

REPORT OF ERNST & YOUNG LLP, INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Stockholders of Alphabet Inc.

We have audited the accompanying consolidated balance sheets of Alphabet Inc. as of December 31, 2015 and 2016, and the related consolidated statements of income, comprehensive income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2016. Our audits also included the financial statement schedule listed in the Index at Item 15(a)2. These financial statements and schedule are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements and schedule based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of Alphabet Inc. at December 31, 2015 and 2016, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2016, in conformity with U.S. generally accepted accounting principles. Also, in our opinion, the related financial statement schedule, when considered in relation to the basic financial statements taken as a whole, presents fairly in all material respects the information set forth therein.

As discussed in Notes 1 and 14 to the consolidated financial statements, the Company changed its method of accounting for share-based payments to employees as a result of the adoption of the amendments to the FASB Accounting Standards Codification resulting from Accounting Standards Update No. 2016-09, "Improvements to Employee Share-Based Payment Accounting," effective January 1, 2016.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Alphabet Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 2, 2017 expressed an unqualified opinion thereon.

/s/ Ernst & Young LLP

San Jose, California
February 2, 2017

REPORT OF ERNST & YOUNG LLP, INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Stockholders of Alphabet Inc.

We have audited Alphabet Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). Alphabet Inc.'s management is responsible for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

In our opinion, Alphabet Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the 2016 consolidated financial statements of Alphabet Inc. and our report dated February 2, 2017 expressed an unqualified opinion thereon.

/s/ Ernst & Young LLP

San Jose, California
February 2, 2017

Alphabet Inc.
CONSOLIDATED BALANCE SHEETS
(In millions, except share and par value amounts which are reflected in thousands, and par value per share amounts)

	As of December 31, 2015	As of December 31, 2016
Assets		
Current assets:		
Cash and cash equivalents	$ 16,549	$ 12,918
Marketable securities	56,517	73,415
Total cash, cash equivalents, and marketable securities (including securities loaned of $4,531 and $0)	73,066	86,333
Accounts receivable, net of allowance of $296 and $467	11,556	14,137
Receivable under reverse repurchase agreements	450	0
Income taxes receivable, net	1,903	95
Inventory	491	268
Prepaid revenue share, expenses and other assets	2,648	4,575
Total current assets	90,114	105,408
Prepaid revenue share, expenses and other assets, non-current	3,181	1,819
Non-marketable investments	5,183	5,878
Deferred income taxes	251	383
Property and equipment, net	29,016	34,234
Intangible assets, net	3,847	3,307
Goodwill	15,869	16,468
Total assets	$ 147,461	$ 167,497
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 1,931	$ 2,041
Short-term debt	3,225	0
Accrued compensation and benefits	3,539	3,976
Accrued expenses and other current liabilities	4,768	6,144
Accrued revenue share	2,329	2,942
Securities lending payable	2,428	0
Deferred revenue	788	1,099
Income taxes payable, net	302	554
Total current liabilities	19,310	16,756
Long-term debt	1,995	3,935
Deferred revenue, non-current	151	202
Income taxes payable, non-current	3,663	4,677
Deferred income taxes	189	226
Other long-term liabilities	1,822	2,665
Total liabilities	27,130	28,461
Commitments and Contingencies (Note 10)		
Stockholders' equity:		
Convertible preferred stock, $0.001 par value per share, 100,000 shares authorized; no shares issued and outstanding	0	0
Class A and Class B common stock, and Class C capital stock and additional paid-in capital, $0.001 par value per share: 15,000,000 shares authorized (Class A 9,000,000, Class B 3,000,000, Class C 3,000,000); 687,348 (Class A 292,297, Class B 50,295, Class C 344,756) and 691,293 (Class A 296,992, Class B 47,437, Class C 346,864) shares issued and outstanding	32,982	36,307
Accumulated other comprehensive loss	(1,874)	(2,402)
Retained earnings	89,223	105,131
Total stockholders' equity	120,331	139,036
Total liabilities and stockholders' equity	$ 147,461	$ 167,497

See accompanying notes.

Alphabet Inc.
CONSOLIDATED STATEMENTS OF INCOME
(In millions, except per share amounts)

	Year Ended December 31,		
	2014	2015	2016
Revenues	$ 66,001	$ 74,989	$ 90,272
Costs and expenses:			
Cost of revenues	25,691	28,164	35,138
Research and development	9,832	12,282	13,948
Sales and marketing	8,131	9,047	10,485
General and administrative	5,851	6,136	6,985
Total costs and expenses	49,505	55,629	66,556
Income from operations	16,496	19,360	23,716
Other income (expense), net	763	291	434
Income before income taxes	17,259	19,651	24,150
Provision for income taxes	3,639	3,303	4,672
Net income from continuing operations	$ 13,620	$ 16,348	$ 19,478
Net income from discontinued operations	516	0	0
Net income	$ 14,136	$ 16,348	$ 19,478
Less: Adjustment Payment to Class C capital stockholders	0	522	0
Net income available to all stockholders	$ 14,136	$ 15,826	$ 19,478
Basic net income per share of Class A and B common stock:			
Continuing operations	$ 20.15	$ 23.11	$ 28.32
Discontinued operations	0.76	0.00	0.00
Basic net income per share of Class A and B common stock	$ 20.91	$ 23.11	$ 28.32
Basic net income per share of Class C capital stock:			
Continuing operations	$ 20.15	$ 24.63	$ 28.32
Discontinued operations	0.76	0.00	0.00
Basic net income per share of Class C capital stock	$ 20.91	$ 24.63	$ 28.32
Diluted net income per share of Class A and B common stock:			
Continuing operations	$ 19.82	$ 22.84	$ 27.85
Discontinued operations	0.75	0.00	0.00
Diluted net income per share of Class A and B common stock	$ 20.57	$ 22.84	$ 27.85
Diluted net income per share of Class C capital stock:			
Continuing operations	$ 19.82	$ 24.34	$ 27.85
Discontinued operations	0.75	0.00	0.00
Diluted net income per share of Class C capital stock	$ 20.57	$ 24.34	$ 27.85

See accompanying notes.

Alphabet Inc.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(In millions)

	Year Ended December 31,		
	2014	2015	2016
Net income	$ 14,136	$ 16,348	$ 19,478
Other comprehensive (loss) income:			
Change in foreign currency translation adjustment	(996)	(1,067)	(599)
Available-for-sale investments:			
Change in net unrealized gains (losses)	505	(715)	(314)
Less: reclassification adjustment for net (gains) losses included in net income	(134)	208	221
Net change (net of tax effect of $60, $29, and $0)	371	(507)	(93)
Cash flow hedges:			
Change in net unrealized gains (losses)	651	676	515
Less: reclassification adjustment for net (gains) losses included in net income	(124)	(1,003)	(351)
Net change (net of tax effect of $196, $115, and $64)	527	(327)	164
Other comprehensive (loss) income	(98)	(1,901)	(528)
Comprehensive income	$ 14,038	$ 14,447	$ 18,950

See accompanying notes.

Alphabet Inc.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In millions, except share amounts which are reflected in thousands)

	Class A and Class B Common Stock, Class C Capital Stock and Additional Paid-In Capital		Accumulated Other Comprehensive Income (Loss)	Retained Earnings	Total Stockholders' Equity
	Shares	Amount			
Balance as of December 31, 2013	671,664	$ 25,922	$ 125	$ 60,930	$ 86,977
Common and capital stock issued	8,508	465	0	0	465
Stock-based compensation expense		4,279	0	0	4,279
Stock-based compensation tax benefits		625	0	0	625
Tax withholding related to vesting of restricted stock units		(2,524)	0	0	(2,524)
Net income		0	0	14,136	14,136
Other comprehensive loss		0	(98)	0	(98)
Balance as of December 31, 2014	680,172	28,767	27	75,066	103,860
Common and capital stock issued	8,714	664	0	0	664
Stock-based compensation expense		5,151	0	0	5,151
Stock-based compensation tax benefits		815	0	0	815
Tax withholding related to vesting of restricted stock units		(2,779)	0	0	(2,779)
Repurchases of capital stock	(2,391)	(111)	0	(1,669)	(1,780)
Adjustment Payment to Class C capital stockholders	853	475	0	(522)	(47)
Net income		0	0	16,348	16,348
Other comprehensive loss		0	(1,901)	0	(1,901)
Balance as of December 31, 2015	687,348	32,982	(1,874)	89,223	120,331
Cumulative effect of accounting change	0	180	0	(133)	47
Common and capital stock issued	9,106	298	0	0	298
Stock-based compensation expense		6,700	0	0	6,700
Tax withholding related to vesting of restricted stock units		(3,597)	0	0	(3,597)
Repurchases of capital stock	(5,161)	(256)	0	(3,437)	(3,693)
Net income		0	0	19,478	19,478
Other comprehensive loss		0	(528)	0	(528)
Balance as of December 31, 2016	691,293	$ 36,307	$ (2,402)	$ 105,131	$ 139,036

See accompanying notes.

Alphabet Inc.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In millions)

	Year Ended December 31,		
	2014	2015	2016
Operating activities			
Net income	$ 14,136	$ 16,348	$ 19,478
Adjustments:			
Depreciation and impairment of property and equipment	3,523	4,132	5,267
Amortization and impairment of intangible assets	1,456	931	877
Stock-based compensation expense	4,279	5,203	6,703
Deferred income taxes	(104)	(179)	(38)
Gain on divestiture of business	(740)	0	0
(Gain) loss on marketable and non-marketable investments, net	(390)	334	275
Other	192	212	174
Changes in assets and liabilities, net of effects of acquisitions:			
Accounts receivable	(1,641)	(2,094)	(2,578)
Income taxes, net	591	(179)	3,125
Prepaid revenue share, expenses and other assets	459	(318)	312
Accounts payable	436	203	110
Accrued expenses and other liabilities	757	1,597	1,515
Accrued revenue share	245	339	593
Deferred revenue	(175)	43	223
Net cash provided by operating activities	23,024	26,572	36,036
Investing activities			
Purchases of property and equipment	(11,014)	(9,950)	(10,212)
Proceeds from disposals of property and equipment	55	35	240
Purchases of marketable securities	(56,310)	(74,368)	(84,509)
Maturities and sales of marketable securities	51,315	62,905	66,895
Purchases of non-marketable investments	(1,440)	(2,326)	(1,109)
Maturities and sales of non-marketable investments	213	154	494
Cash collateral related to securities lending	1,403	(350)	(2,428)
Investments in reverse repurchase agreements	(775)	425	450
Proceeds from divestiture of business	386	0	0
Acquisitions, net of cash acquired, and purchases of intangible assets	(4,888)	(236)	(986)
Net cash used in investing activities	(21,055)	(23,711)	(31,165)
Financing activities			
Net payments related to stock-based award activities	(2,069)	(2,375)	(3,304)
Adjustment Payment to Class C capital stockholders	0	(47)	0
Repurchases of capital stock	0	(1,780)	(3,693)
Proceeds from issuance of debt, net of costs	11,625	13,705	8,729
Repayments of debt	(11,643)	(13,728)	(10,064)
Net cash used in financing activities	(2,087)	(4,225)	(8,332)
Effect of exchange rate changes on cash and cash equivalents	(433)	(434)	(170)
Net decrease in cash and cash equivalents	(551)	(1,798)	(3,631)
Cash and cash equivalents at beginning of period	18,898	18,347	16,549
Cash and cash equivalents at end of period	$ 18,347	$ 16,549	$ 12,918
Supplemental disclosures of cash flow information			
Cash paid for taxes, net of refunds	$ 3,138	$ 3,651	$ 1,643
Cash paid for interest	86	96	84

See accompanying notes.

Alphabet Inc.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Note 1. Nature of Operations and Summary of Significant Accounting Policies

Nature of Operations

Google was incorporated in California in September 1998 and re-incorporated in the State of Delaware in August 2003. We generate revenues primarily by delivering relevant, cost-effective online advertising.

On August 10, 2015, we announced plans to create a new public holding company, Alphabet Inc. (Alphabet), and a new operating structure. On October 2, 2015, we implemented the holding company reorganization, and as a result, Alphabet became the successor issuer to Google Inc. (Google).

The implementation of the holding company reorganization on October 2, 2015 was accounted for as a merger under common control. Alphabet has recognized the assets and liabilities of Google at carryover basis. The consolidated financial statements of Alphabet present comparative information for prior years on a combined basis, as if both Alphabet and Google were under common control for all periods presented.

Basis of Consolidation

The consolidated financial statements of Alphabet include the accounts of Alphabet and all wholly owned subsidiaries as well as all variable interest entities where we are the primary beneficiary. All intercompany balances and transactions have been eliminated.

Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. Generally Accepted Accounting Principles (GAAP) requires us to make estimates and assumptions that affect the amounts reported and disclosed in the financial statements and the accompanying notes. Actual results could differ materially from these estimates. On an ongoing basis, we evaluate our estimates, including those related to the accounts receivable and sales allowances, fair values of financial instruments, intangible assets and goodwill, useful lives of intangible assets and property and equipment, income taxes, and contingent liabilities, among others. We base our estimates on historical experience and on various other assumptions that are believed to be reasonable, the results of which form the basis for making judgments about the carrying values of assets and liabilities.

Revenue Recognition

The following table presents our revenues by segment and revenue source (in millions):

	Year Ended December 31,		
	2014	2015	2016
Google segment			
Google properties	$ 45,085	$ 52,357	$ 63,785
Google Network Members' properties	14,539	15,033	15,598
Google advertising revenues	59,624	67,390	79,383
Google other revenues	6,050	7,154	10,080
Google segment revenues	$ 65,674	$ 74,544	$ 89,463
Other Bets			
Other Bets revenues	$ 327	$ 445	$ 809
Consolidated revenues	$ 66,001	$ 74,989	$ 90,272

We generate revenues primarily by delivering performance and brand advertising. Performance advertising creates and delivers relevant ads that users will click, leading to direct engagement with advertisers. Brand advertising enhances users' awareness of and affinity with advertisers' products and services, through videos, text, images, and other ads that run across various devices.

Google properties revenues consist primarily of advertising revenues generated on Google.com, the Google app, YouTube, and other Google owned and operated properties like Gmail, Maps and Google Play. Google Network Members' properties revenues consist primarily of revenues generated from placing ads on Google Network Members'

properties. Our customers generally purchase ads through AdWords, DoubleClick Bid Manager, and DoubleClick AdExchange, among others. Most of our customers pay us on a cost-per-click basis, which means that an advertiser pays us only when a user engages with the ads by clicking on an ad on Google properties or Google Network Members' properties or by viewing YouTube engagement ads like TrueView (counted as an engagement when the user chooses not to skip the ad). We also offer advertising on other bases such as cost-per-impression, which enables our brand advertisers to pay us based on the number of times their ads are displayed on Google properties and Google Network Members' properties.

Revenue from advertising is recognized when the goods or services have been delivered or provided, the amounts we charge are fixed or determinable, we and our advertisers or other customers understand the specific nature and terms of the agreed upon transactions, and collectability is reasonably assured. We recognize as revenues the amounts charged to advertisers each time a user engages with ads that appears next to the search results or content on Google properties or Google Network Members' properties. For those advertisers using our cost-per-impression pricing, we recognize as revenues the amounts charged to advertisers each time their ads are displayed on Google properties or Google Network Members' properties. We generally report revenues from ads placed on Google Network Members' properties on a gross basis principally because we are the primary obligor to our advertisers.

Revenue from hardware sales to end customers or through distribution channels is generally recognized when the product has been shipped, risk of loss has transferred to the customer, objective evidence exists that customer acceptance provisions have been met, no significant obligations remain and allowances for discounts, price protection, returns and customer incentives, if applicable, can be reasonably and reliably estimated. Revenues are reported net of these allowances.

For the sale of certain third-party products and services, we evaluate whether it is appropriate to recognize revenue based on the gross amount billed to the customers or the net amount earned as revenue share. Generally, when we record revenue on a gross basis, we are the primary obligor in a transaction, and have also considered other factors, including whether we are subject to inventory risk or have latitude in establishing prices.

For multi-element arrangements, including those that contain software essential to hardware products' functionality and services, we allocate revenue to each unit of accounting based on their relative selling prices. In such circumstances, we use a hierarchy to determine the selling prices to be used for allocating revenue: (i) vendor-specific objective evidence of fair value (VSOE), (ii) third-party evidence of selling price, and (iii) best estimate of the selling price (ESP). VSOE generally exists only when we sell the deliverable separately and is the price actually charged by us for that deliverable. ESPs reflect our best estimates of what the selling price of the deliverable would be if it was sold regularly on a stand-alone basis.

We record deferred revenues when cash payments are received in advance of our performance in the underlying agreement on the accompanying Consolidated Balance Sheets.

Cost of Revenues

Cost of revenues consists of traffic acquisition costs which are paid to Google Network Members primarily for ads displayed on their properties and amounts paid to our distribution partners who make available our search access points and services. Our distribution partners include browser providers, mobile carriers, original equipment manufacturers, and software developers.

Additionally, other costs of revenues include the following:

- The expenses associated with the operation of our data centers (including depreciation, labor, energy, and bandwidth costs);
- Content acquisition costs primarily related to payments to certain content providers from whom we license their video and other content for distribution on YouTube and Google Play (we pay fees to these content providers based on revenues generated or a flat fee);
- Credit card and other transaction fees related to processing customer transactions;
- Stock-based compensation expense;
- Inventory related costs for hardware we sell; and
- Amortization of certain intangible assets.

Stock-based Compensation

Stock-based compensation includes restricted stock units (RSUs) that will be settled in Alphabet stock as well as awards we expect to ultimately settle in cash. RSUs are measured at the fair market value of the underlying stock at the grant date. Liability classified awards are remeasured at fair value through settlement. We recognize stock-

based compensation using the straight-line method over the requisite service period. With the adoption of ASU 2016-09 on January 1, 2016, we account for forfeitures as they occur.

For RSUs, shares are issued on the vesting dates net of the minimum statutory tax withholding to be paid by us on behalf of our employees. As a result, the actual number of shares issued will be fewer than the actual number of RSUs outstanding. We record a liability for withholding amounts to be paid by us primarily as a reduction to additional paid-in capital.

Certain Risks and Concentrations

Our revenues are primarily derived from online advertising, the market for which is highly competitive and rapidly changing. In addition, our revenues are generated from a multitude of vertical market segments in countries around the world. Significant changes in this industry or changes in customer buying or advertiser spending behavior could adversely affect our operating results.

We are subject to concentrations of credit risk principally from cash and cash equivalents, marketable securities, foreign exchange contracts, and accounts receivable. Cash equivalents and marketable securities consist primarily of time deposits, money market and other funds, highly liquid debt instruments of the U.S. government and its agencies, debt instruments issued by foreign governments, debt instruments issued by municipalities in the U.S., corporate debt securities, agency mortgage-backed securities, and asset-backed securities. Foreign exchange contracts are transacted with various financial institutions with high credit standing. Accounts receivable are typically unsecured and are derived from revenues earned from customers located around the world. In 2014, 2015, and 2016, we generated approximately 45%, 46%, and 47% of our revenues from customers based in the U.S., with the majority of revenues from customers outside of the U.S. located in Europe and Japan. We perform ongoing evaluations to determine customer credit and we limit the amount of credit we extend, but generally we do not require collateral from our customers. We maintain reserves for estimated credit losses and these losses have generally been within our expectations.

No individual customer or groups of affiliated customers represented more than 10% of our revenues in 2014, 2015, or 2016.

Fair Value of Financial Instruments

Our financial assets and financial liabilities including cash equivalents, marketable securities, foreign currency and interest rate derivative contracts, and non-marketable debt securities are measured and recorded at fair value on a recurring basis. We measure certain financial assets at fair value for disclosure purposes, as well as on a nonrecurring basis when they are deemed to be other-than-temporarily impaired. Our other current financial assets and our other current financial liabilities have fair values that approximate their carrying value.

Fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that is determined based on assumptions that market participants would use in pricing an asset or a liability. Assets and liabilities recorded at fair value are measured and classified in accordance with a three-tier fair value hierarchy based on the observability of the inputs available in the market used to measure fair value:

Level 1 - Observable inputs that reflect quoted prices (unadjusted) for identical assets or liabilities in active markets.

Level 2 - Include other inputs that are based upon quoted prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-based valuation techniques for which all significant inputs are observable in the market or can be derived from observable market data. Where applicable, these models project future cash flows and discount the future amounts to a present value using market-based observable inputs including interest rate curves, foreign exchange rates, and credit ratings.

Level 3 - Unobservable inputs that are supported by little or no market activities.

The fair value hierarchy requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value.

Cash, Cash Equivalents, and Marketable Securities

We invest all excess cash primarily in debt securities including those of the U.S. government and its agencies, corporate debt securities, agency mortgage-backed securities, money market and other funds, municipal securities, time deposits, asset backed securities, and debt instruments issued by foreign governments.

We classify all investments that are readily convertible to known amounts of cash and have stated maturities of three months or less from the date of purchase as cash equivalents and those with stated maturities of greater than three months as marketable securities.

We determine the appropriate classification of our investments in marketable securities at the time of purchase and reevaluate such designation at each balance sheet date. We have classified and accounted for our marketable securities as available-for-sale. After consideration of our risk versus reward objectives, as well as our liquidity requirements, we may sell these securities prior to their stated maturities. As we view these securities as available to support current operations, we classify highly liquid securities with maturities beyond 12 months as current assets under the caption marketable securities in the accompanying Consolidated Balance Sheets. We carry these securities at fair value, and report the unrealized gains and losses, net of taxes, as a component of stockholders' equity, except for unrealized losses determined to be other-than-temporary, which we record within other income (expense), net. We determine any realized gains or losses on the sale of marketable securities on a specific identification method, and we record such gains and losses as a component of other income (expense), net.

Non-Marketable Investments

We have accounted for non-marketable equity investments either under the equity or cost method. Investments through which we exercise significant influence but do not have control over the investee are accounted for under the equity method. Investments through which we are not able to exercise significant influence over the investee are accounted for under the cost method.

We have accounted for our non-marketable investments that meet the definition of a debt security as available-for-sale securities. Since these securities do not have contractual maturity dates and we do not intend to liquidate them in the next 12 months, we have classified them as non-current assets on the accompanying Consolidated Balance Sheet.

Variable Interest Entities

We make a determination at the inception of each arrangement whether an entity in which we have made an investment or in which we have other variable interests is considered a Variable Interest Entity ("VIE"). We consolidate VIEs when we are deemed to be the primary beneficiary. The primary beneficiary of a VIE is the party that meets both of the following criteria: (i) has the power to make decisions that most significantly affect the economic performance of the VIE; and (ii) has the obligation to absorb losses or the right to receive benefits that in either case could potentially be significant to the VIE. Periodically, we determine whether any changes occurred requiring a reassessment of whether we are the primary beneficiary of a VIE. If we are not deemed to be the primary beneficiary in a VIE, we account for the investment or other variable interests in a VIE in accordance with applicable GAAP.

Impairment of Marketable and Non-Marketable Investments

We periodically review our marketable and non-marketable investments for impairment. If we conclude that any of these investments are impaired, we determine whether such impairment is other-than-temporary. Factors we consider to make such determination include the duration and severity of the impairment, the reason for the decline in value and the potential recovery period and our intent to sell. For debt securities, we also consider whether (1) it is more likely than not that we will be required to sell the security before recovery of its amortized cost basis, and (2) the amortized cost basis cannot be recovered as a result of credit losses. If any impairment is considered other-than-temporary, we will write down the asset to its fair value and record the corresponding charge as other income (expense), net.

Accounts Receivable

We record accounts receivable at the invoiced amount and we normally do not charge interest. We maintain an allowance for doubtful accounts to reserve for potentially uncollectible receivables. We review the accounts receivable by amounts due by customers which are past due to identify specific customers with known disputes or collectability issues. In determining the amount of the reserve, we make judgments about the creditworthiness of significant customers based on ongoing credit evaluations. We also maintain a sales allowance to reserve for potential credits issued to customers. We determine the amount of the reserve based on historical credits issued.

Property and Equipment

We account for property and equipment at cost less accumulated depreciation and amortization. We compute depreciation using the straight-line method over the estimated useful lives of the assets. We depreciate buildings over periods up to 25 years. We generally depreciate information technology assets over periods up to 7 years. We amortize leasehold improvements over the shorter of the remaining lease term or the estimated useful lives of the assets. Construction in progress is the construction or development of property and equipment that have not yet been placed

in service for our intended use. Depreciation for equipment commences once it is placed in service and depreciation for buildings and leasehold improvements commences once they are ready for our intended use. Land is not depreciated.

Inventory

Inventory consists primarily of finished goods and is stated at the lower of cost and net realizable value. Cost is computed using the first-in, first-out method.

Software Development Costs

We expense software development costs, including costs to develop software products or the software component of products to be sold, leased, or marketed to external users, before technological feasibility is reached. Technological feasibility is typically reached shortly before the release of such products and as a result, development costs that meet the criteria for capitalization were not material for the periods presented.

Software development costs also include costs to develop software to be used solely to meet internal needs and cloud based applications used to deliver our services. We capitalize development costs related to these software applications once the preliminary project stage is complete and it is probable that the project will be completed and the software will be used to perform the function intended. Costs capitalized for developing such software applications were not material for the periods presented.

Business Combinations

We include the results of operations of the businesses that we acquire as of the acquisition date. We allocate the purchase price of our acquisitions to the assets acquired and liabilities assumed based on their estimated fair values. The excess of the purchase price over the fair values of these identifiable assets and liabilities is recorded as goodwill. Acquisition-related expenses are recognized separately from the business combination and are expensed as incurred.

Long-Lived Assets, Goodwill and Other Acquired Intangible Assets

We review property and equipment, long-term prepayments and intangible assets, excluding goodwill, for impairment whenever events or changes in circumstances indicate the carrying amount may not be recoverable. We measure recoverability of these assets by comparing the carrying amounts to the future undiscounted cash flows that the assets or the asset group are expected to generate. If the carrying value of the assets are not recoverable, the impairment recognized is measured as the amount by which the carrying value of the asset exceeds its fair market value. In 2014, we recorded impairments of intangible assets, including an impairment of $378 million in the third quarter of 2014 related to a patent licensing royalty asset. Impairments of intangible assets were not material in 2015 or 2016.

We allocate goodwill to reporting units based on the reporting unit expected to benefit from the business combination. We evaluate our reporting units when changes in our operating structure occur, and if necessary, reassign goodwill using a relative fair value allocation approach. We test our goodwill for impairment at least annually, or more frequently if events or changes in circumstances indicate that the asset may be impaired. No goodwill impairment has been identified in any of the years presented.

Intangible assets with definite lives are amortized over their estimated useful lives. We amortize intangible assets on a straight-line basis with definite lives over periods ranging from one to twelve years.

Income Taxes

We account for income taxes using the asset and liability method, under which we recognize the amount of taxes payable or refundable for the current year and deferred tax assets and liabilities for the future tax consequences of events that have been recognized in our financial statements or tax returns. We measure current and deferred tax assets and liabilities based on provisions of enacted tax law. We evaluate the realization of our deferred tax assets based on all available evidence and establish a valuation allowance to reduce deferred tax assets when it is more-likely-than-not that they will not be realized.

We recognize the financial statement effects of a tax position when it is more-likely-than not that, based on technical merits, the position will be sustained upon examination. The tax benefits of the position recognized in the financial statements are then measured based on the largest amount of benefit that is greater than 50% likely to be realized upon settlement with a taxing authority. In addition, we recognize interest and penalties related to unrecognized tax benefits as a component of the income tax provision.

Foreign Currency

Generally, the functional currency of our international subsidiaries is the local currency. We translate the financial statements of these subsidiaries to U.S. dollars using month-end exchange rates for assets and liabilities, and average rates for the annual period derived from month-end exchange rates for revenues, costs, and expenses. We record translation gains and losses in accumulated other comprehensive income as a component of stockholders' equity. We reflect net foreign exchange transaction gains and losses resulting from the conversion of the transaction currency to functional currency as a component of foreign currency exchange losses in other income (expense), net.

Advertising and Promotional Expenses

We expense advertising and promotional costs in the period in which they are incurred. For the years ended December 31, 2014, 2015 and 2016, advertising and promotional expenses totaled approximately $3,004 million, $3,186 million, and $3,868 million, respectively.

Recent Accounting Pronouncements

Recently issued accounting pronouncements not yet adopted

In May 2014, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update No. 2014-09 (Topic 606) "Revenue from Contracts with Customers." Topic 606 supersedes the revenue recognition requirements in Accounting Standards Codification Topic 605, "Revenue Recognition", and requires entities to recognize revenue when they transfer control of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled to in exchange for those goods or services. We intend to early adopt Topic 606 as of January 1, 2017, using the modified retrospective transition method applied to those contracts which were not completed as of that date. Upon adoption, we will recognize the cumulative effect of adopting this guidance as an adjustment to our opening balance of retained earnings. Prior periods will not be retrospectively adjusted. We expect the adoption of Topic 606 will not have a material impact to our consolidated financial statements, including the presentation of revenues in our Consolidated Statements of Income.

In January 2016, the FASB issued Accounting Standards Update No. 2016-01 (ASU 2016-01) "Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities." ASU 2016-01 amends various aspects of the recognition, measurement, presentation, and disclosure for financial instruments. ASU 2016-01 is effective for annual reporting periods and interim periods within those years beginning after December 15, 2017. The most significant impact relates to the recognition and measurement of equity investments at fair value in the consolidated statement of income. While we continue to evaluate the effect of the standard, we anticipate that the adoption of ASU 2016-01 will increase the volatility of our other income (expense), net, resulting from the remeasurement of our equity investments.

In February 2016, the FASB issued Accounting Standards Update No. 2016-02 (Topic 842) "Leases". Topic 842 supersedes the lease recognition requirements in Accounting Standards Codification Topic 840, "Leases". Under Topic 842, lessees are required to recognize assets and liabilities on the balance sheet for most leases and provide enhanced disclosures. Leases will continue to be classified as either finance or operating. Topic 842 is effective for annual reporting periods, and interim periods within those years beginning after December 15, 2018. Entities are required to use a modified retrospective approach for leases that exist or are entered into after the beginning of the earliest comparative period in the financial statements, and there are certain optional practical expedients that an entity may elect to apply. Full retrospective application is prohibited and early adoption by public entities is permitted. We anticipate that the adoption of ASU 2016-02 will materially affect our statement of financial position and will require changes to our systems and processes. We have not yet made any decision on the timing of adoption or method of adoption with respect to the optional practical expedients.

In June 2016, the FASB issued Accounting Standards Update No. 2016-13 (ASU 2016-13) "Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments" which requires the measurement and recognition of expected credit losses for financial assets held at amortized cost. ASU 2016-13 replaces the existing incurred loss impairment model with an expected loss methodology, which will result in more timely recognition of credit losses. ASU 2016-13 is effective for annual reporting periods, and interim periods within those years beginning after December 15, 2019. We are currently in the process of evaluating the impact of the adoption of this standard on our consolidated financial statements.

Recently adopted accounting pronouncements

In June 2014, the FASB issued Accounting Standards Update No. 2014-10 (ASU 2014-10) "Development Stage Entities (Topic 915): Elimination of Certain Financial Reporting Requirements, Including an Amendment to Variable Interest Entities Guidance in Topic 810, Consolidation." ASU 2014-10 removes the definition of a development stage

entity from the Master Glossary of the Accounting Standards Codification (ASC), thereby removing the financial reporting distinction between development stage entities and other reporting entities. The additional elimination of related consolidation guidance requires companies with interests in development stage entities to reassess whether such entities are variable interest entities under ASC Topic 810, Consolidation. We adopted this standard in the first quarter of 2016 on a retrospective basis. The adoption of this standard did not have a material impact on our consolidated financial statements. Additional disclosures have been made related to certain entities that are now considered variable interest entities under this standard. See Note 7 for details.

In February 2015, the FASB issued Accounting Standards Update No. 2015-02 (ASU 2015-02) "Consolidation (Topic 810): Amendments to the Consolidation Analysis." ASU 2015-02 changes the analysis that a reporting entity must perform to determine whether it should consolidate certain types of legal entities. We adopted this standard in the first quarter of 2016 on a retrospective basis. The adoption of this standard did not have a material impact on our consolidated financial statements but resulted in additional investments being considered variable interest entities.

In March 2016, the FASB issued Accounting Standards Update No. 2016-09 (ASU 2016-09) "Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting." We have elected to early adopt these amendments beginning in the first quarter of 2016. Stock-based compensation excess tax benefits or deficiencies are now reflected in the Consolidated Statements of Income as a component of the provision for income taxes, whereas they previously were recognized in equity. Additionally, our Consolidated Statements of Cash Flows now include excess tax benefits as an operating activity, with the prior periods adjusted accordingly. Finally, we have elected to account for forfeitures as they occur, rather than estimate expected forfeitures. As a result of the adoption of ASU 2016-09, the Consolidated Statements of Cash Flows for the twelve months ended December 31, 2014 and 2015 were adjusted as follows: $648 million and $548 million increases to net cash provided by operating activities, respectively, and $648 million and $548 million increases to net cash used in financing activities, respectively.

Revision of Previously Disclosed Information

During the third quarter of 2016, we identified an omission in our supplemental disclosure of cash paid for income taxes in the Consolidated Statements of Cash Flows. We have evaluated the materiality of the impact quantitatively and qualitatively and concluded it was not material to any of the prior periods impacted. We elected to revise the supplemental disclosure for the comparable periods presented. The revision only impacted our supplemental disclosures included in the Consolidated Statements of Cash Flows.

Prior Period Reclassifications

Certain amounts in prior periods have been reclassified to conform with current period presentation.

Note 2. Financial Instruments

We classify our cash equivalents and marketable securities within Level 1 or Level 2 in the fair value hierarchy because we use quoted market prices or alternative pricing sources and models utilizing market observable inputs to determine their fair value. We classify our foreign currency and interest rate derivative contracts primarily within Level 2 in the fair value hierarchy as the valuation inputs are based on quoted prices and market observable data of similar instruments.

Cash, Cash Equivalents, and Marketable Securities

The following tables summarize our cash, cash equivalents and marketable securities by significant investment categories as of December 31, 2015 and 2016 (in millions):

	As of December 31, 2015					
	Adjusted Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value	Cash and Cash Equivalents	Marketable Securities
Cash	$ 7,380	$ 0	$ 0	$ 7,380	$ 7,380	$ 0
Level 1:						
Money market and other funds	5,623	0	0	5,623	5,623	0
U.S. government notes	20,922	27	(48)	20,901	258	20,643
Marketable equity securities	692	155	0	847	0	847
	27,237	182	(48)	27,371	5,881	21,490
Level 2:						
Time deposits[1]	3,223	0	0	3,223	2,012	1,211
Money market and other funds[2]	1,140	0	0	1,140	1,140	0
Fixed-income bond funds[3]	219	0	0	219	0	219
U.S. government agencies	1,367	2	(3)	1,366	0	1,366
Foreign government bonds	2,242	14	(23)	2,233	0	2,233
Municipal securities	3,812	47	(4)	3,855	0	3,855
Corporate debt securities	13,809	53	(278)	13,584	136	13,448
Agency mortgage-backed securities	9,680	48	(57)	9,671	0	9,671
Asset-backed securities	3,032	0	(8)	3,024	0	3,024
	38,524	164	(373)	38,315	3,288	35,027
Total	$ 73,141	$ 346	$ (421)	$ 73,066	$ 16,549	$ 56,517

	As of December 31, 2016					
	Adjusted Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value	Cash and Cash Equivalents	Marketable Securities
Cash	$ 7,078	$ 0	$ 0	$ 7,078	$ 7,078	$ 0
Level 1:						
Money market and other funds	4,783	0	0	4,783	4,783	0
U.S. government notes	38,454	46	(215)	38,285	613	37,672
Marketable equity securities	160	133	0	293	0	293
	43,397	179	(215)	43,361	5,396	37,965
Level 2:						
Time deposits[1]	142	0	0	142	140	2
Mutual funds[4]	204	7	0	211	0	211
U.S. government agencies	1,826	0	(11)	1,815	300	1,515
Foreign government bonds	2,345	18	(7)	2,356	0	2,356
Municipal securities	4,757	15	(65)	4,707	2	4,705
Corporate debt securities	12,993	114	(116)	12,991	2	12,989
Agency mortgage-backed securities	12,006	26	(216)	11,816	0	11,816
Asset-backed securities	1,855	2	(1)	1,856	0	1,856
	36,128	182	(416)	35,894	444	35,450
Total	$ 86,603	$ 361	$ (631)	$ 86,333	$ 12,918	$ 73,415

(1) The majority of our time deposits are foreign deposits.

(2) The balance related to cash collateral received in connection with our securities lending program, which was invested in reverse repurchase agreements maturing within three months. See section titled "Securities Lending Program" below for further discussion of this program.

(3) Fixed-income bond funds consist of mutual funds that primarily invest in corporate and government bonds.
(4) The fair value option was elected for mutual funds with gains (losses) recognized in other income (expense), net.

We determine realized gains or losses on the marketable securities on a specific identification method. We recognized gross realized gains of $238 million, $357 million, and $272 million for the years ended December 31, 2014, 2015, and 2016. We recognized gross realized losses of $85 million, $565 million, and $482 million for the years ended December 31, 2014, 2015, and 2016. We reflect these gains and losses as a component of other income (expense), net, in the accompanying Consolidated Statements of Income.

The following table summarizes the estimated fair value of our investments in marketable debt securities, accounted for as available-for-sale securities and classified by the contractual maturity date of the securities (in millions):

	As of December 31, 2016
Due in 1 year	$ 13,066
Due in 1 year through 5 years	38,762
Due in 5 years through 10 years	8,382
Due after 10 years	12,701
Total	$ 72,911

The following tables present gross unrealized losses and fair values for those investments that were in an unrealized loss position as of December 31, 2015 and 2016, aggregated by investment category and the length of time that individual securities have been in a continuous loss position (in millions):

	As of December 31, 2015					
	Less than 12 Months		12 Months or Greater		Total	
	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
U.S. government notes	$ 13,757	$ (48)	$ 0	$ 0	$ 13,757	$ (48)
U.S. government agencies	864	(3)	0	0	864	(3)
Foreign government bonds	885	(18)	36	(5)	921	(23)
Municipal securities	1,116	(3)	41	(1)	1,157	(4)
Corporate debt securities	9,192	(202)	784	(76)	9,976	(278)
Agency mortgage-backed securities	5,783	(34)	721	(23)	6,504	(57)
Asset-backed securities	2,508	(7)	386	(1)	2,894	(8)
Total	$ 34,105	$ (315)	$ 1,968	$ (106)	$ 36,073	$ (421)

	As of December 31, 2016					
	Less than 12 Months		12 Months or Greater		Total	
	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
U.S. government notes	$ 26,411	$ (215)	$ 0	$ 0	$ 26,411	$ (215)
U.S. government agencies	1,014	(11)	0	0	1,014	(11)
Foreign government bonds	956	(7)	0	0	956	(7)
Municipal securities	3,461	(63)	46	(2)	3,507	(65)
Corporate debt securities	6,184	(111)	166	(5)	6,350	(116)
Agency mortgage-backed securities	10,184	(206)	259	(10)	10,443	(216)
Asset-backed securities	391	(1)	0	0	391	(1)
Total	$ 48,601	$ (614)	$ 471	$ (17)	$ 49,072	$ (631)

During the years ended December 31, 2014 and 2016, we did not recognize any other-than-temporary impairment loss. During the year ended December 31, 2015, we recognized $281 million of other-than-temporary impairment losses related to our marketable equity securities and fixed-income bond funds. Those losses are included in gain (loss) on marketable securities, net as a component of other income (expense), net, in the accompanying Consolidated Statements of Income. See Note 5 for further details on other income (expense), net.

Securities Lending Program

We entered into securities lending agreements with financial institutions to enhance investment income. We loaned certain securities which were collateralized in the form of cash or securities. Cash collateral was usually invested in reverse repurchase agreements which were collateralized in the form of securities.

We classified loaned securities as cash equivalents or marketable securities and recorded the cash collateral as an asset with a corresponding liability in the accompanying Consolidated Balance Sheets. We classified reverse repurchase agreements maturing within three months as cash equivalents and those longer than three months as receivable under reverse repurchase agreements in the accompanying Consolidated Balance Sheets. For security collateral received, we did not record an asset or liability except in the event of counterparty default.

Our securities lending transactions were accounted for as secured borrowings with significant investment categories as follows (in millions):

	As of December 31, 2015				
	Remaining Contractual Maturity of the Agreements				
Securities Lending Transactions	Overnight and Continuous	Up to 30 days	30 - 90 Days	Greater Than 90 Days	Total
U.S. government notes	$ 1,322	$ 31	$ 0	$ 306	$ 1,659
U.S. government agencies	504	77	0	0	581
Corporate debt securities	188	0	0	0	188
Total	$ 2,014	$ 108	$ 0	$ 306	$ 2,428
Gross amount of recognized liabilities for securities lending in offsetting disclosure					$ 2,428
Amounts related to agreements not included in securities lending in offsetting disclosure					$ 0

As of December 31, 2016, we ended our securities lending program resulting in no cash collateral outstanding.

Derivative Financial Instruments

We recognize derivative instruments as either assets or liabilities in the accompanying Consolidated Balance Sheets at fair value. We record changes in the fair value (i.e., gains or losses) of the derivatives in the accompanying Consolidated Statements of Income as other income (expense), net, revenues, or accumulated other comprehensive income (AOCI) in the accompanying Consolidated Balance Sheets, as discussed below.

We enter into foreign currency contracts with financial institutions to reduce the risk that our cash flows and earnings will be adversely affected by foreign currency exchange rate fluctuations. We use certain interest rate derivative contracts to hedge interest rate exposures on our fixed income securities and debt issuances. Our program is not used for trading or speculative purposes.

We enter into master netting arrangements, which reduce credit risk by permitting net settlement of transactions with the same counterparty. To further reduce credit risk, we enter into collateral security arrangements under which the counterparty is required to provide collateral when the net fair value of certain financial instruments fluctuates from contractually established thresholds. We can take possession of the collateral in the event of counterparty default. As of December 31, 2015 and 2016, we received cash collateral related to the derivative instruments under our collateral security arrangements of $192 million and $362 million.

Cash Flow Hedges

We use foreign currency option and forward contracts designated as cash flow hedges to hedge certain forecasted revenue transactions denominated in currencies other than the U.S. dollar and at times we use interest rate swaps to effectively lock interest rates on anticipated debt issuances. These transactions are designated as cash flow hedges. The notional principal of these contracts was approximately $16.4 billion and $10.7 billion as of December 31, 2015 and 2016. These contracts have maturities of 36 months or less.

We reflect gain or loss on the effective portion of a cash flow hedge as a component of AOCI and subsequently reclassify cumulative gains and losses to revenues or interest expense when the hedged transactions are recorded. If the hedged transactions become probable of not occurring, the corresponding amounts in AOCI is immediately reclassified to other income (expense), net. Further, we exclude the change in the time value and forward points of foreign currency options and forward contracts from our assessment of hedge effectiveness. We recognize changes of the excluded components in other income (expense), net.

As of December 31, 2016, the effective portion of our cash flow hedges before tax effect was a net accumulated gain of $603 million, of which $567 million is expected to be reclassified from AOCI into earnings within the next 12 months.

Fair Value Hedges

We use forward contracts designated as fair value hedges to hedge foreign currency risks for our investments denominated in currencies other than the U.S. dollar. We exclude changes in forward points for the forward contracts from the assessment of hedge effectiveness. The notional principal of these contracts was $1.8 billion and $2.4 billion as of December 31, 2015 and 2016.

We have used interest rate swaps designated as fair value hedges to hedge interest rate risk for certain fixed rate securities. The notional principal of these contracts was $295 million and $0 million as of December 31, 2015 and 2016.

Gains and losses on these forward contracts and interest rate swaps are recognized in other income (expense), net, along with the offsetting losses and gains of the related hedged items.

Other Derivatives

Other derivatives not designated as hedging instruments consist of foreign currency forward contracts that we use to hedge intercompany transactions and other monetary assets or liabilities denominated in currencies other than the local currency of a subsidiary. We recognize gains and losses on these contracts, as well as the related costs in other income (expense), net, along with the foreign currency gains and losses on monetary assets and liabilities. The notional principal of these foreign exchange contracts outstanding was $7.5 billion and $7.9 billion as of December 31, 2015 and 2016.

We also use exchange-traded interest rate futures contracts and "To Be Announced" (TBA) forward purchase commitments of mortgage-backed assets to hedge interest rate risks on certain fixed income securities. The TBA contracts meet the definition of derivative instruments in cases where physical delivery of the assets is not taken at the earliest available delivery date. Our interest rate futures and TBA contracts (together interest rate contracts) are not designated as hedging instruments. We recognize gains and losses on these contracts, as well as the related costs, in other income (expense), net. The gains and losses are generally economically offset by unrealized gains and losses in the underlying available-for-sale securities, which are recorded as a component of AOCI until the securities are sold or other-than-temporarily impaired, at which time the amounts are moved from AOCI into other income (expense), net. The total notional amounts of interest rate contracts outstanding were $50 million and $0 million as of December 31, 2015 and 2016.

The fair values of our outstanding derivative instruments were as follows (in millions):

		As of December 31, 2015		
	Balance Sheet Location	Fair Value of Derivatives Designated as Hedging Instruments	Fair Value of Derivatives Not Designated as Hedging Instruments	Total Fair Value
Derivative Assets:				
Level 2:				
Foreign exchange contracts	Prepaid revenue share, expenses and other assets, current and non-current	$ 626	$ 2	$ 628
Total		$ 626	$ 2	$ 628
Derivative Liabilities:				
Level 2:				
Foreign exchange contracts	Accrued expenses and other liabilities, current and non-current	$ 1	$ 13	$ 14
Interest rate contracts	Accrued expenses and other liabilities, current and non-current	2	0	2
Total		$ 3	$ 13	$ 16

	Balance Sheet Location	As of December 31, 2016		
		Fair Value of Derivatives Designated as Hedging Instruments	Fair Value of Derivatives Not Designated as Hedging Instruments	Total Fair Value
Derivative Assets:				
Level 2:				
Foreign exchange contracts	Prepaid revenue share, expenses and other assets, current and non-current	$ 539	$ 57	$ 596
Total		$ 539	$ 57	$ 596
Derivative Liabilities:				
Level 2:				
Foreign exchange contracts	Accrued expenses and other liabilities, current and non-current	$ 4	$ 9	$ 13
Interest rate contracts	Accrued expenses and other liabilities, current and non-current	0	0	0
Total		$ 4	$ 9	$ 13

The effect of derivative instruments in cash flow hedging relationships on income and other comprehensive income (OCI) is summarized below (in millions):

Derivatives in Cash Flow Hedging Relationship	Gains (Losses) Recognized in OCI on Derivatives Before Tax Effect (Effective Portion)		
	Year Ended December 31,		
	2014	2015	2016
Foreign exchange contracts	$ 929	$ 964	$ 773
Interest rate contracts	(31)	0	0
Total	$ 898	$ 964	$ 773

Derivatives in Cash Flow Hedging Relationship	Location	Gains (Losses) Reclassified from AOCI into Income (Effective Portion)		
		Year Ended December 31,		
		2014	2015	2016
Foreign exchange contracts	Revenues	$ 171	$ 1,399	$ 539
Interest rate contracts	Other income (expense), net	4	5	5
Total		$ 175	$ 1,404	$ 544

Derivatives in Cash Flow Hedging Relationship	Location	Gains (Losses) Recognized in Income on Derivatives (Amount Excluded from Effectiveness Testing and Ineffective Portion)[1]		
		Year Ended December 31,		
		2014	2015	2016
Foreign exchange contracts	Other income (expense), net	$ (279)	$ (297)	$ (381)
Interest rate contracts	Other income (expense), net	4	0	0
Total		$ (275)	$ (297)	$ (381)

[1] Gains (losses) related to the ineffective portion of the hedges were not material in all periods presented.

The effect of derivative instruments in fair value hedging relationships on income is summarized below (in millions):

		Gains (Losses) Recognized in Income on Derivatives[2]		
		Year Ended December 31,		
Derivatives in Fair Value Hedging Relationship	Location	2014	2015	2016
Foreign Exchange Hedges:				
Foreign exchange contracts	Other income (expense), net	$ 115	$ 170	$ 145
Hedged item	Other income (expense), net	(123)	(176)	(139)
Total		$ (8)	$ (6)	$ 6
Interest Rate Hedges:				
Interest rate contracts	Other income (expense), net	$ 0	$ (2)	$ (3)
Hedged item	Other income (expense), net	0	2	3
Total		$ 0	$ 0	$ 0

(2) Amounts excluded from effectiveness testing and the ineffective portion of the fair value hedging relationships were not material in all periods presented

The effect of derivative instruments not designated as hedging instruments on income is summarized below (in millions):

		Gains (Losses) Recognized in Income on Derivatives		
		Year Ended December 31,		
Derivatives Not Designated As Hedging Instruments	Location	2014	2015	2016
Foreign exchange contracts	Other income (expense), net, and net income from discontinued operations	$ 237	$ 198	$ 130
Interest rate contracts	Other income (expense), net	2	1	(11)
Total		$ 239	$ 199	$ 119

Offsetting of Derivatives, Securities Lending, and Reverse Repurchase Agreements

We present our derivatives, securities lending and reverse repurchase agreements at gross fair values in the Consolidated Balance Sheets. However, our master netting and other similar arrangements allow net settlements under certain conditions. As of December 31, 2015 and 2016, information related to these offsetting arrangements was as follows (in millions):

Offsetting of Assets

	As of December 31, 2015						
				Gross Amounts Not Offset in the Consolidated Balance Sheets, but Have Legal Rights to Offset			
Description	Gross Amounts of Recognized Assets	Gross Amounts Offset in the Consolidated Balance Sheets	Net Presented in the Consolidated Balance Sheets	Financial Instruments	Cash Collateral Received	Non-Cash Collateral Received	Net Assets Exposed
Derivatives	$ 628	$ 0	$ 628	$ (13) [1]	$ (189)	$ (214)	$ 212
Reverse repurchase agreements	1,590	0	1,590 [2]	0	0	(1,590)	0
Total	$ 2,218	$ 0	$ 2,218	$ (13)	$ (189)	$ (1,804)	$ 212

	As of December 31, 2016						
				Gross Amounts Not Offset in the Consolidated Balance Sheets, but Have Legal Rights to Offset			
Description	Gross Amounts of Recognized Assets	Gross Amounts Offset in the Consolidated Balance Sheets	Net Presented in the Consolidated Balance Sheets	Financial Instruments	Cash Collateral Received	Non-Cash Collateral Received	Net Assets Exposed
Derivatives	$ 596	$ 0	$ 596	$ (11) [1]	$ (337)	$ (73)	$ 175

(1) The balances as of December 31, 2015 and 2016 were related to derivative liabilities which are allowed to be net settled against derivative assets in accordance with our master netting agreements.

(2) The balances as of December 31, 2015 included $1,140 million recorded in cash and cash equivalents and $450 million recorded in receivable under reverse repurchase agreements.

Offsetting of Liabilities

	As of December 31, 2015						
				Gross Amounts Not Offset in the Consolidated Balance Sheets, but Have Legal Rights to Offset			
Description	Gross Amounts of Recognized Liabilities	Gross Amounts Offset in the Consolidated Balance Sheets	Net Presented in the Consolidated Balance Sheets	Financial Instruments	Cash Collateral Pledged	Non-Cash Collateral Pledged	Net Liabilities
Derivatives	$ 16	$ 0	$ 16	$ (13) [3]	$ (3)	$ 0	$ 0
Securities lending agreements	2,428	0	2,428	0	0	(2,401)	27
Total	$ 2,444	$ 0	$ 2,444	$ (13)	$ (3)	$ (2,401)	$ 27

	As of December 31, 2016						
				Gross Amounts Not Offset in the Consolidated Balance Sheets, but Have Legal Rights to Offset			
Description	Gross Amounts of Recognized Liabilities	Gross Amounts Offset in the Consolidated Balance Sheets	Net Presented in the Consolidated Balance Sheets	Financial Instruments	Cash Collateral Pledged	Non-Cash Collateral Pledged	Net Liabilities
Derivatives	$ 13	$ 0	$ 13	$ (11) [3]	$ 0	$ 0	$ 2

(3) The balances as of December 31, 2015 and 2016 were related to derivative assets which are allowed to be net settled against derivative liabilities in accordance with our master netting agreements.

Note 3. Non-Marketable Investments

Our non-marketable investments include non-marketable equity investments and non-marketable debt securities.

Non-Marketable Equity Investments

Our non-marketable equity investments are investments we have made in privately-held companies accounted for under the equity or cost method and are not required to be consolidated under the variable interest or voting models. As of December 31, 2015 and 2016, investments accounted for under the equity method had a carrying value of approximately $1.6 billion and $1.7 billion, respectively. Our share of equity method investee earnings and losses

including impairment was a net loss of $48 million, $227 million, and $202 million for the years ended December 31, 2014, 2015, and 2016, respectively. As of December 31, 2015 and 2016, investments accounted for under the cost method had a carrying value of $2.6 billion and $3.0 billion, respectively, and a fair value of approximately $7.5 billion and $8.1 billion, respectively. The fair value of the cost method investments are primarily determined from data leveraging private-market transactions and are classified within Level 3 in the fair value hierarchy. We reflect our share of equity method investee earnings and losses and impairments of non-marketable equity investments as a component of other income (expense), net, in the accompanying Consolidated Statements of Income.

Certain renewable energy investments included in our non-marketable equity investments accounted for under the equity method are variable interest entities ("VIE"). These entities' activities involve power generation using renewable sources. We have determined that the governance structures of these entities do not allow us to direct the activities that would significantly impact VIE's economic performance such as setting operating budgets. Therefore, we do not consolidate these VIEs in our financial statements. The carrying value of these VIEs was $1.3 billion with a maximum exposure of $1.3 billion as of December 31, 2015 and $1.2 billion with a maximum exposure of $1.2 billion as of December 31, 2016. The maximum exposure is based on current investments to date. We have determined the single source of our exposure to these VIEs is our capital investment in these entities. We periodically reassess whether we are the primary beneficiary of a VIE. The reassessment process considers whether we have acquired the power to direct the most significant activities of the VIE through changes in governing documents or other circumstances. We also reconsider whether entities previously determined not to be VIEs have become VIEs, and vice versa, based on changes in facts and circumstances including changes in contractual arrangements and capital structure.

Non-Marketable Debt Securities

Our non-marketable debt securities are primarily preferred stock that are redeemable at our option and convertible notes issued by private companies. The cost of these securities was $1.0 billion and $1.1 billion as of December 31, 2015 and 2016, respectively. These debt securities do not have readily determinable market values and are categorized accordingly as Level 3 in the fair value hierarchy. To estimate the fair value of these securities, we use a combination of valuation methodologies, including market and income approaches based on prior transaction prices; estimated timing, probability, and amount of cash flows; and illiquidity considerations. Financial information of private companies may not be available and consequently we will estimate the value based on the best available information at the measurement date. No significant impairments were recognized for the years ended December 31, 2014, 2015, and 2016.

The following table presents a reconciliation for our non-marketable debt securities measured and recorded at fair value on a recurring basis, using significant unobservable inputs (Level 3) (in millions):

	Year Ended December 31	
	2015	2016
Beginning balance	$ 90	$ 1,024
Total net gains or losses		
Included in other comprehensive income	0	106
Purchases	960	78
Sales	(6)	(18)
Settlements	(20)	(25)
Ending balance	$ 1,024	$ 1,165

Note 4. Debt

Short-Term Debt

Google had a short-term debt financing program of up to $3.0 billion through the issuance of commercial paper and a $3.0 billion revolving credit facility as of December 31, 2015. In February 2016, we replaced this program with a new short-term debt financing program of up to $5.0 billion of commercial paper and a $4.0 billion revolving credit facility, which expires in February 2021. Net proceeds from these programs are used for general corporate purposes.

We had $2.0 billion of outstanding commercial paper recorded as short-term debt with a weighted-average interest rate of 0.2% as of December 31, 2015 and no commercial paper outstanding as of December 31, 2016. The estimated fair value of the short-term debt approximated its carrying value as of December 31, 2015.

The interest rate for the credit facility is determined based on a formula using certain market rates. No amounts were outstanding under the credit facility as of December 31, 2015 and December 31, 2016.

In August 2013, we entered into a capital lease obligation on certain property expiring in 2028. In September 2016, we exercised our option to purchase the property for approximately $220 million.

Long-Term Debt

Google issued $3.0 billion of unsecured senior notes in three tranches (collectively, the "2011 Notes") in May 2011, due in 2014, 2016, and 2021, as well as $1.0 billion of unsecured senior notes (the "2014 Notes") in February 2014 due 2024.

In April 2016, we completed an exchange offer with eligible holders of Google's 2011 Notes due 2021 and 2014 Notes due 2024 (collectively, the "Google Notes"). An aggregate principal amount of approximately $1.7 billion of the Google Notes was exchanged for approximately $1.7 billion of Alphabet notes with identical interest rate and maturity. Because the exchange was between a parent and the subsidiary company and for substantially identical notes, the change was treated as a debt modification for accounting purposes with no gain or loss recognized.

In August 2016, Alphabet issued $2.0 billion of unsecured senior notes (the "2016 Notes") due 2026. The net proceeds from the issuance of the 2016 Notes were used for general corporate purposes, including the repayment of outstanding commercial paper. The Alphabet notes due in 2021, 2024, and 2026 rank equally with each other and are structurally subordinated to the outstanding Google Notes.

The total outstanding long-term debt is summarized below (in millions):

	As of December 31, 2015	As of December 31, 2016
Short-Term Portion of Long-Term Debt		
2.125% Notes due on May 19, 2016	$ 1,000	$ 0
Capital Lease Obligation	225	0
Total Short-Term Portion of Long-Term Debt	$ 1,225	$ 0
Long-Term Debt		
3.625% Notes due on May 19, 2021	$ 1,000	$ 1,000
3.375% Notes due on February 25, 2024	1,000	1,000
1.998% Notes due on August 15, 2026	0	2,000
Unamortized discount for the Notes above	(5)	(65)
Total Long-Term Debt[1]	$ 1,995	$ 3,935

[1] Includes the outstanding (and unexchanged) Google Notes issued in 2011 and 2014 and the Alphabet notes exchanged in 2016.

The effective interest yields based on proceeds received from the outstanding notes due in 2021, 2024 and 2026 were 3.734%, 3.377% and 2.231% respectively, with interest payable semi-annually. We may redeem these notes at any time in whole or in part at specified redemption prices. The total estimated fair value of all outstanding notes was approximately $3.1 billion as of December 31, 2015 and $3.9 billion as of December 31, 2016. The fair value was determined based on observable market prices of identical instruments in less active markets and is categorized accordingly as Level 2 in the fair value hierarchy.

As of December 31, 2016, aggregate future principal payments for long-term debt were as follows (in millions):

Years Ending	
2017	$ 0
2018	0
2019	0
2020	0
Thereafter	4,000
Total	$ 4,000

Note 5. Supplemental Financial Statement Information

Property and Equipment, Net

Property and equipment, net, consisted of the following (in millions):

	As of December 31, 2015	As of December 31, 2016
Land and buildings	$ 16,518	$ 19,804
Information technology assets	13,645	16,084
Construction in progress	7,324	8,166
Leasehold improvements	2,576	3,415
Furniture and fixtures	83	58
Property and equipment, gross	40,146	47,527
Less: accumulated depreciation and amortization	(11,130)	(13,293)
Property and equipment, net	$ 29,016	$ 34,234

As of December 31, 2016, assets under capital lease with a cost basis of $299 million were included in property and equipment.

Note Receivable

In connection with the sale of our Motorola Mobile business on October 29, 2014 (see Note 9 for additional information), we received an interest-free, three-year prepayable promissory note (the "Note Receivable") due October 2017. The Note Receivable was included on our Consolidated Balance Sheets in prepaid revenue share, expenses and other assets, non-current, as of December 31, 2015, and in current assets, prepaid revenue share, expenses and other assets, as of December 31, 2016. Based on the general market conditions and the credit quality of Lenovo at the time of the sale, we discounted the Note Receivable at an effective interest rate of 4.5%. The outstanding balances are shown in the table below (in millions):

	As of December 31, 2015	As of December 31, 2016
Principal of the Note Receivable	$ 1,448	$ 1,448
Less: unamortized discount for the Note Receivable	(112)	(51)
Total	$ 1,336	$ 1,397

As of December 31, 2015 and 2016, we did not recognize a valuation allowance on the Note Receivable.

Accrued expenses and other current liabilities

Accrued expenses and other current liabilities consisted of the following (in millions):

	As of December 31, 2015	As of December 31, 2016
Accrued customer liabilities	$ 908	$ 1,256
Other accrued expenses and current liabilities	3,860	4,888
Accrued expenses and other current liabilities	$ 4,768	$ 6,144

Accumulated Other Comprehensive Income (Loss)

The components of AOCI, net of tax, were as follows (in millions):

	Foreign Currency Translation Adjustments	Unrealized Gains (Losses) on Available-for-Sale Investments	Unrealized Gains (Losses) on Cash Flow Hedges	Total
Balance as of December 31, 2013	$ 16	$ 50	$ 59	$ 125
Other comprehensive income (loss) before reclassifications	(996)	505	651	160
Amounts reclassified from AOCI	0	(134)	(124)	(258)
Other comprehensive income (loss)	(996)	371	527	(98)
Balance as of December 31, 2014	$ (980)	$ 421	$ 586	$ 27
Other comprehensive income (loss) before reclassifications	(1,067)	(715)	676	(1,106)
Amounts reclassified from AOCI	0	208	(1,003)	(795)
Other comprehensive income (loss)	(1,067)	(507)	(327)	(1,901)
Balance as of December 31, 2015	$ (2,047)	$ (86)	$ 259	$ (1,874)
Other comprehensive income (loss) before reclassifications	(599)	(314)	515	(398)
Amounts reclassified from AOCI	0	221	(351)	(130)
Other comprehensive income (loss)	(599)	(93)	164	(528)
Balance as of December 31, 2016	$ (2,646)	$ (179)	$ 423	$ (2,402)

The effects on net income of amounts reclassified from AOCI were as follows (in millions):

		Gains (Losses) Reclassified from AOCI to the Consolidated Statement of Income		
		Year Ended December 31,		
AOCI Components	Location	2014	2015	2016
Unrealized gains (losses) on available-for-sale investments				
	Other income (expense), net	$ 153	$ (208)	$ (221)
	Provision for income taxes	(19)	0	0
	Net of tax	$ 134	$ (208)	$ (221)
Unrealized gains (losses) on cash flow hedges				
Foreign exchange contracts	Revenue	$ 171	$ 1,399	$ 539
Interest rate contracts	Other income (expense), net	4	5	5
	Provision for income taxes	(51)	(401)	(193)
	Net of tax	$ 124	$ 1,003	$ 351
Total amount reclassified, net of tax		$ 258	$ 795	$ 130

Other Income (Expense), Net

The components of other income (expense), net, were as follows (in millions):

	Year Ended December 31,		
	2014	2015	2016
Interest income	$ 746	$ 999	$ 1,220
Interest expense	(101)	(104)	(124)
Foreign currency exchange losses, net[1]	(402)	(422)	(475)
Gain (loss) on marketable securities, net	153	(208)	(210)
Gain (loss) on non-marketable investments, net	237	(126)	(65)
Other	130	152	88
Other income (expense), net	$ 763	$ 291	$ 434

[1] Our foreign currency exchange losses, net, are related to the option premium costs and forward points for our foreign currency hedging contracts, our foreign exchange transaction gains and losses from the conversion of the transaction currency to the functional currency, offset by the foreign currency hedging contract losses and gains. The net foreign currency transaction losses were $107 million, $123 million, and $112 million in 2014, 2015, and 2016, respectively.

Note 6. Acquisitions

2016 Acquisitions

Apigee

In October 2016, we completed the acquisition of Apigee Corp., a provider of application programming interface (API) management, for approximately $571 million in cash. We expect the acquisition to accelerate our Google Cloud customers' move to supporting their businesses with high quality digital interactions. Of the total purchase price of $571 million, $41 million was cash acquired, $127 million was attributed to intangible assets, $376 million was attributed to goodwill, and $27 million was attributed to net assets acquired. Goodwill, which was recorded in the Google segment, is primarily attributable to synergies expected to arise after the acquisition and is not deductible for tax purposes.

Other Acquisitions

During the year ended December 31, 2016, we completed other acquisitions and purchases of intangible assets for total consideration of approximately $448 million. In aggregate, $12 million was cash acquired, $143 million was attributed to intangible assets, $288 million was attributed to goodwill, and $5 million was attributed to net assets acquired. These acquisitions generally enhance the breadth and depth of our offerings, as well as expanding our expertise in engineering and other functional areas. The amount of goodwill expected to be deductible for tax purposes is approximately $67 million.

Pro forma results of operations for these acquisitions have not been presented because they are not material to the consolidated results of operations, either individually or in aggregate.

For all intangible assets acquired and purchased during the year ended December 31, 2016, patents and developed technology have a weighted-average useful life of 4.5 years, customer relationships have a weighted-average useful life of 3.4 years, and trade names and other have a weighted-average useful life of 6.2 years.

2015 Acquisitions

bebop Technologies

In December 2015, we completed the acquisition of bebop Technologies Inc. (bebop), a company with a cloud-based development platform focused on enterprise applications. The fair value of total consideration transferred in connection with the close was $272 million, of which $1 million was paid in cash and $271 million was paid in the form of Alphabet Class C capital stock. We issued a total of approximately 514 thousand shares of Alphabet Class C capital stock in relation to this acquisition, part of which will be accounted for as compensation expense. The fair value of the shares of capital stock issued was determined based on the closing market price of Alphabet's Class C capital stock as of the close date. The Class C capital stock issued by Alphabet in connection with the acquisition was treated as a capital contribution from Alphabet to Google. We expect the acquisition will help us provide a new platform to build and maintain enterprise applications. As part of the acquisition, Diane Greene, the former CEO of bebop and a member of our Board of Directors, has joined Google.

Of the total purchase price of $272 million, $28 million was cash acquired, $59 million was attributed to intangible assets, $206 million was attributed to goodwill, and $21 million was attributed to net liabilities assumed. The goodwill, which was recorded in the Google segment, is primarily attributable to the synergies expected to arise after the acquisition. Goodwill is not expected to be deductible for tax purposes.

Other Acquisitions

During the year ended December 31, 2015, we completed other acquisitions and purchases of intangible assets for total consideration of approximately $263 million, which includes the fair value of our previously held equity interest of $0 million. In aggregate, $4 million was cash acquired, $88 million was attributed to intangible assets, $138 million was attributed to goodwill, and $33 million was attributed to net assets acquired. These acquisitions generally enhance the breadth and depth of our offerings, as well as expanding our expertise in engineering and other functional areas. The amount of goodwill expected to be deductible for tax purposes is approximately $20 million.

Pro forma results of operations for these acquisitions have not been presented because they are not material to the consolidated results of operations, either individually or in aggregate.

For all intangible assets acquired during the year ended December 31, 2015, patents and developed technology have a weighted-average useful life of 4.1 years, customer relationships have a weighted-average useful life of 4.0 years, and trade names and other have a weighted-average useful life of 6.8 years.

Note 7. Calico

On September 18, 2013, we announced the formation of Calico, a life science company with a mission to harness advanced technologies to increase our understanding of the biology that controls lifespan. As of December 31, 2016, we have contributed $240 million to Calico in exchange for Calico convertible preferred units and are committed to fund an additional $490 million on an as-needed basis.

Calico is a VIE and its results of operations and statement of financial position are included in our consolidated financial statements as we have the power to direct the activities that most significantly impact its economic performance.

In September 2014, AbbVie Inc. (AbbVie) and Calico announced a research and development collaboration agreement intended to help both companies discover, develop, and bring to market new therapies for patients with age-related diseases, including neurodegeneration and cancer. As of December 31, 2016, AbbVie has contributed $750 million to fund the collaboration pursuant to the agreement, which reflects its total commitment. As of December 31, 2016, Calico has contributed $250 million and committed up to an additional $500 million.

Calico has used its scientific expertise to establish a world-class research and development facility, with a focus on drug discovery and early drug development; and AbbVie provides scientific and clinical development support and its commercial expertise to bring new discoveries to market. Both companies share costs and profits equally. AbbVie's contribution has been recorded as a liability on Calico's financial statements, which is reduced and reflected as a reduction to research and development expense as eligible research and development costs are incurred by Calico over the next few years.

Note 8. Goodwill and Other Intangible Assets

Goodwill

The changes in the carrying amount of goodwill allocated to our disclosed segments for the years ended December 31, 2015 and 2016 were as follows (in millions):

	Google	Other Bets	Total Consolidated
Balance as of December 31, 2014	$ 15,599	$ 0	$ 15,599
Acquisitions	139	0	139
Foreign currency translation and other adjustments	(71)	0	(71)
Allocation in the fourth quarter of 2015	(416)	416	0
Acquisitions	201	4	205
Foreign currency translation and other adjustments	4	(7)	(3)
Balance as of December 31, 2015	$ 15,456	$ 413	$ 15,869
Acquisitions	625	39	664
Foreign currency translation and other adjustments	(54)	(11)	(65)
Balance as of December 31, 2016	$ 16,027	$ 441	$ 16,468

Other Intangible Assets

Information regarding our purchased intangible assets is as follows (in millions):

	As of December 31, 2015		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Patents and developed technology	$ 6,592	$ 3,213	$ 3,379
Customer relationships	1,343	1,201	142
Trade names and other	795	469	326
Total	$ 8,730	$ 4,883	$ 3,847

	As of December 31, 2016		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Value
Patents and developed technology	$ 5,542	$ 2,710	$ 2,832
Customer relationships	352	197	155
Trade names and other	463	143	320
Total	$ 6,357	$ 3,050	$ 3,307

Patents and developed technology, customer relationships, and trade names and other have weighted-average remaining useful lives of 4.6 years, 2.3 years, and 4.7 years, respectively. Amortization expense relating to our purchased intangible assets was $1,079 million, $892 million, and $833 million for the years ended December 31, 2014, 2015, and 2016, respectively. As of December 31, 2016, $2.6 billion of intangible assets that were fully amortized have been removed from gross intangible assets and accumulated amortization.

During the year ended December 31, 2014, we recorded an impairment charge in other cost of revenues of $378 million related to a patent licensing royalty asset acquired in connection with the Motorola acquisition, which we retained subsequent to the sale of Motorola Mobile. The asset was determined to be impaired due to prolonged decreased royalty payments and unpaid interest owed and was written down to its fair value. Fair value was determined based on a discounted cash flow method and reflects estimated future cash flows associated with the patent licensing royalty asset at the measurement date and falls within level 3 in fair value hierarchy. Impairments of intangible assets were not material for the years ended December 31, 2015 and 2016.

As of December 31, 2016, expected amortization expense relating to purchased intangible assets for each of the next five years and thereafter was as follows (in millions):

2017	$ 764
2018	685
2019	579
2020	487
2021	460
Thereafter	332
	$ 3,307

Note 9. Discontinued Operations

Motorola Mobile

On October 29, 2014, we closed the sale of the Motorola Mobile business to Lenovo for a total purchase price of approximately $2.9 billion, including $1.4 billion paid at close, comprised of $660 million in cash and $750 million in Lenovo ordinary shares (519.1 million shares). The remaining $1.5 billion was paid in the form of an interest-free, three-year prepayable promissory note.

We maintain ownership of the vast majority of the Motorola Mobile patent portfolio, including pre-closing patent applications and invention disclosures, which we licensed to Motorola Mobile for its continued operations. Additionally,

in connection with the sale, we agreed to indemnify Lenovo for certain potential liabilities of the Motorola Mobile business, for which we recorded an indemnification liability of $130 million.

The sale resulted in a gain of $740 million, net of tax, which was presented as part of net income from discontinued operations in the Consolidated Statements of Income for the year ended December 31, 2014. Incremental to this net gain, we recognized additional income of $254 million, net of tax, in connection with certain IP licensing arrangements between the parties, included as part of net income from discontinued operations on the Consolidated Statements of Income for the year ended December 31, 2014.

The financial results of Motorola Mobile through the date of divestiture are presented as net income (loss) from discontinued operations on the Consolidated Statements of Income. The following table presents financial results of the Motorola Mobile business included in net income (loss) from discontinued operations for the year ended December 31, 2014 (in millions):

	Year Ended December 31, 2014 [1]
Revenues	$ 5,486
Loss from discontinued operations before income taxes	(177)
Benefits from/(Provision for) income taxes	(47)
Gain on disposal	740
Net (loss) income from discontinued operations	$ 516

[1] The operating results of Motorola Mobile were included in our Consolidated Statements of Income from January 1, 2014 through October 29, 2014, the date of divestiture.

The following table presents the aggregate carrying amounts of the major classes of assets and liabilities divested (in millions):

Assets:	
Cash and cash equivalents	$ 160
Accounts receivable	1,103
Inventories	217
Prepaid expenses and other current assets	357
Prepaid expenses and other assets, non-current	290
Property and equipment, net	542
Intangible assets, net	985
Goodwill	43
Total assets	$ 3,697
Liabilities:	
Accounts payable	$ 1,238
Accrued compensation and benefits	163
Accrued expenses and other current liabilities	10
Deferred revenue, current	165
Other long-term liabilities	250
Total liabilities	$ 1,826

Note 10. Commitments and Contingencies

Operating Leases

We have entered into various non-cancelable operating lease agreements for certain of our offices, facilities, land, and data centers throughout the world with original lease periods expiring primarily between 2017 and 2063. We are committed to pay a portion of the actual operating expenses under certain of these lease agreements. These

operating expenses are not included in the table below. Certain of these arrangements have free or escalating rent payment provisions. We recognize rent expense under such arrangements on a straight-line basis.

As of December 31, 2016, future minimum payments under non-cancelable operating leases, net of sublease income amounts, were as follows over each of the next five years and thereafter (in millions):

	Operating Leases	Sub-lease Income	Net Operating Leases
2017	843	15	828
2018	902	6	896
2019	910	5	905
2020	854	4	850
2021	767	2	765
Thereafter	3,694	1	3,693
Total minimum payments	$ 7,970	$ 33	$ 7,937

Certain leases have adjustments for market provisions. Amounts in the above table represent our best estimates of future payments to be made under these leases.

We have entered into certain non-cancelable lease agreements with original lease periods expiring between 2021 and 2035 where we are the deemed owner for accounting purposes of new construction projects. Excluded from the table above are future minimum lease payments under such leases totaling approximately $1.4 billion, for which a $940 million liability is included on the Consolidated Balance Sheet as of December 31, 2016.

Rent expense under operating leases was $570 million, $734 million, and $897 million in 2014, 2015, and 2016, respectively.

Purchase Obligations

As of December 31, 2016, we had $2.5 billion of other non-cancelable contractual obligations, primarily related to data center operations and facility build-outs, video and other content licensing revenue sharing arrangements, as well as certain inventory purchase commitments.

Letters of Credit

As of December 31, 2016, we had unused letters of credit for $797 million.

Indemnifications

In the normal course of business, to facilitate transactions in our services and products, we indemnify certain parties, including advertisers, Google Network Members, and lessors with respect to certain matters. We have agreed to hold certain parties harmless against losses arising from a breach of representations or covenants, or out of intellectual property infringement or other claims made against certain parties. Several of these agreements limit the time within which an indemnification claim can be made and the amount of the claim. In addition, we have entered into indemnification agreements with our officers and directors, and our bylaws contain similar indemnification obligations to our agents.

It is not possible to make a reasonable estimate of the maximum potential amount under these indemnification agreements due to the unique facts and circumstances involved in each particular agreement. Additionally, we have a limited history of prior indemnification claims and the payments we have made under such agreements have not had a material adverse effect on our results of operations, cash flows, or financial position. However, to the extent that valid indemnification claims arise in the future, future payments by us could be significant and could have a material adverse effect on our results of operations or cash flows in a particular period.

As of December 31, 2016, we did not have any material indemnification claims that were probable or reasonably possible. As part of the sale of Motorola Mobile, we issued indemnifications for certain potential liabilities. Please see Note 9 for additional information.

Legal Matters

Antitrust Investigations

On November 30, 2010, the European Commission's (EC) Directorate General for Competition opened an investigation into various antitrust-related complaints against us. On April 15, 2015, the EC issued a Statement of

Objections (SO) regarding the display and ranking of shopping search results, to which we responded on August 27, 2015. On April 20, 2016, the EC issued an SO regarding certain Android distribution practices. On July 14, 2016, the EC issued a Supplementary SO regarding shopping search results and an SO regarding the syndication of AdSense for Search. We have responded to the SOs and Supplementary SO and continue to respond to the EC's informational requests. We remain committed to working with the EC to resolve these matters.

The Comision Nacional de Defensa de la Competencia in Argentina, the Competition Commission of India (CCI), Brazil's Council for Economic Defense (CADE), the Federal Antimonopoly Service (FAS) of the Russian Federation, and the Korean Fair Trade Commission have also opened investigations into certain of our business practices. In November 2016, we responded to the CCI Director General's report with interim findings of competition law infringements regarding search and ads. In September 2015, FAS found that there has been a competition law infringement in Android mobile distribution. The appeal against that decision has so far been rejected, so Google has implemented the ruling to the degree possible and is working on product changes to finalize implementation. The appeals process continues. In April 2016, the Canadian Competition Bureau informed us that it was closing its antitrust investigations of our business practices.

Patent and Intellectual Property Claims

We have had patent, copyright, and trademark infringement lawsuits filed against us claiming that certain of our products, services, and technologies infringe the intellectual property rights of others. Adverse results in these lawsuits may include awards of substantial monetary damages, costly royalty or licensing agreements, or orders preventing us from offering certain features, functionalities, products, or services, and may also cause us to change our business practices, and require development of non-infringing products or technologies, which could result in a loss of revenues for us and otherwise harm our business. In addition, the U.S. International Trade Commission (ITC) has increasingly become an important forum to litigate intellectual property disputes because an ultimate loss for a company or its suppliers in an ITC action could result in a prohibition on importing infringing products into the U.S. Because the U.S. is an important market, a prohibition on importation could have an adverse effect on us, including preventing us from importing many important products into the U.S. or necessitating workarounds that may limit certain features of our products.

Furthermore, many of our agreements with our customers and partners require us to indemnify them for certain intellectual property infringement claims against them, which would increase our costs as a result of defending such claims, and may require that we pay significant damages if there were an adverse ruling in any such claims. Our customers and partners may discontinue the use of our products, services, and technologies, as a result of injunctions or otherwise, which could result in loss of revenues and adversely impact our business.

Oracle America, Inc. (Oracle) brought a copyright lawsuit against Google in the Northern District of California, alleging that Google's Android infringes Oracle's copyrights related to certain Java application programming interfaces. After trial, final judgment was entered by the district court in favor of Google on June 8, 2016, and the court decided post-trial motions in favor of Google. Oracle has filed a notice of appeal. We believe this lawsuit is without merit and are defending ourselves vigorously. Given the nature of this case, we are unable to estimate the reasonably possible loss or range of loss, if any, arising from this matter.

Other

We are also regularly subject to claims, suits, regulatory and government investigations, and other proceedings involving competition (such as the pending EC investigations described above), intellectual property, privacy, tax, labor and employment, commercial disputes, content generated by our users, goods and services offered by advertisers or publishers using our platforms, personal injury, consumer protection, and other matters. Such claims, suits, regulatory and government investigations, and other proceedings could result in fines, civil or criminal penalties, or other adverse consequences.

Certain of our outstanding legal matters include speculative claims for substantial or indeterminate amounts of damages. We record a liability when we believe that it is probable that a loss has been incurred and the amount can be reasonably estimated. If we determine that a loss is reasonably possible and the loss or range of loss can be estimated, we disclose the possible loss. We evaluate, on a monthly basis, developments in our legal matters that could affect the amount of liability that has been previously accrued, and the matters and related reasonably possible losses disclosed, and make adjustments as appropriate. Significant judgment is required to determine both likelihood of there being and the estimated amount of a loss related to such matters.

With respect to our outstanding legal matters, based on our current knowledge, we believe that the amount or range of reasonably possible loss will not, either individually or in the aggregate, have a material adverse effect on

our business, consolidated financial position, results of operations, or cash flows. However, the outcome of such legal matters is inherently unpredictable and subject to significant uncertainties.

We expense legal fees in the period in which they are incurred.

Indirect Taxes

We are under audit by various domestic and foreign tax authorities with regards to indirect tax matters. The subject matter of indirect tax audits primarily arises from disputes on the tax treatment and tax rate applied to the sale of our products and services in these jurisdictions. We accrue indirect taxes that may result from examinations by, or any negotiated agreements with, these tax authorities when a loss is probable and reasonably estimable. For certain matters, while the loss is reasonably possible, the loss or range of loss cannot be estimated. We believe these matters are without merit and are defending ourselves vigorously. Due to the inherent complexity and uncertainty of these matters and judicial process in certain jurisdictions, the final outcome may be materially different from our expectations.

For information regarding income tax contingencies, see Note 14.

Note 11. Net Income Per Share

We compute net income per share of Class A and Class B common stock and Class C capital stock using the two-class method. Basic net income per share is computed using the weighted-average number of common shares outstanding during the period. Diluted net income per share is computed using the weighted-average number of common shares and the effect of potentially dilutive securities outstanding during the period. Potentially dilutive securities consist of stock options, restricted stock units, and other contingently issuable shares. The dilutive effect of outstanding stock options, restricted stock units, and other contingently issuable shares is reflected in diluted earnings per share by application of the treasury stock method. The computation of the diluted net income per share of Class A common stock assumes the conversion of Class B common stock, while the diluted net income per share of Class B common stock does not assume the conversion of those shares.

The rights, including the liquidation and dividend rights, of the holders of our Class A and Class B common stock and Class C capital stock are identical, except with respect to voting. Further, there are a number of safeguards built into our certificate of incorporation, as well as Delaware law, which preclude our board of directors from declaring or paying unequal per share dividends on our Class A and Class B common stock and Class C capital stock. Specifically, Delaware law provides that amendments to our certificate of incorporation which would have the effect of adversely altering the rights, powers, or preferences of a given class of stock must be approved by the class of stock adversely affected by the proposed amendment. In addition, our certificate of incorporation provides that before any such amendment may be put to a stockholder vote, it must be approved by the unanimous consent of our board of directors. As a result, the undistributed earnings for each year are allocated based on the contractual participation rights of the Class A and Class B common shares and Class C capital stock as if the earnings for the year had been distributed. As the liquidation and dividend rights are identical, the undistributed earnings are allocated on a proportionate basis. The net income per share amounts are the same for Class A and Class B common stock and Class C capital stock because the holders of each class are legally entitled to equal per share distributions whether through dividends or in liquidation. Further, as we assume the conversion of Class B common stock in the computation of the diluted net income per share of Class A common stock, the undistributed earnings are equal to net income for that computation.

In the years ended December 31, 2014 and 2016, the net income per share amounts are the same for Class A and Class B common stock and Class C capital stock because the holders of each class are entitled to equal per share dividends or distributions in liquidation in accordance with the Amended and Restated Certificate of Incorporation of Alphabet Inc.

In the year ended December 31, 2015, the Class C Adjustment Payment was allocated to the numerator for calculating net income per share of Class C capital stock from net income available to all stockholders and the remaining undistributed earnings were allocated on a pro rata basis to Class A and Class B common stock and Class C capital stock based on the number of shares used in the per share computation for each class of stock. The weighted-average share impact of the Class C Adjustment Payment is included in the denominator of both basic and diluted net income per share computations for the year ended December 31, 2015.

The following table sets forth the computation of basic and diluted net income per share of Class A and Class B common stock and Class C capital stock (in millions, except share amounts which are reflected in thousands and per share amounts):

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Alphabet Inc.

	Year Ended December 31, 2014		
	Class A	Class B	Class C
Basic net income per share:			
Numerator			
Allocation of undistributed earnings - continuing operations	$ 5,700	$ 1,107	$ 6,813
Allocation of undistributed earnings - discontinued operations	216	42	258
Total	$ 5,916	$ 1,149	$ 7,071
Denominator			
Number of shares used in per share computation	282,877	54,928	338,130
Basic net income per share:			
Continuing operations	$ 20.15	$ 20.15	$ 20.15
Discontinued operations	0.76	0.76	0.76
Basic net income per share	$ 20.91	$ 20.91	$ 20.91
Diluted net income per share:			
Numerator			
Allocation of undistributed earnings for basic computation - continuing operations	$ 5,700	$ 1,107	$ 6,813
Reallocation of undistributed earnings as a result of conversion of Class B to Class A shares	1,107	0	0
Reallocation of undistributed earnings	(20)	(18)	20
Allocation of undistributed earnings - continuing operations	$ 6,787	$ 1,089	$ 6,833
Allocation of undistributed earnings for basic computation - discontinued operations	216	42	258
Reallocation of undistributed earnings as a result of conversion of Class B to Class A shares	42	0	0
Reallocation of undistributed earnings	(1)	(1)	1
Allocation of undistributed earnings - discontinued operations	$ 257	$ 41	$ 259
Denominator			
Number of shares used in basic computation	282,877	54,928	338,130
Weighted-average effect of dilutive securities			
Add:			
Conversion of Class B to Class A common shares outstanding	54,928	0	0
Restricted stock units and other contingently issuable shares	4,572	0	6,563
Number of shares used in per share computation	342,377	54,928	344,693
Diluted net income per share:			
Continuing operations	$ 19.82	$ 19.82	$ 19.82
Discontinued operations	0.75	0.75	0.75
Diluted net income per share	$ 20.57	$ 20.57	$ 20.57

	Year Ended December 31, 2015		
	Class A	Class B	Class C
Basic net income per share:			
Numerator			
Adjustment Payment to Class C capital stockholders	$ 0	$ 0	$ 522
Allocation of undistributed earnings	$ 6,695	$ 1,196	$ 7,935
Total	$ 6,695	$ 1,196	$ 8,457
Denominator			
Number of shares used in per share computation	289,640	51,745	343,241
Basic net income per share	$ 23.11	$ 23.11	$ 24.63
Diluted net income per share:			
Numerator			
Adjustment Payment to Class C capital stockholders	$ 0	$ 0	$ 522
Allocation of undistributed earnings for basic computation	$ 6,695	$ 1,196	$ 7,935
Reallocation of undistributed earnings as a result of conversion of Class B to Class A shares	1,196	0	0
Reallocation of undistributed earnings	(39)	(14)	39
Allocation of undistributed earnings	$ 7,852	$ 1,182	$ 7,974
Denominator			
Number of shares used in basic computation	289,640	51,745	343,241
Weighted-average effect of dilutive securities			
Add:			
Conversion of Class B to Class A common shares outstanding	51,745	0	0
Restricted stock units and other contingently issuable shares	2,395	0	5,909
Number of shares used in per share computation	343,780	51,745	349,150
Diluted net income per share	$ 22.84	$ 22.84	$ 24.34

	Year Ended December 31, 2016		
	Class A	Class B	Class C
Basic net income per share:			
Numerator			
Allocation of undistributed earnings	8,332	1,384	9,762
Denominator			
Number of shares used in per share computation	294,217	48,859	344,702
Basic net income per share	$ 28.32	$ 28.32	$ 28.32
Diluted net income per share:			
Numerator			
Allocation of undistributed earnings for basic computation	$ 8,332	$ 1,384	$ 9,762
Effect of dilutive securities in equity method investments and subsidiaries	(9)	(2)	(10)
Allocation of undistributed earnings for diluted computation	8,323	1,382	9,752
Reallocation of undistributed earnings as a result of conversion of Class B to Class A shares	1,382	0	0
Reallocation of undistributed earnings	(94)	(21)	94
Allocation of undistributed earnings	9,611	1,361	9,846
Denominator			
Number of shares used in basic computation	294,217	48,859	344,702
Weighted-average effect of dilutive securities			
Add:			
Conversion of Class B to Class A common shares outstanding	48,859	0	0
Restricted stock units and other contingently issuable shares	2,055	0	8,873
Number of shares used in per share computation	345,131	48,859	353,575
Diluted net income per share	$ 27.85	$ 27.85	$ 27.85

Note 12. Stockholders' Equity

Convertible Preferred Stock

Our board of directors has authorized 100 million shares of convertible preferred stock, $0.001 par value, issuable in series. As of December 31, 2015 and 2016, there were no shares issued or outstanding.

Class A and Class B Common Stock and Class C Capital Stock

Our board of directors has authorized three classes of stock, Class A and Class B common stock, and Class C capital stock. The rights of the holders of each class of our common and capital stock are identical, except with respect to voting. Each share of Class A common stock is entitled to one vote per share. Each share of Class B common stock is entitled to 10 votes per share. Class C capital stock has no voting rights, except as required by applicable law. Shares of Class B common stock may be converted at any time at the option of the stockholder and automatically convert upon sale or transfer to Class A common stock.

Stock Plans

Under our 2012 Stock Plan, RSUs or stock options may be granted. An RSU award is an agreement to issue shares of our publicly traded stock at the time the award vests. Incentive and non-qualified stock options, or rights to purchase common stock, are generally granted for a term of 10 years. Options and RSUs granted to participants under the 2012 Stock Plan generally vest over four years contingent upon employment or service with us on the vesting date.

As of December 31, 2016, there were 26,206,647 shares of stock reserved for future issuance under our Stock Plan.

Stock-Based Compensation

The following table presents our aggregate stock-based compensation expense by type of costs and expenses per the Consolidated Statements of Income (in millions):

	Year Ended December 31,		
	2014	2015	2016
Cost of revenues	$ 535	$ 806	$ 1,157
Research and development	2,200	2,687	3,354
Sales and marketing	715	899	1,078
General and administrative	725	861	1,282
Discontinued operations	104	0	0
Total stock-based compensation expense	$ 4,279	$ 5,253	$ 6,871

For the years ended December 31, 2014, 2015, and 2016, we recognized tax benefits on total stock-based compensation expense from continuing operations of $867 million, $1,133 million, and $1,465 million, respectively, and from discontinued operations of $30 million, $0 million and $0 million, respectively. In addition, as a result of the Tax Court ruling in Altera Corp. v. Commissioner, we have recorded a tax benefit of $522 million and $690 million related to 2015 and 2016 stock-based compensation expense, respectively, that will be subject to reimbursement of cost share payments if the tax court's opinion is sustained. Refer to Note 14 for more detail regarding the Altera case.

Total direct tax benefit realized, including excess tax benefits, from stock-based awards vested or exercised during the years ended December 31, 2014, 2015, and 2016, was $1,356 million, $1,544 million, and $2,137 million, respectively. These amounts do not include the indirect effects of stock-based awards, which primarily relate to the research and development tax credit.

Of the total stock-based compensation expense from continuing operations recognized in the years ended December 31, 2014, 2015, and 2016, $0 million, $50 million, and $168 million, respectively, was associated with awards expected to be ultimately settled in cash. Awards which we expect to be ultimately settled in cash are classified as liabilities in our Consolidated Balance Sheets.

Beginning January 1, 2016, we account for forfeitures as they occur, rather than estimate expected forfeitures. The net cumulative effect of this change was recognized as a $133 million reduction to retained earnings as of January 1, 2016.

Stock-Based Award Activities

The following table summarizes the activities for our unvested restricted stock units (RSUs) for the year ended December 31, 2016:

	Unvested Restricted Stock Units	
	Number of Shares	Weighted-Average Grant-Date Fair Value
Unvested as of December 31, 2015	25,741,186	$ 531.74
Granted	13,502,900	$ 713.89
Vested	(12,002,071)	$ 532.87
Forfeited/canceled	(1,893,060)	$ 562.03
Unvested as of December 31, 2016	25,348,955	$ 624.92

The weighted-average grant-date fair value of RSUs granted during the years ended December 31, 2014 and 2015, was $573.71 and $546.46, respectively. Total fair value as of the respective vesting dates of RSUs vested during the years ended December 31, 2014, 2015 and 2016 was $6.0 billion, $6.9 billion, and $9.0 billion, respectively.

As of December 31, 2016, there was $14.6 billion of unrecognized compensation cost related to unvested employee RSUs. This amount is expected to be recognized over a weighted-average period of 2.7 years.

As of December 31, 2016, we had 3.3 million stock options outstanding and exercisable, and $2 million of unrecognized compensation cost related to unvested stock options. During the years ended December 31, 2014, 2015,

and 2016, the amount of cash received from the exercise of stock options was $465 million, $393 million, and $298 million, respectively.

Share Repurchases

In October 2015, the board of directors of Alphabet authorized the company to repurchase up to $5,099,019,513.59 of its Class C capital stock, commencing in the fourth quarter of 2015. In January 2016, the board of directors of Alphabet authorized the company to repurchase an additional amount of approximately 514 thousand shares. The repurchases were executed, subject to general business and market conditions and other investment opportunities, through open market purchases or privately negotiated transactions, including through the use of 10b5-1 plans. During 2016, we repurchased and subsequently retired approximately 5.2 million shares of Alphabet Class C capital stock for an aggregate amount of approximately $3.7 billion. We completed all authorized share repurchases under this repurchase program as of June 30, 2016.

In October 2016, the board of directors of Alphabet authorized the company to repurchase up to $7,019,340,976.83 of its Class C capital stock. The repurchases are expected to be executed from time to time, subject to general business and market conditions and other investment opportunities, through open market purchases or privately negotiated transactions, including through Rule 10b5-1 plans. No shares were repurchased in 2016 under this program.

Note 13. 401(k) Plans

We have two 401(k) Savings Plans (401(k) Plans) that qualify as deferred salary arrangements under Section 401 (k) of the Internal Revenue Code. Under these 401(k) Plans, matching contributions are based upon the amount of the employees' contributions subject to certain limitations. We contributed approximately $259 million, $309 million, and $385 million for the years ended December 31, 2014, 2015, and 2016.

Note 14. Income Taxes

Income from continuing operations before income taxes included income from domestic operations of $8,894 million, $8,271 million, and $12,020 million for the years ended December 31, 2014, 2015, and 2016, and income from foreign operations of $8,365 million, $11,380 million, and $12,130 million for the years ended December 31, 2014, 2015, and 2016.

The provision for income taxes consists of the following (in millions):

	Year Ended December 31,		
	2014	2015	2016
Current:			
Federal	$ 2,716	$ 3,235	$ 3,520
State	157	(397)	306
Foreign	774	723	966
Total	3,647	3,561	4,792
Deferred:			
Federal	29	(198)	(70)
State	6	(43)	0
Foreign	(43)	(17)	(50)
Total	(8)	(258)	(120)
Provision for income taxes	$ 3,639	$ 3,303	$ 4,672

The reconciliation of federal statutory income tax rate to our effective income tax rate is as follows:

	Year Ended December 31,		
	2014	2015	2016
U.S. federal statutory tax rate	35.0 %	35.0 %	35.0 %
Foreign rate differential	(12.2)%	(13.4)%	(11.0)%
Federal research credit	(1.8)%	(2.1)%	(2.0)%
Stock-based compensation expense	0.1 %	0.3 %	(3.4)%
Other adjustments	0.0 %	(3.0)%	0.7 %
Effective tax rate	21.1 %	16.8 %	19.3 %

We adopted ASU 2016-09 on January 1, 2016, which requires the excess tax benefits or deficiencies to be reflected in the Consolidated Statements of Income as a component of the provision for income taxes whereas they previously were recognized in equity. Total excess tax benefits recognized in 2016 was $1.0 billion.

Our effective tax rate is impacted by earnings realized in foreign jurisdictions with statutory tax rates lower than the federal statutory tax rate. Substantially all of the income from foreign operations was earned by an Irish subsidiary.

As of December 31, 2016, we have not recognized deferred U.S. income taxes and foreign withholding taxes on a cumulative total of $60.7 billion of undistributed earnings and other basis differences in our foreign subsidiaries. We intend to indefinitely reinvest those earnings and other basis differences in operations outside the U.S. If such earnings and other basis differences in our investment foreign subsidiaries were to be repatriated in the future, they would be subject to U.S. income taxes and applicable non-U.S. income and withholding taxes. Determining the unrecognized deferred tax liability related to such investments in foreign subsidiaries that are indefinitely reinvested is not practicable.

On July 27, 2015, the United States Tax Court, in an opinion in Altera Corp. v. Commissioner, invalidated the portion of the Treasury regulations issued under IRC Section 482 requiring related-party participants in a cost sharing arrangement to share stock-based compensation costs. The U.S. Tax Court issued the final decision on December 28, 2015. The IRS served a Notice of Appeal on February 22, 2016. At this time, the U.S. Treasury has not withdrawn the requirement to include stock-based compensation from its regulations. We have evaluated the opinion and continue to record a tax benefit in 2016 related to reimbursement of cost share payments for the previously shared stock-based compensation costs. In addition, we continue to record a tax liability for the U.S. tax cost of potential repatriation of the associated contingent foreign earnings because at this time we cannot reasonably conclude that the Company has the ability and the intent to indefinitely reinvest these contingent earnings. The net impact to our consolidated financial statements is not material. We will continue to monitor developments related to the case and the potential impact on our consolidated financial statements.

Deferred Income Taxes

Deferred income taxes reflect the net effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of our deferred tax assets and liabilities are as follows (in millions):

	As of December 31,	
	2015	2016
Deferred tax assets:		
Stock-based compensation expense	$ 534	$ 574
Accrued employee benefits	832	939
Accruals and reserves not currently deductible	245	500
Tax credits	503	631
Basis difference in investment of Arris	1,357	1,327
Prepaid cost sharing	3,468	4,409
Other	931	926
Total deferred tax assets	7,870	9,306
Valuation allowance	(1,732)	(2,076)
Total deferred tax assets net of valuation allowance	6,138	7,230
Deferred tax liabilities:		
Depreciation and amortization	(1,126)	(877)
Identified intangibles	(787)	(844)
Renewable energy investments	(529)	(788)
Foreign earnings	(3,468)	(4,409)
Other	(166)	(155)
Total deferred tax liabilities	(6,076)	(7,073)
Net deferred tax assets	$ 62	$ 157

As of December 31, 2016, our federal and state net operating loss carryforwards for income tax purposes were approximately $592 million and $681 million. If not utilized, the federal net operating loss carryforwards will begin to expire in 2021 and the state net operating loss carryforwards will begin to expire in 2017. It is more likely than not that our state net operating loss carryforwards will not be realized; therefore, we have recorded a valuation allowance against them. The net operating loss carryforwards are subject to various annual limitations under the tax laws of the different jurisdictions. Our foreign net operating loss carryforwards for income tax purposes were $304 million that will begin to expire in 2022.

As of December 31, 2016, our California research and development credit carryforwards for income tax purposes were approximately $1,515 million that can be carried over indefinitely. We believe the state tax credit is not likely to be realized. Our foreign tax credit carryforwards for income tax purposes were approximately $166 million that will start to expire in 2025. We believe it is more likely than not that all of the foreign tax credit will be realized.

As of December 31, 2016, we maintained a valuation allowance with respect to certain of our deferred tax assets relating primarily to investment losses that are capital in nature, California deferred tax assets, and certain foreign net operating losses that we believe are not likely to be realized. We established a deferred tax asset for the book-to-tax basis difference in our investments in Arris shares received from the sale of the Motorola Home business to Arris in 2013. Since any future losses to be recognized upon the sale of Arris shares will be capital losses, a valuation allowance has been recorded against this deferred tax asset to the extent such deferred tax asset is not likely to be covered by capital gains generated as of 2016. We reassess the valuation allowance quarterly and if future evidence allows for a partial or full release of the valuation allowance, a tax benefit will be recorded accordingly.

As a result of the Altera opinion, we have recognized a deferred tax asset of $4.4 billion and a deferred tax liability of $4.4 billion. Refer to above for more details on the Altera case.

Uncertain Tax Positions

The following table summarizes the activity related to our gross unrecognized tax benefits from January 1, 2014 to December 31, 2016 (in millions):

	2014	2015	2016
Beginning gross unrecognized tax benefits	$ 2,502	$ 3,294	$ 4,167
Increases related to prior year tax positions	66	224	899
Decreases related to prior year tax positions	(44)	(176)	(157)
Decreases related to settlement with tax authorities	(1)	(27)	(196)
Increases related to current year tax positions	771	852	680
Ending gross unrecognized tax benefits	$ 3,294	$ 4,167	$ 5,393

The total amount of gross unrecognized tax benefits was $3,294 million, $4,167 million, and $5,393 million as of December 31, 2014, 2015, and 2016, respectively, of which, $2,909 million, $3,614 million, and $4,258 million if recognized, would affect our effective tax rate.

As of December 31, 2015 and 2016, we had accrued $348 million and $493 million in interest and penalties in provision for income taxes.

We file income tax returns in the U.S. federal jurisdiction and in many state and foreign jurisdictions, our two major tax jurisdictions are the U.S. federal and Ireland. We are subject to the continuous examination of our income tax returns by the IRS and other tax authorities. The IRS completed its examination through our 2006 tax years; all issues have been concluded except for one which is currently under review in Tax Court. The IRS is currently examining our 2007 through 2012 tax returns. We have also received tax assessments in multiple foreign jurisdictions asserting transfer pricing adjustments or permanent establishment. We continue to defend any and all such claims as presented.

Our 2013, 2014, 2015, and 2016 tax years remain subject to examination by the IRS for U.S. federal tax purposes, and our 2011 through 2015 tax years remain subject to examination by the appropriate governmental agencies for Irish tax purposes. There are other ongoing audits in various other jurisdictions that are not material to our financial statements.

We regularly assess the likelihood of adverse outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. We continue to monitor the progress of ongoing discussions with tax authorities and the impact, if any, of the expected expiration of the statute of limitations in various taxing jurisdictions.

We believe that an adequate provision has been made for any adjustments that may result from tax examinations. However, the outcome of tax audits cannot be predicted with certainty. If any issues addressed in our tax audits are resolved in a manner not consistent with management's expectations, we could be required to adjust our provision for income taxes in the period such resolution occurs. Although the timing of resolution, settlement, closure of audits is not certain, it is reasonably possible that certain U.S. federal and non-U.S. tax audits may be concluded within the next 12 months, which could significantly increase or decrease the balance of our gross unrecognized tax benefits.

We estimate that our unrecognized tax benefits as of December 31, 2016 could possibly decrease by approximately $200 million to $700 million in the next 12 months. Positions that may be resolved include various U.S. and non-U.S. matters.

Note 15. Information about Segments and Geographic Areas

We operate our business in multiple operating segments. Google is our only reportable segment. None of our other segments meet the quantitative thresholds to qualify as reportable segments; therefore, the other operating segments are combined and disclosed below as Other Bets.

Our reported segments are described below:

- Google – Google includes our main internet products such as Search, Ads, Commerce, Maps, YouTube, Google Cloud, Android, Chrome, and Google Play as well as our hardware initiatives. Our technical infrastructure and some newer efforts like virtual reality are also included in Google. Google generates revenues primarily from advertising, sales of digital content, apps and cloud offerings, and sales of hardware products.
- Other Bets – Other Bets is a combination of multiple operating segments that are not individually material. Other Bets includes businesses such as Access, Calico, CapitalG, GV, Nest, Verily, Waymo, and X. Revenues from the Other Bets are derived primarily through the sales of internet and TV services through Google Fiber, sales of Nest products and services, and licensing and R&D services through Verily.

Revenue, cost of revenue, and operating expenses are generally directly attributed to our segments. Inter-segment revenues are not presented separately, as these amounts are immaterial. Our Chief Operating Decision Maker does not evaluate operating segments using asset information. Prior period segment information has been recast to conform to the current period segment presentation.

Information about segments during the periods presented were as follows (in millions):

	Year Ended December 31,		
	2014	2015	2016
Revenues:			
Google	$ 65,674	$ 74,544	$ 89,463
Other Bets	327	445	809
Total revenues	$ 66,001	$ 74,989	$ 90,272

	Year Ended December 31,		
	2014	2015	2016
Operating income (loss):			
Google	$ 18,965	$ 23,319	$ 27,892
Other Bets	(1,893)	(3,456)	(3,578)
Reconciling items[1]	(576)	(503)	(598)
Total income from operations	$ 16,496	$ 19,360	$ 23,716

(1) Reconciling items are primarily related to corporate administrative costs and other miscellaneous items that are not allocated to individual segments.

	Year Ended December 31,		
	2014	2015	2016
Capital expenditures:			
Google	$ 11,178	$ 8,868	$ 9,417
Other Bets	496	850	1,385
Reconciling items[2]	(660)	232	(590)
Total capital expenditures as presented on the Consolidated Statements of Cash Flows	$ 11,014	$ 9,950	$ 10,212

(2) Reconciling items are related to timing differences of payments as segment capital expenditures are on accrual basis while total capital expenditures shown on the Consolidated Statements of Cash Flow are on cash basis and other miscellaneous differences. For the year ended December 31, 2014, reconciling items included capital expenditures of Motorola Mobile.

Stock-based compensation (SBC) and depreciation, amortization, and impairment are included in segment operating income (loss) as below (in millions):

	Year Ended December 31,		
	2014	2015	2016
Stock-based compensation:			
Google	$ 3,686	$ 4,610	$ 5,926
Other Bets	338	475	647
Reconciling items[3]	151	118	130
Total stock-based compensation[4]	$ 4,175	$ 5,203	$ 6,703
Depreciation, amortization, and impairment:			
Google	$ 4,779	$ 4,839	$ 5,800
Other Bets	147	203	340
Reconciling items[5]	53	21	4
Total depreciation, amortization, and impairment as presented on the Consolidated Statements of Cash Flows	$ 4,979	$ 5,063	$ 6,144

(3) Reconciling items represent corporate administrative costs that are not allocated to individual segments.

(4) For purposes of segment reporting, we define SBC as awards accounted for under FASB ASC Topic 718 that we expect to settle in stock. SBC for segment reporting does not include expenses related to awards that we expect to ultimately settle in cash. For the year ended December 31, 2014, amounts exclude SBC from discontinued operations.

(5) Reconciling items are primarily related to corporate administrative costs and other miscellaneous items that are not allocated to individual segments. For the year ended December 31, 2014, reconciling items primarily represent depreciation, amortization and impairment related to Motorola Mobile.

Revenues by geography are based on the billing addresses of our customers. The following tables set forth revenues and long-lived assets by geographic area (in millions):

	Year Ended December 31,		
	2014	2015	2016
Revenues:			
United States	$ 29,482	$ 34,810	$ 42,781
United Kingdom	6,483	7,067	7,787
Rest of the world	30,036	33,112	39,704
Total revenues	$ 66,001	$ 74,989	$ 90,272

	As of December 31, 2015	As of December 31, 2016
Long-lived assets:		
United States	$ 43,686	$ 47,383
International	13,661	14,706
Total long-lived assets	$ 57,347	$ 62,089

Note 16. Subsequent Event

In January 2017, Temasek, a Singapore-based investment company, signed a binding commitment to purchase a non-controlling interest in Verily for an aggregate of $800 million in cash. We closed the first tranche of the investment in February 2017 and anticipate closing the second and final tranche upon completion of certain terms in the second half of 2017. The transaction will be accounted for as an equity transaction with no gain or loss recognized.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our chief executive officer and chief financial officer, evaluated the effectiveness of our disclosure controls and procedures pursuant to Rule 13a-15 under the Exchange Act, as of the end of the period covered by this Annual Report on Form 10-K.

Based on this evaluation, our chief executive officer and chief financial officer concluded that, as of December 31, 2016, our disclosure controls and procedures are designed at a reasonable assurance level and are effective to provide reasonable assurance that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our chief executive officer and chief financial officer, as appropriate, to allow timely decisions regarding required disclosure.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2016 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rule 13a-15(f) of the Exchange Act. Our management conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on this evaluation, management concluded that our internal control over financial reporting was effective as of December 31, 2016. Management reviewed the results of its assessment with our Audit Committee. The effectiveness of our internal control over financial reporting as of December 31, 2016 has been audited by Ernst & Young LLP, an independent registered public accounting firm, as stated in its report which is included in Item 8 of this Annual Report on Form 10-K.

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply its judgment in evaluating the benefits of possible controls and procedures relative to their costs.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item will be included under the caption "Directors, Executive Officers, and Corporate Governance" in our Proxy Statement for 2017 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2016 (2017 Proxy Statement) and is incorporated herein by reference. The information required by this item regarding delinquent filers pursuant to Item 405 of Regulation S-K will be included under the caption "Section 16(a) Beneficial Ownership Reporting Compliance" in the 2017 Proxy Statement and is incorporated herein by reference.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item will be included under the captions "Director Compensation," "Executive Compensation" and "Directors, Executive Officers, and Corporate Governance—Corporate Governance and Board Matters—Compensation Committee Interlocks and Insider Participation" in the 2017 Proxy Statement and is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item will be included under the captions "Common Stock Ownership of Certain Beneficial Owners and Management" and "Equity Compensation Plan Information" in 2017 Proxy Statement and is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item will be included under the captions "Certain Relationships and Related Transactions" and "Directors, Executive Officers, and Corporate Governance—Corporate Governance and Board Matters—Director Independence" in the 2017 Proxy Statement and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item will be included under the caption "Independent Registered Public Accounting Firm" in the 2017 Proxy Statement and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) We have filed the following documents as part of this Annual Report on Form 10-K:

1. Consolidated Financial Statements

Reports of Ernst & Young LLP, Independent Registered Public Accounting Firm	40
Financial Statements:	
Consolidated Balance Sheets	42
Consolidated Statements of Income	43
Consolidated Statements of Comprehensive Income	44
Consolidated Statements of Stockholders' Equity	45
Consolidated Statements of Cash Flows	46
Notes to Consolidated Financial Statements	47

2. Financial Statement Schedules

Schedule II: Valuation and Qualifying Accounts

The table below details the activity of the allowance for doubtful accounts and sales credits for the three years ended December 31, 2016 (in millions):

	Balance at Beginning of Year	Additions	Usage	Balance at End of Year
		(In millions)		
Year ended December 31, 2014	$ 631	$ 1,240	$ (1,646)	$ 225
Year ended December 31, 2015	$ 225	$ 579	$ (508)	$ 296
Year ended December 31, 2016	$ 296	$ 942	$ (771)	$ 467

Note: Additions to the allowance for doubtful accounts are charged to expense. Additions to the allowance for sales credits are charged against revenues. For the year ended December 31, 2014, additions included the impact from the Motorola acquisition and usage included the impact from the sale of Motorola Mobile business.

All other schedules have been omitted because they are not required, not applicable, or the required information is otherwise included.

3. Exhibits

See the Exhibit Index immediately following the signature page of this Annual Report on Form 10-K.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

Date: February 2, 2017

ALPHABET INC.

By: /S/ LARRY PAGE

Larry Page

Chief Executive Officer
(Principal Executive Officer of the Registrant)

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Larry Page and Ruth M. Porat, jointly and severally, his or her attorney-in-fact, with the power of substitution, for him or her in any and all capacities, to sign any amendments to this Annual Report on Form 10-K and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his or her substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ LARRY PAGE Larry Page	Chief Executive Officer, Co-Founder and Director (Principal Executive Officer)	February 2, 2017
/s/ RUTH M. PORAT Ruth M. Porat	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	February 2, 2017
/s/ JAMES G. CAMPBELL James G. Campbell	Vice President, Corporate Controller, and Chief Accounting Officer (Principal Accounting Officer)	February 2, 2017
/s/ ERIC E. SCHMIDT Eric E. Schmidt	Executive Chairman of the Board of Directors	February 2, 2017
/s/ SERGEY BRIN Sergey Brin	President, Co-Founder, and Director	February 2, 2017
/s/ L. JOHN DOERR L. John Doerr	Director	February 2, 2017
/s/ ROGER W. FERGUSON, JR. Roger W. Ferguson, Jr.	Director	February 2, 2017
/s/ DIANE B. GREENE Diane B. Greene	Director	February 2, 2017
/s/ JOHN L. HENNESSY John L. Hennessy	Director	February 2, 2017
/s/ ANN MATHER Ann Mather	Director	February 2, 2017
/s/ ALAN R. MULALLY Alan R. Mulally	Director	February 2, 2017
/s/ PAUL S. OTELLINI Paul S. Otellini	Director	February 2, 2017
/s/ K. RAM SHRIRAM K. Ram Shriram	Director	February 2, 2017
/s/ SHIRLEY M. TILGHMAN Shirley M. Tilghman	Director	February 2, 2017

EXHIBIT INDEX

Exhibit Number		Description	Incorporated by reference herein	
			Form	Date
2.01		Agreement and Plan of Merger, dated October 2, 2015, by and among Google Inc., the Registrant and Maple Technologies Inc.	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
3.01		Amended and Restated Certificate of Incorporation of the Registrant, dated October 2, 2015	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
3.02		Amended and Restated Bylaws of the Registrant, dated October 2, 2015	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.01		Specimen Class A Common Stock certificate	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.02		Specimen Class C Capital Stock certificate	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.03		Alphabet Inc. Deferred Compensation Plan	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.04		Transfer Restriction Agreement, dated October 2, 2015, between the Registrant and Larry Page and certain of his affiliates	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.05		Transfer Restriction Agreement, dated October 2, 2015, between the Registrant and Sergey Brin and certain of his affiliates	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.06		Transfer Restriction Agreement, dated October 2, 2015, between the Registrant and Eric E. Schmidt and certain of its affiliates	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.07		Class C Undertaking, dated October 2, 2015, executed by the Registrant	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
4.08		Indenture, dated February 12, 2016, between the Registrant and The Bank of New York Mellon Trust Company, N.A., as Trustee	Registration Statement on Form S-3 (File No. 333-209510)	February 12, 2016
4.09		Registrant Registration Rights Agreement dated December 14, 2015	Registration Statement on Form S-3 (File No. 333-209518)	February 12, 2016
4.10		First Supplemental Indenture, dated April 27, 2016, between the Registrant and The Bank of New York Mellon Trust Company, N.A., as trustee	Current Report on Form 8-K (File No. 001-37580)	April 27, 2016
4.11		Form of the Registrant's 3.625% Notes due 2021 (included in Exhibit 4.10)		
4.12		Form of the Registrant's 3.375% Notes due 2024 (included in Exhibit 4.10)		
4.13		Form of the Registrant's 1.998% Note due 2026	Current Report on Form 8-K (File No. 001-37580)	August 9, 2016
10.01		Form of Indemnification Agreement entered into between the Registrant, its affiliates and its directors and officers	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
10.02	◆	Letter Agreement, dated June 22, 2016, between Roger W. Ferguson, Jr. and the Registrant	Current Report on Form 8-K (File No. 001-37580)	June 29, 2016
10.03	◆	Offer Letter, dated March 20, 2015, between Ruth Porat and Google Inc., as assumed by the Registrant on October 2, 2015	Current Report on Form 8-K (File No. 001-36380)	March 26, 2015

Exhibit Number		Description	Incorporated by reference herein	
			Form	Date
10.04	◆	Compensation Plan Agreement, dated October 2, 2015, between Google Inc. and the Registrant	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
10.05	◆	Director Arrangements Agreement, dated October 2, 2015, between Google Inc. and the Registrant	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
10.06	◆	Alphabet Inc. Deferred Compensation Plan	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
10.07	◆	Google Inc. 2004 Stock Plan, as amended	Current Report on Form 8-K (File No. 000-50726)	June 7, 2011
10.07.1	◆	Google Inc. 2004 Stock Plan - Form of Google Stock Option Agreement	Annual Report on Form 10-K (File No. 000-50726)	March 30, 2005
10.07.2	◆	Google Inc. 2004 Stock Plan - Form of Google Restricted Stock Unit Agreement	Annual Report on Form 10-K (File No. 000-50726)	March 30, 2005
10.07.3	◆	Google Inc. 2004 Stock Plan - Amendment to Stock Option Agreements	Registration Statement on Form S-3 (File No. 333-142243)	April 20, 2007
10.08	◆	Alphabet Inc. 2012 Stock Plan	Current Report on Form 8-K (File No. 001-37580)	June 10, 2016
10.08.1	◆	Amendment to the Alphabet Inc. 2012 Stock Plan	Quarterly Report on Form 10-Q (File No. 001-37580)	November 3, 2016
10.08.2	◆	Alphabet Inc. 2012 Stock Plan - Form of Alphabet Restricted Stock Unit Agreement	Quarterly Report on Form 10-Q (File No. 001-37580)	November 3, 2016
10.09	◆	Motorola Mobility Holdings, Inc. 2011 Incentive Compensation Plan	Registration Statement on Form S-8 (File No. 333-181661)	May 24, 2012
10.10	◆	AdMob, Inc. 2006 Stock Plan and UK Sub-Plan of the AdMob, Inc. 2006 Stock Plan	Registration Statement on Form S-8 filed (File No. 333-167411)	June 9, 2010
10.11	◆	Apigee Corporation 2015 Equity Incentive Plan	Registration Statement on Form S-8 (File No. 333-214573)	November 10, 2016
10.11.1	◆	Apigee Corporation 2015 Equity Incentive Plan - Form of Restricted Stock Unit Agreement	Registration Statement on Form S-8 (File No. 333-214573)	November 10, 2016
10.12	◆	Apigee Corporation 2005 Stock Incentive Plan	Registration Statement on Form S-8 (File No. 333-214573)	November 10, 2016
10.12.1	◆	Apigee Corporation 2005 Stock Incentive Plan - Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement	Registration Statement on Form S-8 (File No. 333-214573)	November 10, 2016
12	*	Computation of Earnings to Fixed Charge Ratios		
14.01		Code of Conduct of the Registrant effective as of October 2, 2015	Current Report on Form 8-K (File No. 001-37580)	October 2, 2015
21.01	*	Subsidiaries of the Registrant		
23.01	*	Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm		
24.01	*	Power of Attorney (incorporated by reference to the signature page of this Annual Report on Form 10-K)		

Exhibit Number		Description	Incorporated by reference herein	
			Form	Date
31.01	*	Certification of Chief Executive Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002		
31.02	*	Certification of Chief Financial Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002		
32.01	‡	Certifications of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002		
101.INS		XBRL Instance Document		
101.SCH		XBRL Taxonomy Extension Schema Document		
101.CAL		XBRL Taxonomy Extension Calculation Linkbase Document		
101.DEF		XBRL Taxonomy Extension Definition Linkbase Document		
101.LAB		XBRL Taxonomy Extension Label Linkbase Document		
101.PRE		XBRL Taxonomy Extension Presentation Linkbase Document		

◆ Indicates management compensatory plan, contract, or arrangement.

* Filed herewith.

‡ Furnished herewith.

Exhibit 12

COMPUTATION OF RATIO OF EARNINGS TO FIXED CHARGES

	Year Ended December 31,				
(In millions, except ratios)	2012	2013	2014	2015	2016
Earnings:					
Pre-tax income from continuing operations	$ 14,469	$ 15,899	$ 17,259	$ 19,651	$ 24,150
Add:					
Fixed charges	233	258	307	349	423
Pre-tax income from continuing operations plus fixed charges	$ 14,702	$ 16,157	$ 17,566	$ 20,000	$ 24,573
Fixed charges:					
Interest expense and amortization of capitalized expenses related to indebtedness	$ 84	$ 83	$ 101	$ 104	$ 124
Estimated interest component included in rent expense	149	175	206	245	299
Total fixed charges	$ 233	$ 258	$ 307	$ 349	$ 423
Ratio of earnings to fixed charges	63	63	57	57	58

Exhibit 21.01

SUBSIDIARIES OF THE REGISTRANT

The following is a list of subsidiaries of Alphabet Inc., omitting subsidiaries which, considered in the aggregate as a single subsidiary, would not constitute a significant subsidiary as of December 31, 2016:

Name of Subsidiary	Jurisdiction of Incorporation or Organization
Google Inc.	Delaware
Google Ireland Holdings	Ireland

Exhibit 23.01

CONSENT OF ERNST & YOUNG LLP, INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-8 No. 333-207254) pertaining to the Google Inc. 2004 Stock Plan, Alphabet Inc. 2012 Stock Plan, Click Holding Corp. 2005 Stock Incentive Plan, AdMob, Inc. 2006 Stock Plan, UK Sub-Plan of the AdMob, Inc. 2006 Stock Plan, Motorola Mobility Holdings, Inc. 2011 Incentive Compensation Plan and Alphabet Inc. Deferred Compensation Plan,

(2) Registration Statement (Form S-3 No. 333-209510) of Alphabet Inc.,

(3) Registration Statement (Form S-8 No. 333-212914) pertaining to the Alphabet Inc. 2012 Stock Plan, and

(4) Registration Statement (Form S-8 No. 333-214573) pertaining to the Apigee Corporation 2015 Equity Incentive Plan and the Apigee Corporation 2005 Stock Incentive Plan;

of our reports dated February 2, 2017, with respect to the consolidated financial statements and schedule of Alphabet Inc. and the effectiveness of internal control over financial reporting of Alphabet Inc. included in this Annual Report (Form 10-K) of Alphabet Inc. for the year ended December 31, 2016.

/s/ Ernst & Young LLP

San Jose, California

February 2, 2017

Exhibit 31.01

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO
EXCHANGE ACT RULES 13a-14(a) AND 15d-14(a),
AS ADOPTED PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Larry Page, certify that:

1. I have reviewed this Annual Report on Form 10-K of Alphabet Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15 (e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 2, 2017

/s/ LARRY PAGE
Larry Page
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.02

CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO
EXCHANGE ACT RULES 13a-14(a) AND 15d-14(a),
AS ADOPTED PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Ruth Porat, certify that:

1. I have reviewed this Annual Report on Form 10-K of Alphabet Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15 (e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 2, 2017

/s/ RUTH PORAT
Ruth Porat
Senior Vice President and
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.01

CERTIFICATIONS OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Larry Page, certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Annual Report on Form 10-K of Alphabet Inc. for the fiscal year ended December 31, 2016, fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Annual Report on Form 10-K fairly presents, in all material respects, the financial condition and results of operations of Alphabet Inc.

Date: February 2, 2017

By: /S/ LARRY PAGE
Name: Larry Page
Title: Chief Executive Officer
(Principal Executive Officer)

I, Ruth Porat, certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Annual Report on Form 10-K of Alphabet Inc. for the fiscal year ended December 31, 2016, fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Annual Report on Form 10-K fairly presents, in all material respects, the financial condition and results of operations of Alphabet Inc.

Date: February 2, 2017

By: /S/ RUTH PORAT
Name: Ruth Porat
Title: Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

The foregoing certifications are not deemed filed with the Securities and Exchange Commission for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (Exchange Act), and are not to be incorporated by reference into any filing of Alphabet Inc. under the Securities Act of 1933, as amended, or the Exchange Act, whether made before or after the date hereof, regardless of any general incorporation language in such filing.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended June 30, 2017

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission File Number: 001-35551

FACEBOOK, INC.

(Exact name of registrant as specified in its charter)

Delaware	20-1665019
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification Number)

1601 Willow Road, Menlo Park, California 94025
(Address of principal executive offices and Zip Code)

(650) 543-4800
(Registrant's telephone number, including area code)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 (Exchange Act) during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See definition of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐ (Do not check if a smaller reporting company)	Smaller reporting company	☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

Indicate the number of shares outstanding of each of the issuer's classes of Common Stock, as of the latest practicable date.

Class	Number of Shares Outstanding
Class A Common Stock $0.000006 par value	2,370,333,098 shares outstanding as of July 24, 2017
Class B Common Stock $0.000006 par value	533,863,486 shares outstanding as of July 24, 2017

FACEBOOK, INC.
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NOTE ABOUT FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. All statements contained in this Quarterly Report on Form 10-Q other than statements of historical fact, including statements regarding our future results of operations and financial position, our business strategy and plans, and our objectives for future operations, are forward-looking statements. The words "believe," "may," "will," "estimate," "continue," "anticipate," "intend," "expect," and similar expressions are intended to identify forward-looking statements. We have based these forward-looking statements largely on our current expectations and projections about future events and trends that we believe may affect our financial condition, results of operations, business strategy, short-term and long-term business operations and objectives, and financial needs. These forward-looking statements are subject to a number of risks, uncertainties and assumptions, including those described in Part II, Item 1A, "Risk Factors" in this Quarterly Report on Form 10-Q. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and assumptions, the future events and trends discussed in this Quarterly Report on Form 10-Q may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

We undertake no obligation to revise or publicly release the results of any revision to these forward-looking statements, except as required by law. Given these risks and uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements.

Unless expressly indicated or the context requires otherwise, the terms "Facebook," "company," "we," "us," and "our" in this document refer to Facebook, Inc., a Delaware corporation, and, where appropriate, its wholly owned subsidiaries. The term "Facebook" may also refer to our products, regardless of the manner in which they are accessed. For references to accessing Facebook on the "web" or via a "website," such terms refer to accessing Facebook on personal computers. For references to accessing Facebook on "mobile," such term refers to accessing Facebook via a mobile application or via a mobile-optimized version of our website such as m.facebook.com, whether on a mobile phone or tablet.

LIMITATIONS OF KEY METRICS AND OTHER DATA

The numbers for our key metrics, which include our daily active users (DAUs), monthly active users (MAUs), and average revenue per user (ARPU), are calculated using internal company data based on the activity of user accounts. While these numbers are based on what we believe to be reasonable estimates of our user base for the applicable period of measurement, there are inherent challenges in measuring usage of our products across large online and mobile populations around the world. In addition, we are continually seeking to improve our estimates of our user base, and such estimates may change due to improvements or changes in our methodology. In 2016, we estimate that "duplicate" accounts (an account that a user maintains in addition to his or her principal account) may have represented approximately 6% of our worldwide MAUs. We also seek to identify "false" accounts, which we divide into two categories: (1) user-misclassified accounts, where users have created personal profiles for a business, organization, or non-human entity such as a pet (such entities are permitted on Facebook using a Page rather than a personal profile under our terms of service); and (2) undesirable accounts, which represent user profiles that we determine are intended to be used for purposes that violate our terms of service, such as spamming. In 2016, for example, we estimate user-misclassified and undesirable accounts may have represented approximately 1% of our worldwide MAUs. However, these estimates are based on an internal review of a limited sample of accounts and we apply significant judgment in making this determination, such as identifying names that appear to be fake or other behavior that appears inauthentic to the reviewers. Our estimates may change as our methodologies evolve, including through the application of new technologies, which may allow us to identify previously undetected false or duplicate accounts and improve our ability to evaluate a broader population of our users. As such, our estimation of duplicate or false accounts may not accurately represent the actual number of such accounts.

Our data limitations may affect our understanding of certain details of our business. For example, while user-provided data indicates a decline in usage among younger users, this age data is unreliable because a disproportionate number of our younger users register with an inaccurate age. Accordingly, our understanding of usage by age group may not be complete.

In addition, our data regarding the geographic location of our users is estimated based on a number of factors, such as the user's IP address and self-disclosed location. These factors may not always accurately reflect the user's actual location. For example, a user may appear to be accessing Facebook from the location of the proxy server that the user connects to rather than from the user's actual location. The methodologies used to measure user metrics may also be susceptible to algorithm or other technical errors. Our estimates for revenue by user location and revenue by user device are also affected by these factors. For example, in late 2015, we discovered an error in the algorithm we used to attribute our revenue by user geography. While this issue did not affect our overall worldwide revenue, it did affect our attribution of revenue to different geographic regions. The fourth quarter of 2015 revenue by user geography and ARPU amounts were adjusted to reflect this reclassification.

We regularly review our processes for calculating these metrics, and from time to time we may discover inaccuracies in our metrics or make adjustments to improve their accuracy, including adjustments that may result in the recalculation of our historical metrics. We believe that any such inaccuracies or adjustments are immaterial unless otherwise stated. In addition, our DAU and MAU estimates will differ from estimates published by third parties due to differences in methodology.

The numbers of DAUs and MAUs discussed in this Quarterly Report on Form 10-Q, as well as ARPU, do not include Instagram, WhatsApp, or Oculus users unless they would otherwise qualify as such users, respectively, based on their other activities on Facebook. In addition, other user engagement metrics included herein do not include Instagram, WhatsApp, or Oculus unless otherwise specifically stated.

PART I—FINANCIAL INFORMATION

Item 1. Financial Statements

FACEBOOK, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(In millions, except for number of shares and par value)
(Unaudited)

	June 30, 2017	December 31, 2016
Assets		
Current assets:		
Cash and cash equivalents	$ 6,252	$ 8,903
Marketable securities	29,200	20,546
Accounts receivable, net of allowances for doubtful accounts of $90 and $94 as of June 30, 2017 and December 31, 2016, respectively	3,897	3,993
Prepaid expenses and other current assets	1,455	959
Total current assets	40,804	34,401
Property and equipment, net	10,628	8,591
Intangible assets, net	2,186	2,535
Goodwill	18,129	18,122
Other assets	2,096	1,312
Total assets	$ 73,843	$ 64,961
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 323	$ 302
Partners payable	278	280
Accrued expenses and other current liabilities	2,626	2,203
Deferred revenue and deposits	88	90
Total current liabilities	3,315	2,875
Other liabilities	4,047	2,892
Total liabilities	7,362	5,767
Stockholders' equity:		
Common stock, $0.000006 par value; 5,000 million Class A shares authorized, 2,371 million and 2,354 million shares issued and outstanding, including 2 million and 4 million outstanding shares subject to repurchase, as of June 30, 2017 and December 31, 2016, respectively; 4,141 million Class B shares authorized, 532 million and 538 million shares issued and outstanding, including 1 million and 2 million outstanding shares subject to repurchase, as of June 30, 2017 and December 31, 2016, respectively	—	—
Additional paid-in capital	39,291	38,227
Accumulated other comprehensive loss	(370)	(703)
Retained earnings	27,560	21,670
Total stockholders' equity	66,481	59,194
Total liabilities and stockholders' equity	$ 73,843	$ 64,961

See Accompanying Notes to Condensed Consolidated Financial Statements.

FACEBOOK, INC.
CONDENSED CONSOLIDATED STATEMENTS OF INCOME
(In millions, except per share amounts)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue	$ 9,321	$ 6,436	$ 17,353	$ 11,818
Costs and expenses:				
Cost of revenue	1,237	917	2,395	1,755
Research and development	1,919	1,471	3,753	2,814
Marketing and sales	1,124	901	2,181	1,728
General and administrative	640	413	1,295	778
Total costs and expenses	4,920	3,702	9,624	7,075
Income from operations	4,401	2,734	7,729	4,743
Interest and other income, net	87	20	168	78
Income before provision for income taxes	4,488	2,754	7,897	4,821
Provision for income taxes	594	471	938	800
Net income	$ 3,894	$ 2,283	$ 6,959	$ 4,021
Less: Net income attributable to participating securities	4	7	10	13
Net income attributable to Class A and Class B common stockholders	$ 3,890	$ 2,276	$ 6,949	$ 4,008
Earnings per share attributable to Class A and Class B common stockholders:				
Basic	$ 1.34	$ 0.80	$ 2.40	$ 1.41
Diluted	$ 1.32	$ 0.78	$ 2.36	$ 1.38
Weighted average shares used to compute earnings per share attributable to Class A and Class B common stockholders:				
Basic	2,900	2,856	2,895	2,850
Diluted	2,951	2,921	2,950	2,912
Share-based compensation expense included in costs and expenses:				
Cost of revenue	$ 47	$ 29	$ 81	$ 51
Research and development	787	631	1,457	1,217
Marketing and sales	120	95	216	177
General and administrative	78	62	145	118
Total share-based compensation expense	$ 1,032	$ 817	$ 1,899	$ 1,563

See Accompanying Notes to Condensed Consolidated Financial Statements.

FACEBOOK, INC.
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(In millions)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Net income	$ 3,894	$ 2,283	$ 6,959	$ 4,021
Other comprehensive income (loss):				
Change in foreign currency translation adjustment, net of tax	246	(116)	306	20
Change in unrealized gain/loss on available-for-sale investments and other, net of tax	10	19	27	61
Comprehensive income	$ 4,150	$ 2,186	$ 7,292	$ 4,102

See Accompanying Notes to Condensed Consolidated Financial Statements.

FACEBOOK, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(In millions)
(Unaudited)

	Six Months Ended June 30,	
	2017	2016
Cash flows from operating activities		
Net income	$ 6,959	$ 4,021
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	1,400	1,137
Share-based compensation	1,899	1,563
Deferred income taxes	(58)	(178)
Other	12	19
Changes in assets and liabilities:		
Accounts receivable	223	(225)
Prepaid expenses and other current assets	(577)	(257)
Other assets	82	4
Accounts payable	(38)	(39)
Partners payable	(10)	14
Accrued expenses and other current liabilities	157	414
Deferred revenue and deposits	(4)	23
Other liabilities	373	646
Net cash provided by operating activities	10,418	7,142
Cash flows from investing activities		
Purchases of property and equipment	(2,715)	(2,127)
Purchases of marketable securities	(14,137)	(9,635)
Sales of marketable securities	3,998	4,158
Maturities of marketable securities	1,498	903
Acquisitions of businesses, net of cash acquired, and purchases of intangible assets	(8)	(20)
Change in restricted cash and deposits	33	74
Net cash used in investing activities	(11,331)	(6,647)
Cash flows from financing activities		
Taxes paid related to net share settlement of equity awards	(1,495)	—
Principal payments on capital lease and other financing obligations	—	(312)
Repurchases of Class A common stock	(378)	—
Other financing activities, net	12	6
Net cash used in financing activities	(1,861)	(306)
Effect of exchange rate changes on cash and cash equivalents	123	12
Net (decrease) increase in cash and cash equivalents	(2,651)	201
Cash and cash equivalents at beginning of period	8,903	4,907
Cash and cash equivalents at end of period	$ 6,252	$ 5,108

See Accompanying Notes to Condensed Consolidated Financial Statements.

FACEBOOK, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(In millions)
(Unaudited)

	Six Months Ended June 30,	
	2017	2016
Supplemental cash flow data		
Cash paid during the period for:		
Interest	$ —	$ 11
Income taxes, net	$ 1,359	$ 407
Non-cash investing and financing activities:		
Net change in accounts payable, accrued expenses and other current liabilities, and other liabilities related to property and equipment additions	$ 157	$ 89
Change in unsettled repurchases of Class A common stock	$ 30	$ —

See Accompanying Notes to Condensed Consolidated Financial Statements.

FACEBOOK, INC.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

Note 1. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States (GAAP) and applicable rules and regulations of the Securities and Exchange Commission regarding interim financial reporting. Certain information and note disclosures normally included in the financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to such rules and regulations. As such, the information included in this quarterly report on Form 10-Q should be read in conjunction with the consolidated financial statements and accompanying notes included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 .

The condensed consolidated balance sheet as of December 31, 2016 included herein was derived from the audited financial statements as of that date, but does not include all disclosures including notes required by GAAP.

The condensed consolidated financial statements include the accounts of Facebook, Inc. and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated.

The accompanying condensed consolidated financial statements reflect all normal recurring adjustments necessary to present fairly the financial position, results of operations, and cash flows for the interim periods, but are not necessarily indicative of the results of operations to be anticipated for the full year ending December 31, 2017 .

There have been no changes to our significant accounting policies described in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 that have had a material impact on our condensed consolidated financial statements and related notes.

In the fourth quarter of 2016, we elected to early adopt Accounting Standards Update No. 2016-09, *Compensation - Stock Compensation (Topic 718): Improvement to Employee Share-based Payment Accounting* (ASU 2016-09). We were required to reflect any adoption adjustments as of January 1, 2016, the beginning of the annual period that included the interim period of adoption. As such, our condensed consolidated statements of income and statements of comprehensive income for the three and six months ended June 30, 2016 and statements of cash flows for the six months ended June 30, 2016 had been adjusted to reflect the impact of ASU 2016-09 adoption. See "Note 1—Summary of Significant Accounting Policies" in the notes to our consolidated financial statements in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 for detailed adoption information.

Use of Estimates

Conformity with GAAP requires the use of estimates and judgments that affect the reported amounts in the condensed consolidated financial statements and accompanying notes. These estimates form the basis for judgments we make about the carrying values of our assets and liabilities, which are not readily apparent from other sources. We base our estimates and judgments on historical information and on various other assumptions that we believe are reasonable under the circumstances. GAAP requires us to make estimates and judgments in several areas, including, but not limited to, those related to revenue recognition, collectability of accounts receivable, loss contingencies, fair value of financial instruments, fair value of acquired intangible assets and goodwill, useful lives of intangible assets and property and equipment, and income taxes. These estimates are based on management's knowledge about current events and expectations about actions we may undertake in the future. Actual results could differ materially from those estimates.

Recently Issued Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* (ASU 2014-09), which amends the existing accounting standards for revenue recognition. In August 2015, the FASB issued ASU No. 2015-14, *Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date* , which delays the effective date of ASU 2014-09 by one year. The FASB also agreed to allow entities to choose to adopt the standard as of the original effective date. In March 2016, the FASB issued Accounting Standards Update No. 2016-08, *Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations (Reporting Revenue Gross versus Net)* (ASU 2016-08) which clarifies the implementation guidance on principal versus agent considerations. The guidance includes indicators to assist an entity in determining whether it controls a specified good or service before it is transferred to the customers. The new standard further requires new disclosures about contracts with customers, including the significant judgments the registrant has made when applying the guidance. We will be adopting the new standard effective January 1, 2018. The new

standard also permits two methods of adoption: retrospectively to each prior reporting period presented (full retrospective method), or retrospectively with the cumulative effect of initially applying the guidance recognized at the date of initial application (the modified retrospective method). We currently anticipate adopting the standard using the modified retrospective method. While we are still in the process of completing our analysis on the impact this guidance will have on our consolidated financial statements, related disclosures, and our internal controls over financial reporting, we do not expect the impact to be material.

In February 2016, the FASB issued Accounting Standards Update No. 2016-02, *Leases (Topic 842)* (ASU 2016-02), which generally requires companies to recognize operating and financing lease liabilities and corresponding right-of-use assets on the balance sheet. This guidance will be effective for us in the first quarter of 2019 on a modified retrospective basis and early adoption is permitted. We currently anticipate adopting the new standard effective January 1, 2019. While we continue to evaluate the effect of adopting this guidance on our consolidated financial statements and related disclosures, we expect our operating leases, as disclosed in Note 8 — Commitments and Contingencies, will be subject to the new standard. We will recognize right-of-use assets and operating lease liabilities on our consolidated balance sheets upon adoption, which will increase our total assets and liabilities.

In January 2017, the FASB issued Accounting Standards Update No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business* (ASU 2017-01), which revises the definition of a business and provides new guidance in evaluating when a set of transferred assets and activities is a business. This guidance will be effective for us in the first quarter of 2018 on a prospective basis, and early adoption is permitted. We do not expect the standard to have a material impact on our consolidated financial statements.

In January 2017, the FASB issued Accounting Standards Update No. 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment* (ASU 2017-04), which eliminates step two from the goodwill impairment test. Under ASU 2017-04, an entity should recognize an impairment charge for the amount by which the carrying amount of a reporting unit exceeds its fair value up to the amount of goodwill allocated to that reporting unit. This guidance will be effective for us in the first quarter of 2020 on a prospective basis, and early adoption is permitted. We do not expect the standard to have a material impact on our consolidated financial statements.

Note 2. Earnings per Share

We compute earnings per share (EPS) of Class A and Class B common stock using the two-class method required for participating securities. We consider restricted stock awards to be participating securities because holders of such shares have non-forfeitable dividend rights in the event of our declaration of a dividend for common shares.

Undistributed earnings allocated to participating securities are subtracted from net income in determining net ioeome attributable to common stockholders. Basic EPS is computed by dividing net income attributable to common stockholders by the weighted-average number of shares of our Class A and Class B common stock outstanding, adjusted for outstanding shares that are subject to repurchase.

For the calculation of diluted EPS, net income attributable to common stockholders for basic EPS is adjusted by the effect of dilutive securities, such as awards under our equity compensation plans and inducement awards under separate non-plan restricted stock unit (RSU) award agreements. In addition, the computation of the diluted EPS of Class A common stock assumes the conversion of our Class B common stock to Class A common stock, while the diluted EPS of Class B common stock does not assume the conversion of those shares to Class A common stock. Diluted EPS attributable to common stockholders is computed by dividiog the resulting net income attributable to common stockholders by the weighted-average number of fully diluted common shares outstanding.

Certain RSUs were excluded from the EPS calculation because the impact would be anti-dilutive. These excluded RSUs were not material for the three and six months ended June 30, 2017 and 2016 , respectively.

Basic and diluted EPS are the same for each class of common stock because they are entitled to the same liquidation and dividend rights.

The numerators and denominators of the basic and diluted EPS computations for our common stock are calculated as follows (in millions, except per share amounts):

	Three Months Ended June 30,				Six Months Ended June 30,			
	2017		2016		2017		2016	
	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B
Basic EPS:								
Numerator								
Net income	$ 3,177	$ 717	$ 1,846	$ 437	$ 5,673	$ 1,286	$ 3,250	$ 771
Less: Net income attributable to participating securities	4	—	5	2	8	2	11	2
Net income attributable to common stockholders	$ 3,173	$ 717	$ 1,841	$ 435	$ 5,665	$ 1,284	$ 3,239	$ 769
Denominator								
Weighted average shares outstanding	2,368	535	2,317	548	2,363	536	2,310	549
Less: Shares subject to repurchase	2	1	7	2	3	1	7	2
Number of shares used for basic EPS computation	2,366	534	2,310	546	2,360	535	2,303	547
Basic EPS	$ 1.34	$ 1.34	$ 0.80	$ 0.80	$ 2.40	$ 2.40	$ 1.41	$ 1.41
Diluted EPS:								
Numerator								
Net income attributable to common stockholders	$ 3,173	$ 717	$ 1,841	$ 435	$ 5,665	$ 1,284	$ 3,239	$ 769
Reallocation of net income attributable to participating securities	4	—	7	—	10	—	13	—
Reallocation of net income as a result of conversion of Class B to Class A common stock	717	—	435	—	1,284	—	769	—
Reallocation of net income to Class B common stock	—	(2)	—	6	—	(1)	—	9
Net income attributable to common stockholders for diluted EPS	$ 3,894	$ 715	$ 2,283	$ 441	$ 6,959	$ 1,283	$ 4,021	$ 778
Denominator								
Number of shares used for basic EPS computation	2,366	534	2,310	546	2,360	535	2,303	547
Conversion of Class B to Class A common stock	534	—	546	—	535	—	547	—
Weighted average effect of dilutive securities:								
Employee stock options	4	4	7	7	4	4	7	7
RSUs	45	3	50	7	47	3	48	7
Shares subject to repurchase	2	1	5	1	3	1	5	1
Earn-out shares	—	—	3	3	1	1	2	2
Number of shares used for diluted EPS computation	2,951	542	2,921	564	2,950	544	2,912	564
Diluted EPS	$ 1.32	$ 1.32	$ 0.78	$ 0.78	$ 2.36	$ 2.36	$ 1.38	$ 1.38

Note 3. Cash and Cash Equivalents, and Marketable Securities

The following table sets forth the cash and cash equivalents, and marketable securities (in millions):

	June 30, 2017	December 31, 2016
Cash and cash equivalents:		
Cash	$ 1,452	$ 1,364
Money market funds	4,421	5,409
U.S. government securities	25	1,463
U.S. government agency securities	90	667
Certificate of deposits and time deposits	264	—
Total cash and cash equivalents	6,252	8,903
Marketable securities:		
U.S. government securities	11,061	7,130
U.S. government agency securities	9,623	7,411
Corporate debt securities	8,516	6,005
Total marketable securities	29,200	20,546
Total cash and cash equivalents, and marketable securities	$ 35,452	$ 29,449

The gross unrealized gains or losses on our marketable securities as of June 30, 2017 and December 31, 2016 were not significant. In addition, the gross unrealized loss that had been in a continuous loss position for 12 months or longer was not significant as of June 30, 2017 and December 31, 2016 . As of June 30, 2017 , we considered the decreases in market value on our marketable securities to be temporary in nature and did not consider any of our investments to be other-than-temporarily impaired.

The following table classifies our marketable securities by contractual maturities (in millions):

	June 30, 2017
Due in one year	$ 7,739
Due in one to five years	21,461
Total	$ 29,200

Note 4. Fair Value Measurement

The following table summarizes, for assets or liabilities measured at fair value, the respective fair value and the classification by level of input within the fair value hierarchy (in millions):

		Fair Value Measurement at Reporting Date Using		
Description	June 30, 2017	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents:				
Money market funds	$ 4,421	$ 4,421	$ —	$ —
U.S. government securities	25	25	—	—
U.S. government agency securities	90	90	—	—
Certificate of deposits and time deposits	264	—	264	—
Marketable securities:				
U.S. government securities	11,061	11,061	—	—
U.S. government agency securities	9,623	9,623	—	—
Corporate debt securities	8,516	—	8,516	—
Total cash equivalents and marketable securities	$ 34,000	$ 25,220	$ 8,780	$ —
Accrued expenses and other current liabilities:				
Contingent consideration liability	$ 347	$ —	$ 347	$ —

		Fair Value Measurement at Reporting Date Using		
Description	December 31, 2016	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents:				
Money market funds	$ 5,409	$ 5,409	$ —	$ —
U.S. government securities	1,463	1,463	—	—
U.S. government agency securities	667	667	—	—
Marketable securities:				
U.S. government securities	7,130	7,130	—	—
U.S. government agency securities	7,411	7,411	—	—
Corporate debt securities	6,005	—	6,005	—
Total cash equivalents and marketable securities	$ 28,085	$ 22,080	$ 6,005	$ —
Accrued expenses and other current liabilities:				
Contingent consideration liability	$ 242	$ —	$ 242	$ —

We classify our cash equivalents and marketable securities within Level 1 or Level 2 because we use quoted market prices or alternative pricing sources and models utilizing market observable inputs to determine their fair value.

We classify our contingent consideration liability within Level 2 as the valuation inputs are based on quoted market prices and market observable data. During the three and six months ended June 30, 2017 , we recognized an increase in the fair value of our contingent consideration liability of $21 million and $105 million , respectively, primarily due to the increase in the fair value of our common stock.

Note 5. Property and Equipment

Property and equipment consists of the following (in millions):

	June 30, 2017	December 31, 2016
Land	$ 720	$ 696
Buildings	4,013	3,109
Leasehold improvements	742	531
Network equipment	6,685	5,179
Computer software, office equipment and other	517	398
Construction in progress	1,991	1,890
Total	14,668	11,803
Less: Accumulated depreciation	(4,040)	(3,212)
Property and equipment, net	$ 10,628	$ 8,591

Construction in progress includes costs related to construction of data centers, office buildings, and network equipment infrastructure to support our data centers around the world. No interest was capitalized during the three and six months ended June 30, 2017 and 2016 .

Note 6. Goodwill and Intangible Assets

The changes in the carrying amount of goodwill for the six months ended June 30, 2017 are as follows (in millions):

Balance as of December 31, 2016	$ 18,122
Effect of currency translation adjustment	7
Balance as of June 30, 2017	$ 18,129

Intangible assets consist of the following (in millions):

		June 30, 2017			December 31, 2016		
	Weighted-Average Remaining Useful Lives (in years)	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Acquired users	4.3	$ 2,056	$ (826)	$ 1,230	$ 2,056	$ (678)	$ 1,378
Acquired technology	2.0	931	(614)	317	931	(518)	413
Acquired patents	6.0	785	(461)	324	785	(420)	365
Trade names	2.7	629	(350)	279	629	(293)	336
Other	3.0	162	(126)	36	162	(119)	43
Total intangible assets	4.0	$ 4,563	$ (2,377)	$ 2,186	$ 4,563	$ (2,028)	$ 2,535

Amortization expense of intangible assets was $174 million and $349 million for the three and six months ended June 30, 2017 , respectively, and $193 million and $373 million for the three and six months ended June 30, 2016 , respectively.

As of June 30, 2017 , expected amortization expense for the unamortized acquired intangible assets for the next five years and thereafter is as follows (in millions):

The remainder of 2017	$ 338
2018	619
2019	526
2020	357
2021	265
Thereafter	81
Total	$ 2,186

Note 7. Long-term Debt

In May 2016, we entered into a five -year senior unsecured revolving credit facility that allows us to borrow up to $2.0 billion . Any amounts outstanding under this facility will be due and payable on May 20, 2021. As of June 30, 2017 , no amounts had been drawn down, and we were in compliance with the covenants under this facility.

Note 8. Commitments and Contingencies

Commitments

Leases

During the six months ended June 30, 2017, we entered into additional non-cancelable operating lease agreements, mostly related to office buildings. Our various non-cancelable operating lease agreements for certain of our offices, land, facilities, and data centers have original lease periods expiring between 2017 and 2038 and our total future minimum payments related to these operating leases as of June 30, 2017 was $2.7 billion . We are committed to pay a portion of the related actual operating expenses under certain of these lease agreements. Certain of these arrangements have free rent periods or escalating rent payment provisions, and we recognize rent expense under such arrangements on a straight-line basis. Operating lease expense was $81 million and $156 million for the three and six months ended June 30, 2017 , respectively, and $66 million and $129 million for the three and six months ended June 30, 2016 , respectively.

Contingencies

Beginning on May 22, 2012, multiple putative class actions, derivative actions, and individual actions were filed in state and federal courts in the United States and in other jurisdictions against us, our directors, and/or certain of our officers alleging violation of securities laws or breach of fiduciary duties in connection with our initial public offering (IPO) and seeking unspecified damages. We believe these lawsuits are without merit, and we intend to continue to vigorously defend them. The vast majority of the cases in the United States, along with multiple cases filed against The NASDAQ OMX Group, Inc. and The Nasdaq Stock Market LLC (collectively referred to herein as NASDAQ) alleging technical and other trading-related errors by NASDAQ in connection with our IPO, were ordered centralized for coordinated or consolidated pre-trial proceedings in the U.S. District Court for the Southern District of New York. In a series of rulings in 2013 and 2014, the court denied our motion to dismiss the consolidated securities class action and granted our motions to dismiss the derivative actions against our directors and certain of our officers. On July 24, 2015, the court of appeals affirmed the dismissal of the derivative actions. On December 11, 2015, the court granted plaintiffs' motion for class certification in the consolidated securities action. On April 14, 2017, we filed a motion for summary judgment. Trial is scheduled to begin on October 23, 2017.

On April 27, 2016, we announced a proposal to create a new class of non-voting capital stock (Class C capital stock) and our intention to declare and pay a dividend of two shares of Class C capital stock for each outstanding share of Class A and Class B common stock (the Reclassification). Following our announcement of the Reclassification, beginning on April 29, 2016, multiple purported class action lawsuits were filed on behalf of our stockholders in the Delaware Court of Chancery against us, certain of our board of directors, and Mark Zuckerberg. The lawsuits have been consolidated under the caption *In re Facebook, Inc. Class C Reclassification Litig.* , C.A. No. 12286-VCL, and the consolidated complaint generally alleges that the defendants breached their fiduciary duties in connection with the Reclassification. Among other remedies, these lawsuits seek to enjoin the Reclassification as well as unspecified money damages, costs, and attorneys' fees. Trial is scheduled to begin on September 26, 2017. We believe that the lawsuits are without merit and intend to vigorously defend against all claims asserted.

We are also party to various legal proceedings, claims, and regulatory, tax or government inquiries and investigations that arise in the ordinary course of business. With respect to these matters, we evaluate the developments on a regular basis and accrue a liability when we believe a loss is probable and the amount can be reasonably estimated.

We believe that the amount or estimable range of reasonably possible or probable loss will not, either individually or in the aggregate, have a material adverse effect on our business, consolidated financial position, results of operations, or cash flows. However, the outcome of these matters is inherently uncertain. Therefore, if one or more of these matters were resolved against us for amounts in excess of management's expectations, our results of operations and financial condition, including in a particular reporting period in which any such outcome becomes probable and estimable, could be materially adversely affected.

For information regarding income tax contingencies, see Note 10 — Income Taxes.

Note 9. Stockholders' Equity

Reclassification

In April 2016, our board of directors approved the Reclassification by approving amendments to our restated certificate of incorporation (the New Certificate) that would, among other things, create a new non-voting Class C capital stock. The Class C capital stock will have the same rights and powers, rank equally (including as to dividends and distributions, mergers or similar business combinations, and in connection with any liquidation, dissolution, or winding up of the corporation), share ratably and be identical in all other respects and as to all matters to the shares of Class A and Class B common stock, except for voting rights and as expressly provided in the New Certificate. The New Certificate was approved by our stockholders on June 20, 2016. As of June 30, 2017, the New Certificate was not yet effective.

As part of the Reclassification, we announced that our board of directors intends to issue two shares of the Class C capital stock as a one-time stock dividend for each share of Class A and Class B common stock outstanding. The record and payment dates for this dividend will be determined by our board of directors in its discretion and there can be no assurance as to the timing of such dates. For accounting purposes, we expect this dividend will be treated as a stock split in the form of a dividend.

Share Repurchase Program

In November 2016, our board of directors authorized a $6.0 billion share repurchase program of our Class A common stock, which commenced in 2017 and does not have an expiration date. The timing and actual number of shares repurchased depend on a variety of factors, including price, general business and market conditions, and other investment opportunities, and shares may be repurchased through open market purchases or privately negotiated transactions, including through the use of trading plans intended to qualify under Rule 10b5-1 under the Exchange Act. During the six months ended June 30, 2017 , we repurchased and subsequently retired approximately 3 million shares of our Class A common stock for an aggregate amount of approximately $408 million .

Share-based Compensation Plans

We maintain two share-based employee compensation plans: the 2012 Equity Incentive Plan (2012 Plan) and the 2005 Stock Plan (collectively, Stock Plans). Our 2012 Plan serves as the successor to our 2005 Stock Plan and provides for the issuance of incentive and nonstatutory stock options, restricted stock awards, stock appreciation rights, RSUs, performance shares, and stock bonuses to qualified employees, directors and consultants. Outstanding awards under the 2005 Stock Plan continue to be subject to the terms and conditions of the 2005 Stock Plan. Our board of directors approved the amendment and restatement of our 2012 Plan (the Amended 2012 Plan), which was approved by our stockholders and adopted by us in June 2016.

We initially reserved 25 million shares of our Class A common stock for issuance under our 2012 Plan. Following the date of the contemplated stock dividend of Class C capital stock described above, if it is declared and paid, the shares reserved and available for issuance under our Amended 2012 Plan will be shares of the new Class C capital stock, except for shares reserved for awards outstanding immediately prior to the payment of the dividend. The number of shares reserved for issuance under our Amended 2012 Plan increases automatically on January 1 of each of the calendar years during the term of the Amended 2012 Plan, which will continue through and including April 2026 unless terminated earlier by our board of directors or a committee thereof, by a number of shares of Class C capital stock (and prior to the date of the payment of the stock dividend described above, Class A common stock) equal to the lesser of (i) 2.5% of the total issued and outstanding shares of our Class A common stock and Class C capital stock as of the immediately preceding December 31st or (ii) a number of shares determined by our board of directors. Our board of directors elected not to increase the number of shares reserved for issuance in 2017.

The following table summarizes the activities of stock option awards under the Stock Plans for the six months ended June 30, 2017 :

	Shares Subject to Options Outstanding			
	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value (1)
	(in thousands)		(in years)	(in millions)
Balance as of December 31, 2016	5,687	$ 7.78		
Stock options exercised	(2,154)	5.67		
Balance as of June 30, 2017	3,533	$ 9.07	2.7	$ 501
Stock options exercisable as of June 30, 2017	2,749	$ 7.38	2.6	$ 395

(1) The aggregate intrinsic value is calculated as the difference between the exercise price of the underlying stock option awards and the official closing price of our Class A common stock of $150.98 , as reported on the NASDAQ Global Select Market on June 30, 2017 .

The following table summarizes the activities for our unvested RSUs for the six months ended June 30, 2017 :

	Unvested RSUs (1)	
	Number of Shares	Weighted Average Grant Date Fair Value
	(in thousands)	
Unvested at December 31, 2016	98,586	$ 82.99
Granted	28,565	140.14
Vested	(22,810)	79.72
Forfeited	(3,719)	95.32
Unvested at June 30, 2017	100,622	$ 99.49

(1) Unvested shares include inducement awards issued in connection with an acquisition in 2014 and are subject to the terms, restrictions, and conditions of separate non-plan RSU award agreements.

The fair value as of the respective vesting dates of RSUs that vested during the three and six months ended June 30, 2017 was $1.51 billion and $3.21 billion , respectively, and $1.18 billion and $2.63 billion during the three and six months ended June 30, 2016 , respectively.

As of June 30, 2017 , there was $8.78 billion of unrecognized share-based compensation expense, of which (i) $8.68 billion was related to RSUs, and (ii) $100 million was related to restricted shares, shares related to our contingent consideration with performance conditions that were met in the second quarter of 2016 but are still subject to a service condition, and stock options. This unrecognized compensation expense is expected to be recognized over a weighted-average period of approximately three years .

Note 10. Income Taxes

Our tax provision for interim periods is determined using an estimate of our annual effective tax rate, adjusted for discrete items arising in that quarter. In each quarter, we update our estimate of the annual effective tax rate, and if our estimated annual effective tax rate changes, we make a cumulative adjustment in that quarter. Our quarterly tax provision and our quarterly estimate of our annual effective tax rate are subject to significant volatility due to several factors, including our ability to accurately predict the proportion of our income (loss) before provision for income taxes in multiple jurisdictions, the tax effects of our share-based compensation, and the effects of acquisitions and the integration of those acquisitions.

Our 2017 effective tax rate differs from the U.S. statutory rate primarily due to a portion of our income before provision for income taxes being earned in jurisdictions with tax rates lower than the U.S. statutory rate where we plan to indefinitely reinvest a certain portion of those earnings, as well as the recognition of excess tax benefits from share-based compensation.

Our gross unrecognized tax benefits were $3.45 billion and $3.31 billion as of June 30, 2017 and December 31, 2016 , respectively. If the gross unrecognized tax benefits as of June 30, 2017 were realized in a subsequent period, this would result in a tax benefit of $2.68 billion within our provision of income taxes at such time. Our existing tax positions will continue to generate an increase in unrecognized tax benefits in subsequent periods.

In July 2016, we received a Statutory Notice of Deficiency (Notice) from the IRS related to transfer pricing with our foreign subsidiaries in conjunction with the examination of the 2010 tax year. While the Notice applies only to the 2010 tax year, the IRS states that it will also apply its position to tax years subsequent to 2010, which, if the IRS prevails in its position, could result in

an additional federal tax liability of an estimated, aggregate amount of approximately $3.0 billion to $5.0 billion in excess of the amounts in our originally filed U.S. return, plus interest and any penalties asserted. We do not agree with the position of the IRS and have filed a petition in the United States Tax Court challenging the Notice. We have previously accrued an estimated unrecognized tax benefit consistent with the guidance in ASC 740 that is lower than the potential additional federal tax liability of $3.0 billion to $5.0 billion in excess of the amounts in our originally filed U.S. return, plus interest and penalties. If the IRS prevails in the assessment of additional tax due based on its position, the assessed tax, interest and penalties, if any, could have a material adverse impact on our financial position, results of operations or cash flows. As of June 30, 2017, we have not resolved this matter and proceedings continue in the United States Tax Court.

We are subject to taxation in the United States and various other state and foreign jurisdictions. The material jurisdictions in which we are subject to potential examination include the United States and Ireland. We are under examination by the Internal Revenue Service (IRS) for our 2011 through 2013 tax years. Our 2014 and subsequent years remain open to examination by the IRS. Our 2012 and subsequent years remain open to examination in Ireland.

We believe that adequate amounts have been reserved for any adjustments to the provision for income taxes or other tax items that may ultimately result from these examinations. Although the timing of the resolution, settlement, and closure of any audits is highly uncertain, it is reasonably possible that the balance of gross unrecognized tax benefits could significantly change in the next 12 months. Given the number of years remaining that are subject to examination, we are unable to estimate the full range of possible adjustments to the balance of gross unrecognized tax benefits. However, we do not anticipate a significant impact to such amounts within the next 12 months.

Note 11. Geographical Information

Revenue by geography is based on the billing address of the marketer or developer. The following tables set forth revenue and property and equipment, net by geographic area (in millions):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue:				
United States	$ 4,048	$ 2,852	$ 7,574	$ 5,361
Rest of the world [1]	5,273	3,584	9,779	6,457
Total revenue	$ 9,321	$ 6,436	$ 17,353	$ 11,818

(1) No individual country, other than disclosed above, exceeded 10% of our total revenue for any period presented.

	June 30, 2017	December 31, 2016
Property and equipment, net:		
United States	$ 8,215	$ 6,793
Rest of the world [1]	2,413	1,798
Total property and equipment, net	$ 10,628	$ 8,591

(1) No individual country, other than disclosed above, exceeded 10% of our total property and equipment, net for any period presented.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

You should read the following discussion of our financial condition and results of operations in conjunction with our condensed consolidated financial statements and the related notes included elsewhere in this Quarterly Report on Form 10-Q and with our audited consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2016 , as filed with the Securities and Exchange Commission. In addition to our historical condensed consolidated financial information, the following discussion contains forward-looking statements that reflect our plans, estimates, and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this Quarterly Report on Form 10-Q, particularly in Part II, Item 1A, "Risk Factors." For a discussion of limitations in the measurement of certain of our user metrics, see the section entitled "Limitations of Key Metrics and Other Data" in this Quarterly Report on Form 10-Q.

Certain revenue information in the section entitled "—Three and Six Months Ended June 30, 2017 and 2016—Revenue — Foreign Exchange Impact on Revenue" is presented on a constant currency basis. This information is a non-GAAP financial measure. To calculate revenue on a constant currency basis, we translated revenue for the three and six months ended June 30, 2017 using the prior year's monthly exchange rates for our settlement currencies other than the U.S. dollar. This non-GAAP financial measure is not intended to be considered in isolation or as a substitute for, or superior to, financial information prepared and presented in accordance with GAAP. This measure may be different from non-GAAP financial measures used by other companies, limiting its usefulness for comparison purposes. Moreover, presentation of revenue on a constant currency basis is provided for year-over-year comparison purposes, and investors should be cautioned that the effect of changing foreign currency exchange rates has an actual effect on our operating results. We believe this non-GAAP financial measure provides investors with useful supplemental information about the financial performance of our business, enables comparison of financial results between periods where certain items may vary independent of business performance, and allows for greater transparency with respect to key metrics used by management in operating our business.

Executive Overview of Second Quarter Results

Our key user metrics and financial results for the second quarter of 2017 are as follows:

User growth:

- Daily active users (DAUs) were 1.32 billion on average for June 2017 , an increase of 17% year-over-year.
- Monthly active users (MAUs) were 2.01 billion as of June 30, 2017 , an increase of 17% year-over-year.

Financial results:

- Revenue was $9.32 billion , up 45% year-over-year, and ad revenue was $9.16 billion , up 47% year-over-year.
- Total costs and expenses were $ 4.92 billion .
- Income from operations was $4.40 billion .
- Net income was $3.89 billion with diluted earnings per share of $1.32 .
- Capital expenditures were $ 1.44 billion .
- Effective tax rate was 13% .
- Cash and cash equivalents and marketable securities were $35.45 billion as of June 30, 2017 .
- Headcount was 20,658 as of June 30, 2017 , an increase of 43% year-over-year.

In the second quarter of 2017 , we announced our new mission, which is to give people the power to build community and bring the world closer together. We also continued to focus on our three main revenue growth priorities: (i) helping businesses expand their use of our mobile products, (ii) developing innovative ad products that help businesses get the most of their ad campaigns, and (iii) making our ads more relevant and effective through our targeting capabilities and outcome-based measurement.

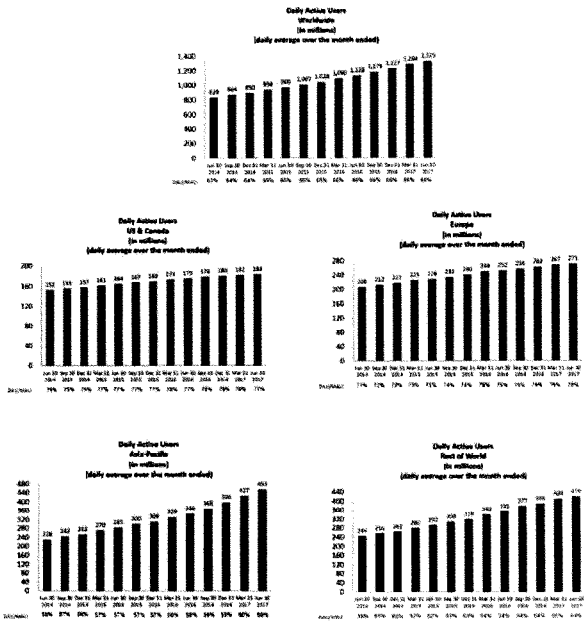
We continued to invest, based on our roadmap, in: (i) our most developed ecosystem, the Facebook app and platform, as well as video, (ii) driving growth and building ecosystems around our products and features that already have significant user bases, such as Instagram, Messenger, and WhatsApp, and (iii) long-term technology initiatives, such as artificial intelligence, connectivity, and virtual and augmented reality, that we believe will further our mission to build community and bring the world closer together. We intend to continue to invest based on this roadmap, and we expect these investments and our increasingly global scale will drive significant overall year-over-year expense growth compared to 2016. In addition, we anticipate our expenses in 2017 will continue to grow as we execute on priorities such as (i) hiring top engineering talent, (ii) investing in research and development, content, and sales and marketing efforts, and (iii) expanding our data center capacity and office facilities to support our growth.

Trends in Our User Metrics

The numbers for our key metrics, our DAUs, MAUs, and average revenue per user (ARPU), do not include Instagram, WhatsApp, or Oculus users unless they would otherwise qualify as such users, respectively, based on their other activities on Facebook. In addition, other user engagement metrics do not include Instagram, WhatsApp, or Oculus unless otherwise specifically stated.

Trends in the number of users affect our revenue and financial results by influencing the number of ads we are able to show, the value of our ads to marketers, the volume of Payments transactions, as well as our expenses and capital expenditures. Substantially all of our daily and monthly active users (as defined below) access Facebook on mobile devices.

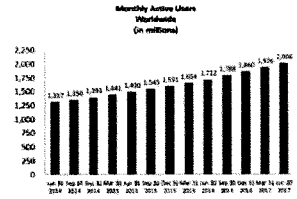
- ***Daily Active Users (DAUs)***. We define a daily active user as a registered Facebook user who logged in and visited Facebook through our website or a mobile device, or used our Messenger application (and is also a registered Facebook user), on a given day. We view DAUs, and DAUs as a percentage of MAUs, as measures of user engagement.

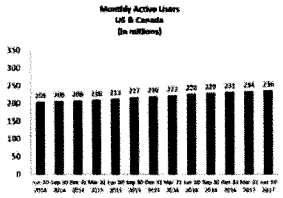


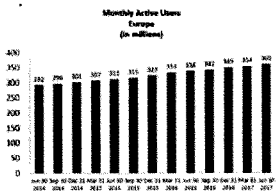
Note: For purposes of reporting DAUs, MAUs, and ARPU by geographic region, Europe includes all users in Russia and Turkey and Rest of World includes all users in Africa, Latin America, and the Middle East.

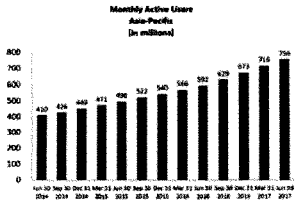
Worldwide DAUs increased 17% to 1.32 billion on average during June 2017 from 1.13 billion during June 2016 . We experienced growth in DAUs across major markets, including India, Indonesia, and Brazil.

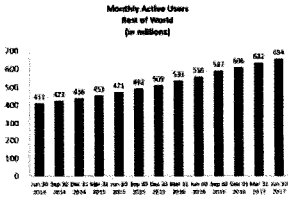
Monthly Active Users (MAUs) . We define a monthly active user as a registered Facebook user who logged in and visited Facebook through our website or a mobile device, or used our Messenger application (and is also a registered Facebook user), in the last 30 days as of the date of measurement. MAUs are a measure of the size of our global active user community.







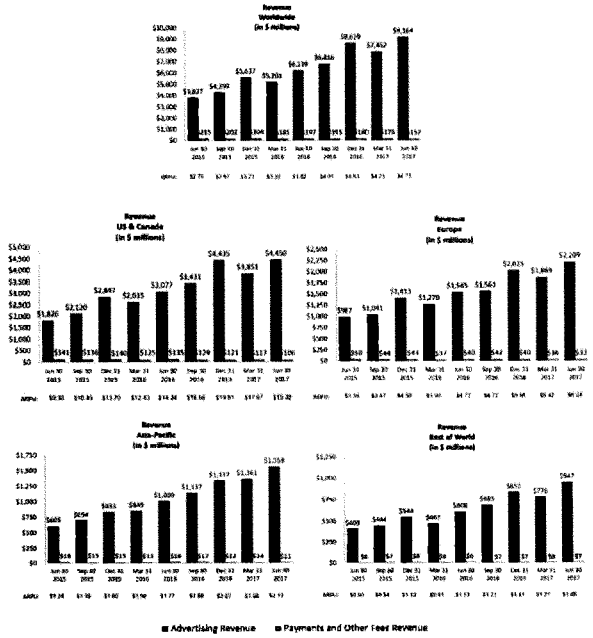




As of June 30, 2017 , we had 2.01 billion MAUs, an increase of 17% from June 30, 2016 . Users in India, Indonesia, and Brazil represented key sources of growth in the second quarter of 2017 , relative to the same period in 2016 .

Trends in Our Monetization by User Geography

We calculate our revenue by user geography based on our estimate of the geography in which ad impressions are delivered, virtual and digital goods are purchased, or virtual reality platform devices are shipped. We define ARPU as our total revenue in a given geography during a given quarter, divided by the average of the number of MAUs in the geography at the beginning and end of the quarter. While ARPU includes all sources of revenue, the number of MAUs used in this calculation only includes users of Facebook and Messenger as described in the definition of MAU above. Revenue from users who are not also Facebook or Messenger MAUs was not material. The geography of our users affects our revenue and financial results because we currently monetize users in different geographies at different average rates. Our revenue and ARPU in regions such as United States & Canada and Europe are relatively higher primarily due to the size and maturity of those online and mobile advertising markets. For example, ARPU in the second quarter of 2017 in the United States & Canada region was more than nine times higher than in the Asia-Pacific region.



Note: Our revenue by user geography in the charts above is geographically apportioned based on our estimation of the geographic location of our users when they perform a revenue-generating activity. This allocation differs from our revenue by geography disclosure in our condensed consolidated financial statements where revenue is geographically apportioned based on the location of the marketer or developer. In late 2015, we discovered an error in the algorithm we used to attribute our revenue by user geography. While this issue did not affect our overall worldwide revenue, it did affect our attribution of revenue to different geographic regions. The fourth quarter of 2015 revenue by user geography and ARPU amounts for all regions were adjusted to reflect this reclassification.

During the second quarter of 2017 , worldwide ARPU was $4.73 , an increase of 24% from the second quarter of 2016 . Over this period, ARPU increased by 35% in United States & Canada, 33% in Europe, 31% in Rest of World, and 20% in Asia-Pacific. In addition, user growth was more rapid in geographies with relatively lower ARPU, such as Asia-Pacific and Rest of World. We expect that user growth in the future will be primarily concentrated in those regions where ARPU is relatively lower, such that worldwide ARPU may continue to increase at a slower rate relative to ARPU in any geographic region, or potentially decrease even if ARPU increases in each geographic region.

Components of Results of Operations

Revenue

Advertising. We generate substantially all of our revenue from advertising. Our advertising revenue is generated by displaying ad products on Facebook, Instagram, and third-party affiliated websites or mobile applications. Marketers pay for ad products either directly or through their relationships with advertising agencies, based on the number of clicks made by people, the number of actions taken by people, or the number of impressions delivered. We recognize revenue from the delivery of click-based ads in the period in which a person clicks on the content, and action-based ads in the period in which a person takes the action the marketer contracted for. We recognize revenue from the display of impression-based ads in the contracted period in which the impressions are delivered. Impressions are considered delivered when an ad is displayed to people. The number of ads we show is subject to methodological changes as we continue to evolve our ads business and the structure of our ads products. We calculate price per ad as total ad revenue divided by the number of ads delivered, representing the effective price paid per impression by a marketer regardless of their desired objective such as impression, click, or action. For advertising revenue arrangements where we are not the primary obligor, we recognize revenue on a net basis.

Payments and other fees. We enable Payments from people to purchase virtual and digital goods from our developers. People can transact and make payments on the Facebook website by using debit and credit cards, PayPal, mobile phone payments, gift cards, or other methods. We receive a fee from developers when people make purchases in these applications using our Payments infrastructure. We recognize revenue net of amounts remitted to our developers. We have mandated the use of our Payments infrastructure for game applications on Facebook, and fees related to Payments are generated almost exclusively from games. Our other fees revenue, which has not been significant in recent periods, consists primarily of revenue from the delivery of virtual reality platform devices and related platform sales.

Cost of Revenue and Operating Expenses

Cost of revenue. Our cost of revenue consists primarily of expenses associated with the delivery and distribution of our products. These include expenses related to the operation of our data centers, such as facility and server equipment depreciation, salaries, benefits, and share-based compensation for employees on our operations teams, and energy and bandwidth costs. Cost of revenue also includes credit card and other transaction fees related to processing customer transactions, costs associated with partner arrangements, amortization of intangible assets, and cost of virtual reality platform device inventory sold.

Research and development. Research and development expenses consist primarily of share-based compensation, salaries, and benefits for employees on our engineering and technical teams who are responsible for building new products as well as improving existing products. We expense all of our research and development costs as they are incurred.

Marketing and sales. Our marketing and sales expenses consist of salaries, share-based compensation, and benefits for our employees engaged in sales, sales support, marketing, business development, and customer service functions. Our marketing and sales expenses also include marketing and promotional expenditures, as well as amortization of intangible assets.

General and administrative. The majority of our general and administrative expenses consist of salaries, benefits, and share-based compensation for certain of our executives as well as our legal, finance, human resources, corporate communications and policy, and other administrative employees. In addition, general and administrative expenses include legal-related costs and professional services.

Results of Operations

The following tables set forth our condensed consolidated statements of income data:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
	(in millions)			
Revenue	$ 9,321	$ 6,436	$ 17,353	$ 11,818
Costs and expenses:				
Cost of revenue	1,237	917	2,395	1,755
Research and development	1,919	1,471	3,753	2,814
Marketing and sales	1,124	901	2,181	1,728
General and administrative	640	413	1,295	778
Total costs and expenses	4,920	3,702	9,624	7,075
Income from operations	4,401	2,734	7,729	4,743
Interest and other income, net	87	20	168	78
Income before provision for income taxes	4,488	2,754	7,897	4,821
Provision for income taxes	594	471	938	800
Net income	$ 3,894	$ 2,283	$ 6,959	$ 4,021

Share-based compensation expense included in costs and expenses:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
	(in millions)			
Cost of revenue	$ 47	$ 29	$ 81	$ 51
Research and development	787	631	1,457	1,217
Marketing and sales	120	95	216	177
General and administrative	78	62	145	118
Total share-based compensation expense	$ 1,032	$ 817	$ 1,899	$ 1,563

The following tables set forth our condensed consolidated statements of income data (as a percentage of revenue):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue	100%	100%	100%	100%
Costs and expenses:				
Cost of revenue	13	14	14	15
Research and development	21	23	22	24
Marketing and sales	12	14	13	15
General and administrative	7	6	7	7
Total costs and expenses	53	58	55	60
Income from operations	47	42	45	40
Interest and other income, net	1	—	1	1
Income before provision for income taxes	48	43	46	41
Provision for income taxes	6	7	5	7
Net income	42%	35%	40%	34%

Share-based compensation expense included in costs and expenses (as a percentage of revenue):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Cost of revenue	1%	—%	—%	—%
Research and development	8	10	8	10
Marketing and sales	1	1	1	1
General and administrative	1	1	1	1
Total share-based compensation expense	11%	13%	11%	13%

Three and Six Months Ended June 30, 2017 and 2016

Revenue

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
			(in millions, except for percentages)			
Advertising	$ 9,164	$ 6,239	47 %	$ 17,021	$ 11,440	49 %
Payments and other fees	157	197	(20)%	332	378	(12)%
Total revenue	$ 9,321	$ 6,436	45 %	$ 17,353	$ 11,818	47 %

Revenue in the second quarter and the first six months of 2017 increased $2.89 billion , or 45% , and $5.54 billion , or 47% , respectively, compared to the same periods in 2016 . The increases were due to increases in advertising revenue.

The most important factor driving advertising revenue growth was an increase in revenue from ads in News Feed. For the second quarter and the first six months of 2017 , we estimate that mobile advertising revenue represented approximately 87% and 86% , respectively, of total advertising revenue, as compared with approximately 84% and 83% , respectively, in the same periods in 2016 . Factors that influenced our advertising revenue growth in the second quarter and the first six months of 2017 included (i) an increase in demand for our ad inventory, in part driven by an increase in the number of marketers actively advertising on Facebook, (ii) an increase in users and their engagement, and (iii) an increase in the number and frequency of ads displayed in News Feed, as well as the quality, relevance, and performance of those ads. However, we anticipate increases in the number and frequency of ads displayed in News Feed will be a less significant driver of our revenue growth in the future.

During the second quarter and first six months of 2017 , as compared to the same periods in 2016 , the average price per ad increased by 24% and 19%, respectively, and the number of ads delivered increased by 19% and 25%, respectively. The increase in average price per ad was driven by an increase in demand for our ad inventory. The increase in the ads delivered was driven by the same factors that influenced our advertising revenue growth, partially offset by increasing user engagement with video content and other product changes.

Payments and other fees revenue in the second quarter and the first six months of 2017 decreased $40 million , or 20% , and $46 million , or 12% , respectively, compared to the same periods in 2016 . The decreases in Payments and other fees revenue were mostly due to decreased Payments revenue from games played on personal computers. We anticipate Payments and other fees
revenue will continue to decline in 2017.

Foreign Exchange Impact on Revenue

The general strengthening of the U.S. dollar relative to certain foreign currencies from the second quarter and the first six months of 2016 compared to the same periods in 2017 had an unfavorable impact on our revenue.

If we had translated revenue for the second quarter ended June 30, 2017 using the prior year's monthly exchange rates for our settlement currencies other than the U.S. dollar, our total revenue and advertising revenue would have been $9.46 billion and $9.31 billion , respectively. Using these constant rates, both total revenue and advertising revenue would have been $141 million higher than actual total revenue and advertising revenue for the second quarter of 2017 . If we had translated revenue for the six months ended June 30, 2017 using the prior year's monthly exchange rates for our settlement currencies other than the U.S. dollar, our total revenue and advertising revenue would have been $17.52 billion and $17.18 billion , respectively. Using these constant rates, total revenue and advertising revenue would have been $164 million and $163 million higher than actual total revenue and advertising revenue, respectively, for the first six months of 2017 .

Cost of revenue

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
	(in millions, except for percentages)					
Cost of revenue	$ 1,237	$ 917	35%	$ 2,395	$ 1,755	36%
Percentage of revenue	13%	14%		14%	15%	

Cost of revenue in the second quarter and the first six months of 2017 increased $320 million , or 35% , and $640 million , or 36% , respectively, compared to the same periods in 2016 . The majority of the increases in both periods were due to increases in operational expenses related to our data centers and technical infrastructure and, to a lesser extent, higher costs associated with ads payment processing and partnership arrangements.

Research and development

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
	(in millions, except for percentages)					
Research and development	$ 1,919	$ 1,471	30%	$ 3,753	$ 2,814	33%
Percentage of revenue	21%	23%		22%	24%	

Research and development expenses in the second quarter and the first six months of 2017 increased $448 million , or 30% , and $939 million , or 33% , respectively, compared to the same periods in 2016 . The majority of the increases in both periods were due to increases in payroll and benefits as a result of a 48% increase in employee headcount from June 30, 2016 to June 30, 2017 in engineering and other technical functions. In addition, our equipment and related expenses to support our research and development efforts increased in both the second quarter and the first six months of 2017 , compared to the same periods in 2016.

Marketing and sales

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
	(in millions, except for percentages)					
Marketing and sales	$ 1,124	$ 901	25%	$ 2,181	$ 1,728	26%
Percentage of revenue	12%	14%		13%	15%	

Marketing and sales expenses in the second quarter and the first six months of 2017 increased $223 million , or 25% , and $453 million , or 26% , respectively, compared to the same periods in 2016 . The increases in both periods in 2017 were partially due to increases in payroll and benefits expenses as a result of a 30% increase in employee headcount from June 30, 2016 to June 30, 2017 in our marketing and sales functions. Additionally, in the second quarter and the first six months of 2017 , our marketing expenses increased $61 million and $124 million, respectively, and our professional services expense increased $50 million and $114 million, respectively, due to higher consulting and other professional service fees, compared to the same periods in 2016 .

General and administrative

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
	(in millions, except for percentages)					
General and administrative	$ 640	$ 413	55%	$ 1,295	$ 778	66%
Percentage of revenue	7%	6%		7%	7%	

General and administrative expenses in the second quarter and the first six months of 2017 increased $227 million , or 55% , and $517 million , or 66% , respectively, compared to the same periods in 2016 . The majority of the increases in both periods were due to increases in legal-related costs, and to a lesser extent, payroll and benefits expenses as a result of a 47% increase in employee headcount from June 30, 2016 to June 30, 2017 in general and administrative functions.

Interest and other income, net

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
	(in millions, except for percentages)					
Interest income, net	$ 91	$ 32	184 %	$ 158	$ 60	163 %
Other (expense) income, net	(4)	(12)	(67)%	10	18	(44)%
Interest and other income, net	$ 87	$ 20	NM	$ 168	$ 78	115 %

Interest and other income, net in the second quarter and the first six months of 2017 increased $67 million and $90 million , respectively, compared to the same periods in 2016 . The increases in both periods were primarily due to increases in interest income driven by higher invested cash balances and interest rates. In addition, for the first six months, such increase was partially offset by the foreign exchange impact resulting from the periodic re-measurement of our foreign currency monetary assets and liabilities.

Provision for income taxes

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% change	2017	2016	% change
	(in millions, except for percentages)					
Provision for income taxes	$ 594	$ 471	26%	$ 938	$ 800	17%
Effective tax rate	13%	17%		12%	17%	

Our provision for income taxes in the second quarter and the first six months of 2017 increased $123 million , or 26% , and $138 million , or 17% , respectively, compared to the same periods in 2016 , mostly due to increases in income before provision for income taxes, partially offset by decreases in the effective tax rates.

Our effective tax rates in the second quarter and the first six months of 2017 decreased compared to the same periods in 2016, primarily due to increases in income before provision for income taxes being earned in jurisdictions with a tax rate lower than that of the U.S. statutory rate where we plan to indefinitely reinvest a certain portion of those earnings, partially offset by decreases in the tax rate benefit from share-based compensation. In the second quarter and the first six months of 2017, excess tax benefits recognized from share-based compensation decreased our provision for income taxes by $275 million and $577 million , respectively, and our effective tax rates by six and seven percentage points, respectively, as compared to the tax rate without such benefits. For comparison, in the second quarter and the first six months of 2016, excess tax benefits recognized from share-based compensation decreased our provision for income taxes by $236 million and $462 million, respectively, and our effective tax rates by nine and ten percentage points, respectively, as compared to the tax rate without such benefits.

Effective Tax Rate Items . Our effective tax rate in the future will depend upon the proportion of our income before provision for income taxes earned in the United States and in jurisdictions with a tax rate lower than the U.S. statutory rate where we plan to indefinitely reinvest a certain portion of those earnings, as well as a number of other factors, including tax benefits from share-based compensation, tax effects of integrating intellectual property from acquisitions, settlement of tax contingency items, the impact of new legislation, and timing and amount of discrete items.

The portion of our income before provision for income taxes earned in jurisdictions with a tax rate lower than the U.S. statutory rate will depend upon the proportion of revenue and costs associated with the respective jurisdictions. Our ability to indefinitely reinvest those future earnings will depend upon the amount, location, and cost of deploying those earnings to where they are needed by the business.

Integrating intellectual property from acquisitions into our business generally involves intercompany transactions that have the impact of increasing our provision for income taxes. Consequently, our provision for income taxes and our effective tax rate may initially increase following an acquisition and integration. The magnitude of this impact will depend upon the specific type, size, and taxing jurisdictions of the intellectual property as well as the relative contributions to income in subsequent periods.

The tax effects of the accounting for share-based compensation will increase or decrease our effective tax rate based upon the difference between our share-based compensation expense and the deductions taken on our tax return which depends upon the stock price at the time of employee award vesting.

We recognize excess tax benefits on a discrete basis and we anticipate that our effective tax rate will vary from quarter to quarter depending on our stock price in each period. If our stock price remains constant to the July 24, 2017 price, we expect that our third quarter and full year rates will be similar to the rate in the second quarter.

Unrecognized Tax Benefits. As of June 30, 2017, our net unrecognized tax benefits, which were accrued as current liabilities of $25 million and other liabilities of $2.63 billion, were predominantly accrued for uncertainties related to transfer pricing with our foreign subsidiaries, which includes licensing of intellectual property, providing services, and other transactions, as well as for uncertainties with our research tax credits. The ultimate settlement of the liabilities will depend upon resolution of tax audits, litigation, or events that would otherwise change the assessment of such items. Based upon the status of litigation described below and the current status of tax audits in various jurisdictions, we do not anticipate a significant impact to such amounts within the next 12 months.

In July 2016, we received a Statutory Notice of Deficiency (Notice) from the IRS related to transfer pricing with our foreign subsidiaries in conjunction with the examination of the 2010 tax year. While the Notice applies only to the 2010 tax year, the IRS states that it will also apply its position for tax years subsequent to 2010, which, if the IRS prevails in its position, could result in an additional federal tax liability of an estimated aggregated amount of approximately $3.0 billion to $5.0 billion in excess of the amounts in our originally filed U.S. return, plus interest and any penalties asserted. We do not agree with the position of the IRS and have filed a petition in the United States Tax Court challenging the Notice. We have previously accrued an estimated unrecognized tax benefit consistent with the guidance in ASC 740 that is lower than the potential additional federal tax liability of $3.0 billion to $5.0 billion in excess of the amounts in our originally filed U.S. return, plus interest and penalties. If the IRS prevails in the assessment of additional tax due based on its position, the assessed tax, interest, and penalties, if any, could have a material adverse impact on our financial position, results of operations, or cash flows. As of June 30, 2017, we have not resolved this matter and proceedings continue in the United States Tax Court. We believe that adequate amounts have been reserved for any adjustments that may ultimately result from these examinations.

We expect to continue to accrue unrecognized tax benefits for certain recurring tax positions and anticipate that the amount for future quarters accrued will be similar to the second quarter and the first six months of 2017. Absent any unanticipated event, we do not expect our unrecognized tax benefits will have a significant impact on our effective tax rate in 2017.

Liquidity and Capital Resources

Our principal sources of liquidity are our cash and cash equivalents, marketable securities, and cash generated frum operations. Cash and cash equivalents and marketable securities consist mostly of cash on deposit with banks, investments in money market funds, and investments in U.S. government agency securities, U.S. government securities, and corporate debt securities. Cash and cash equivalents and marketable securities were $35.45 billion as of June 30, 2017 , an increase of $6.00 billion from December 31, 2016 , mostly due to $10.42 billion of cash generated from operations, partially offset by $2.72 billion for purchases of property and equipment, $1.50 billion of taxes paid related to net share settlement of equity awards, and $378 millinn for repurchases of our Class A common stock.

Cash paid for income taxes (net of refunds) was $1.36 billion for the first six months of 2017 . As of June 30, 2017 , our federal net operating loss carryforward was $3.74 billion, and we anticipate that none of this amount will be utilized to offset our federal taxable income in 2017. As of June 30, 2017 , we had $104 million of federal tax credits, of which none will be available to offset our federal tax liabilities in 2017.

In May 2016, we entered into a five-year senior unsecured revolving credit facility that allows us to borrow up to $2.0 billion . Any amounts outstanding under this facility will be due and payable on May 20, 2021. As of June 30, 2017 , no amounts had been drawn down and we were in compliance with the covenants under this credit facility.

In November 2016, our board of directors authorized a $6.0 billion share repurchase program of our Class A common stock that commenced in 2017 and does not have an expiration date. The timing and actual number of shares repurchased depend on a variety of factors, including price, general business and market conditions, and other investment opportunities, and shares may be repurchased through open market purchases or privately negotiated transactions, including through the use of trading plans intended to qualify under Rule 10b5-1 under the Securities Exchange Act of 1934 (Exchange Act). During the six months ended June 30, 2017 , we repurchased and subsequently retired approximately 3 million shares of our Class A common stock for an aggregate amount of approximately $408 million .

In January 2017, we began funding withholding taxes due on employee equity awards by net share settlement, rather than our previous approach of requiring employees to sell shares of our common stock to cover taxes upon vesting of such awards. In the first six months of 2017, we paid $1.50 billion of taxes related to the net share settlement of equity awards.

As of June 30, 2017 , $9.91 billion of the $35.45 billion in cash and cash equivalents and marketable securities was held by our foreign subsidiaries. We have provided residual taxes for the portion of earnings in jurisdictions where we do not intend to indefinitely reinvest such earnings of the local subsidiary.

We currently anticipate that our available funds, credit facility, and cash flow from operations will be sufficient to meet our operational cash needs for the fnreseeable future.

Cash Provided by Operating Activities

Cash flow from operating activities during the first six months of 2017 mostly consisted of net income, adjusted for certain non-cash items, such as share-based compensation expense of $1.90 billion and total depreciation and amortization of $1.40 billion . The increase in cash flow from operating activities during the first six months of 2017 , compared to the same period in 2016 , was mostly due to an increase in net income, as adjusted for share-based compensation expense and depreciation and amortization.

Cash Used in Investing Activities

Cash used in investing activities was $11.33 billion for the first six months of 2017 , mostly due to $8.64 billion for net purchases of marketable securities, and $2.72 billion for capital expenditures as we continued to invest in servers, data centers, office buildings, and network infrastructure. The increase in cash used in investing activities during the first six months of 2017 , compared to the same period in 2016 , was primarily due to net purchases of marketable securities.

We anticipate making capital expenditures in 2017 of approximately $7.0 billion to $7.5 billion.

Cash Used in Financing Activities

Cash used in financing activities during the first six months of 2017 mostly consisted of $1.50 billion of taxes paid related to net share settlement of equity awards, and $378 million for repurchases of our Class A common stock. The increase in cash used in financing activities during the first six months of 2017 , compared to the same period in 2016 , was mostly due to taxes paid related to net share settlement of equity awards and repurchases of our Class A common stock that commenced in 2017, partially offset by the reduction in payments on capital lease and other financing obligations.

Off-Balance Sheet Arrangements

We did not have any off-balance sheet arrangements as of June 30, 2017 .

Contractual Obligations

Except as disclosed in Note 8 — Commitments and Contingencies in the notes to the condensed consolidated financial statements included in Part I, Item 1, there were no material changes in our commitments under contractual obligations, as disclosed in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 .

Contingencies

We are involved in legal proceedings, claims, and regulatory, tax or government inquiries and investigations. We record a provision for a liability when we believe that it is both probable that a liability has been incurred, and that the amount can be reasonably estimated. Significant judgment is required to determine both probability and the estimated amount. Such matters are inherently unpredictable and subject to significant uncertainties, some of which are beyond our control. Should any of these estimates and assumptions change or prove to be incorrect, it could have a material impact on our results of operations, financial position, and cash flows.

See Note 8 — Commitments and Contingencies and Note 10 — Income Taxes in the notes to the condensed consolidated financial statements included in Part I, Item 1, and "Legal Proceedings" contained in Part II, Item 1 of this Quarterly Report on Form 10-Q for additional information regarding contingencies.

Recently Issued Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* (ASU 2014-09), which amends the existing accounting standards for revenue recognition. In August 2015, the FASB issued ASU No. 2015-14, *Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date* , which delays the effective date of ASU 2014-09 by one year. The FASB also agreed to allow entities to choose to adopt the standard as of the original effective date. In March 2016, the FASB issued Accounting Standards Update No. 2016-08, *Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations (Reporting Revenue Gross versus Net)* (ASU 2016-08) which clarifies the implementation guidance on principal versus agent considerations. The guidance includes indicators to assist an entity in determining whether it controls a specified good or service before it is transferred to the customers. The new standard further requires new disclosures about contracts with customers, including the significant judgments the registrant has made when applying the guidance. We will be adopting the new standard effective January 1, 2018. The new standard also permits two methods of adoption: retrospectively to each prior reporting period presented (full retrospective method), or retrospectively with the cumulative effect of initially applying the guidance recognized at the date of initial application (the modified retrospective method). We currently anticipate adopting the standard using the modified retrospective method. While we are still in the process of completing our analysis on the impact this guidance will have on our consolidated financial statements, related disclosures, and our internal controls over financial reporting, we do not expect the impact to be material.

In February 2016, the FASB issued Accounting Standards Update No. 2016-02, *Leases (Topic 842)* (ASU 2016-02), which generally requires companies to recognize operating and financing lease liabilities and corresponding right-of-use assets on the balance sheet. This guidance will be effective for us in the first quarter of 2019 on a modified retrospective basis and early adoption is permitted. We currently anticipate adopting the new standard effective January 1, 2019. While we continue to evaluate the effect of adopting this guidance on our consolidated financial statements and related disclosures, we expect our operating leases, as disclosed in Note 8 — Commitments and Contingencies in the notes to the condensed consolidated financial statements included in Part I, Item 1, will be subject to the new standard. We will recognize right-of-use assets and operating lease liabilities on our consolidated balance sheets upon adoption, which will increase our total assets and liabilities.

In January 2017, the FASB issued Accounting Standards Update No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business* (ASU 2017-01), which revises the definition of a business and provides new guidance in evaluating when a set of transferred assets and activities is a business. This guidance will be effective for us in the first quarter of 2018 on a prospective basis, and early adoption is permitted. We do not expect the standard to have a material impact on our consolidated financial statements.

In January 2017, the FASB issued Accounting Standards Update No. 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment* (ASU 2017-04), which eliminates step two from the goodwill impairment test. Under ASU 2017-04, an entity should recognize an impairment charge for the amount by which the carrying amount of a reporting unit exceeds its fair value up to the amount of goodwill allocated to that reporting unit. This guidance will be

effective for us in the first quarter of 2020 on a prospective basis, and early adoption is permitted. We do not expect the standard to have a material impact on our consolidated financial statements.

Critical Accounting Policies and Estimates

Our condensed consolidated financial statements are prepared in accordance with GAAP. The preparation of these condensed consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue, costs and expenses, and related disclosures. These estimates form the basis for judgments we make about the carrying values of our assets and liabilities, which are not readily apparent from other sources. We base our estimates and judgments on historical experience and on various other assumptions that we believe are reasonable under the circumstances. On an ongoing basis, we evaluate our estimates and assumptions. Our actual results may differ from these estimates under different assumptions or conditions.

We believe that the assumptions and estimates associated with income taxes, loss contingencies, and business combinations and valuation of goodwill and other acquired intangible assets have the greatest potential impact on our condensed consolidated financial statements. Therefore, we consider these to be our critical accounting policies and estimates.

There have been no material changes to our critical accounting policies and estimates as compared to the critical accounting policies and estimates described in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 .

Item 3. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risks, including changes to foreign currency exchange rates, interest rates, and inflation.

Foreign Currency Exchange Risk

We have foreign currency risks related to our revenue and operating expenses denominated in currencies other than the U.S. dollar, primarily the Euro. In general, we are a net receiver of currencies other than the U.S. dollar. Accordingly, changes in exchange rates, and in particular a strengthening of the U.S. dollar, have negatively affected our revenue and other operating results as expressed in U.S. dollars.

We have experienced and will continue to experience fluctuations in our net income as a result of transaction gains or losses related to revaluing certain current asset and current liability balances that are denominated in currencies other than the functional currency of the entities in which they are recorded. At this time, we have not entered into, but in the future we may enter into, derivatives or other financial instruments in an attempt to hedge our foreign currency exchange risk. It is difficult to predict the effect hedging activities would have on our results of operations. We recognized foreign currency losses of $3 million and $13 million in the three months ended June 30, 2017 and 2016, respectively, and foreign currency gains of $11 million and $16 million in the six months ended June 30, 2017 and 2016, respectively.

Interest Rate Sensitivity

Our exposure to changes in interest rates relates primarily to interest earned and market value on our cash and cash equivalents and marketable securities.

Our cash and cash equivalents, and marketable securities consist of cash, certificates of deposit, time deposits, money market funds, U.S. government securities, U.S. government agency securities, and corporate debt securities. Our investment policy and strategy are focused on preservation of capital and supporting our liquidity requirements. Changes in U.S. interest rates affect the interest earned on our cash and cash equivalents and marketable securities, and the market value of those securities. A hypothetical 100 basis point increase in interest rates would have resulted in a decrease of $534 million and $403 million in the market value of our available-for-sale debt securities as of June 30, 2017 and December 31, 2016 , respectively. Any realized gains or losses resulting from such interest rate changes would only occur if we sold the investments prior to maturity.

Item 4. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our chief executive officer (CEO) and chief financial officer (CFO), has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (Exchange Act)), as of the end of the period covered by this Quarterly Report on Form 10-Q. Based on such evaluation, our CEO and CFO have concluded that as of June 30, 2017 , our disclosure controls and procedures are designed at a reasonable assurance level and are effective to provide reasonable assurance that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in the rules and forms of the Securities and Exchange Commission (SEC), and that such information is accumulated and communicated to our management, including our CEO and CFO, as appropriate, to allow timely decisions regarding required disclosure.

Changes in Internal Control

There were no changes in our internal control over financial reporting identified in management's evaluation pursuant to Rules 13a-15(d) or 15d-15(d) of the Exchange Act during the period covered by this Quarterly Report on Form 10-Q that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating the disclosure controls and procedures and internal control over financial reporting, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures and internal control over financial reporting must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs.

PART II—OTHER INFORMATION

Item 1. Legal Proceedings

Beginning on May 22, 2012, multiple putative class actions, derivative actions, and individual actions were filed in state and federal courts in the United States and in other jurisdictions against us, our directors, and/or certain of our officers alleging violation of securities laws or breach of fiduciary duties in connection with our initial public offering (IPO) and seeking unspecified damages. We believe these lawsuits are without merit, and we intend to continue to vigorously defend them. The vast majority of the cases in the United States, along with multiple cases filed against The NASDAQ OMX Group, Inc. and The Nasdaq Stock Market LLC (collectively referred to herein as NASDAQ) alleging technical and other trading-related errors by NASDAQ in connection with our IPO, were ordered centralized for coordinated or consolidated pre-trial proceedings in the U.S. District Court for the Southern District of New York. In a series of rulings in 2013 and 2014, the court denied our motion to dismiss the consolidated securities class action and granted our motions to dismiss the derivative actions against our directors and certain of our officers. On July 24, 2015, the court of appeals affirmed the dismissal of the derivative actions. On December 11, 2015, the court granted plaintiffs' motion for class certification in the consolidated securities action. On April 13, 2017, we filed a motion for summary judgment. Trial is scheduled to begin on October 23, 2017.

On April 27, 2016, we announced a proposal to create a new class of non-voting capital stock (Class C capital stock) and our intention to declare and pay a dividend of two shares of Class C capital stock for each outstanding share of Class A and Class B common stock (the Reclassification). Following our announcement of the Reclassification, beginning on April 29, 2016, multiple purported class action lawsuits were filed on behalf of our stockholders in the Delaware Court of Chancery against us, certain of our board of directors, and Mark Zuckerberg. The lawsuits have been consolidated under the caption *In re Facebook, Inc. Class C Reclassification Litig.*, C.A. No. 12286-VCL, and the consolidated complaint generally alleges that the defendants breached their fiduciary duties in connection with the Reclassification. Among other remedies, these lawsuits seek to enjoin the Reclassification as well as unspecified money damages, costs, and attorneys' fees. Trial is scheduled to begin on September 26, 2017. We believe that the lawsuits are without merit and intend to vigorously defend against all claims asserted.

On December 29, 2014, an entity named Social Ranger LLC sued us for alleged violations of the United States antitrust laws in connection with virtual currency services. On May 24, 2017, the parties entered into a settlement agreement resolving all claims.

We are also involved in other legal proceedings, claims, and regulatory, tax or government inquiries and investigations arising from the ordinary course of our business, and we may in the future be subject to additional lawsuits and disputes.

Item 1A. Risk Factors

Certain factors may have a material adverse effect on our business, financial condition, and results of operations. You should consider carefully the risks and uncertainties described below, in addition to other information contained in this Quarterly Report on Form 10-Q, including our condensed consolidated financial statements and related notes. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties that we are unaware of, or that we currently believe are not material, may also become important factors that adversely affect our business. If any of the following risks actually occurs, our business, financial condition, results of operations, and future prospects could be materially and adversely affected. In that event, the trading price of our Class A common stock could decline, and you could lose part or all of your investment.

Risks Related to Our Business and Industry

If we fail to retain existing users or add new users, or if our users decrease their level of engagement with our products, our revenue, financial results, and business may be significantly harmed.

The size of our user base and our users' level of engagement are critical to our success. Our financial performance has been and will continue to be significantly determined by our success in adding, retaining, and engaging active users of our products, particularly for Facebook and Instagram. We anticipate that our active user growth rate will continue to decline over time as the size of our active user base increases, and as we achieve higher market penetration rates. If people do not perceive our products to be useful, reliable, and trustworthy, we may not be able to attract or retain users or otherwise maintain or increase the frequency and duration of their engagement. A number of other social networking companies that achieved early popularity have since seen their active user bases or levels of engagement decline, in some cases precipitously. There is no guarantee that we will not experience a similar erosion of our active user base or engagement levels. Our user engagement patterns have changed over time, and user engagement can be difficult to measure, particularly as we introduce new and different products and services. Any number of factors could potentially negatively affect user retention, growth, and engagement, including if:

- users increasingly engage with other competitive products or services;
- we fail to introduce new products or services that users find engaging or if we introduce new products or services that are not favorably received;
- users feel that their experience is diminished as a result of the decisions we make with respect to the frequency, prominence, format, size, and quality of ads that we display;
- users have difficulty installing, updating, or otherwise accessing our products on mobile devices as a result of actions by us or third parties that we rely on to distribute our products and deliver our services;
- user behavior on any of our products changes, including decreases in the quality and frequency of content shared on our products and services;
- we are unable to continue to develop products for mobile devices that users find engaging, that work with a variety of mobile operating systems and networks, and that achieve a high level of market acceptance;
- there are decreases in user sentiment about the quality or usefulness of our products or concerns related to privacy and sharing, safety, security, or other factors;
- we are unable to manage and prioritize information to ensure users are presented with content that is appropriate, interesting, useful, and relevant to them;
- we are unable to obtain or attract engaging third-party content;
- users adopt new technologies where our products may be displaced in favor of other products or services, or may not be featured or otherwise available;
- there are adverse changes in our products that are mandated by legislation, regulatory authorities, or litigation, including settlements or consent decrees;
- technical or other problems prevent us from delivering our products in a rapid and reliable manner or otherwise affect the user experience, such as security breaches or failure to prevent or limit spam or similar content;
- we adopt terms, policies, or procedures related to areas such as sharing, content, or user data that are perceived negatively by our users or the general public;

- we elect to focus our user growth and engagement efforts more on longer-term initiatives, or if initiatives designed to attract and retain users and engagement are unsuccessful or discontinued, whether as a result of actions by us, third parties, or otherwise;
- we fail to provide adequate customer service to users, marketers, developers, or other partners;
- we, developers whose products are integrated with our products, or other partners and companies in our industry are the subject of adverse media reports or other negative publicity; or
- our current or future products, such as our development tools and application programming interfaces that enable developers to build, grow, and monetize mobile and web applications, reduce user activity on our products by making it easier for our users to interact and share on third-party mobile and web applications.

If we are unable to maintain or increase our user base and user engagement, our revenue and financial results may be adversely affected. Any decrease in user retention, growth, or engagement could render our products less attractive to users, marketers, and developers, which is likely to have a material and adverse impact on our revenue, business, financial condition, and results of operations. If our active user growth rate continues to slow, we will become increasingly dependent on our ability to maintain or increase levels of user engagement and monetization in order to drive revenue growth.

We generate substantially all of our revenue from advertising. The loss of marketers, or reduction in spending by marketers, could seriously harm our business.

Substantially all of our revenue is currently generated from third parties advertising on Facebook and Instagram. For the first six months of 2017 and 2016, advertising accounted for 98% and 97% , respectively, of our revenue. As is common in the industry, our marketers do not have long-term advertising commitments with us. Many of our marketers spend only a relatively small portion of their overall advertising budget with us. In addition, marketers may view some of our products as experimental and unproven. Marketers will not continue to do business with us, or they will reduce the prices they are willing to pay to advertise with us or the budgets they are willing to commit to us, if we do not deliver ads in an effective manner, or if they do not believe that their investment in advertising with us will generate a competitive return relative to other alternatives.

Our advertising revenue could also be adversely affected by a number of other factors, including:

- decreases in user engagement, including time spent on our products;
- our inability to continue to increase user access to and engagement with our mobile products;
- product changes or inventory management decisions we may make that change the size, format, frequency, or relative prominence of ads displayed on our products or of other unpaid content shared by marketers on our products;
- our inability to maintain or increase marketer demand, the pricing of our ads, or both;
- our inability to maintain or increase the quantity or quality of ads shown to users;
- changes to third-party policies that limit our ability to deliver or target advertising on mobile devices;
- the availability, accuracy, and utility of analytics and measurement solutions offered by us or third parties that demonstrate the value of our ads to marketers, or our ability to further improve such tools;
- loss of advertising market share to our competitors, including if prices for purchasing ads increase or if competitors offer lower priced or more integrated products;
- adverse legal developments relating to advertising, including legislative and regulatory developments and developments in litigation;
- decisions by marketers to reduce their advertising as a result of adverse media reports or other negative publicity involving us, our advertising metrics, content on our products, developers with mobile and web applications that are integrated with our products, or other companies in our industry;
- reductions of advertising by marketers due to objectionable content published on our products by third parties;
- the effectiveness of our ad targeting or degree to which users opt out of certain types of ad targeting;
- the degree to which users cease or reduce the number of times they click on our ads;

- changes in the way advertising on mobile devices or on personal computers is measured or priced; and
- the impact of macroeconomic conditions, whether in the advertising industry in general, or among specific types of marketers or within particular geographies.

The occurrence of any of these or other factors could result in a reduction in demand for our ads, which may reduce the prices we receive for our ads, or cause marketers to stop advertising with us altogether, either of which would negatively affect our revenue and financial results.

Our user growth, engagement, and monetization on mobile devices depend upon effective operation with mobile operating systems, networks, and standards that we do not control.

The substantial majority of our revenue is generated from advertising on mobile devices. There is no guarantee that popular mobile devices will continue to feature Facebook or our other products, or that mobile device users will continue to use our products rather than competing products. We are dependent on the interoperability of Facebook and our other products with popular mobile operating systems, networks, and standards that we do not control, such as the Android and iOS operating systems. Any changes, bugs, or technical issues in such systems, or changes in our relationships with mobile operating system partners, handset manufacturers, or mobile carriers, or in their terms of service or policies that degrade our products' functionality, reduce or eliminate our ability to distribute our products, give preferential treatment to competitive products, limit our ability to deliver, target, or measure the effectiveness of ads, or charge fees related to the distribution of our products or our delivery of ads could adversely affect the usage of Facebook or our other products and monetization on mobile devices. Additionally, in order to deliver high quality mobile products, it is important that our products work well with a range of mobile technologies, systems, networks, and standards that we do not control, and that we have good relationships with handset manufacturers and mobile carriers. We may not be successful in maintaining or developing relationships with key participants in the mobile ecosystem or in developing products that operate effectively with these technologies, systems, networks, or standards. In the event that it is more difficult for our users to access and use Facebook or our other products on their mobile devices, or if our users choose not to access or use Facebook or our other products on their mobile devices or use mobile products that do not offer access to Facebook or our other products, our user growth and user engagement could be harmed. From time to time, we may also take actions regarding the distribution of our products or the operation of our business based on what we believe to be in our long-term best interests. Such actions may adversely affect our users and our relationships with the operators of mobile operating systems, handset manufacturers, mobile carriers, or other business partners, and there is no assurance that these actions will result in the anticipated long-term benefits. In the event that our users are adversely affected by these actions or if our relationships with such third parties deteriorate, our user growth, engagement, and monetization could be adversely affected and our business could be harmed.

Our business is highly competitive. Competition presents an ongoing threat to the success of our business.

We compete with companies that sell advertising, as well as with companies that provide social and communication products and services that are designed to engage users and capture time spent on mobile devices and online. We face significant competition in every aspect of our business, including from companies that facilitate communication and the sharing of content and information, companies that enable marketers to display advertising, and companies that provide development platforms for applications developers. We compete with companies that offer products across broad platforms that replicate capabilities we provide. For example, Google has integrated social functionality into a number of its products, including search, video, and Android. We also compete with companies that develop applications, particularly mobile applications, that provide social or other communications functionality, such as messaging, photo- and video-sharing, and micro-blogging, as well as companies that provide regional social networks that have strong positions in particular countries. In addition, we face competition from traditional, online, and mobile businesses that provide media for marketers to reach their audiences and/or develop tools and systems for managing and optimizing advertising campaigns. We also compete with companies that develop and deliver virtual reality products and services.

Some of our current and potential competitors may have significantly greater resources or better competitive positions in certain product segments, geographic regions, or user demographics than we do. These factors may allow our competitors to respond more effectively than us to new or emerging technologies and changes in market conditions. We believe that some users, particularly younger users, are aware of and actively engaging with other products and services similar to, or as a substitute for, Facebook products and services, and we believe that some users have reduced their use of and engagement with our products and services in favor of these other products and services. In the event that users increasingly engage with other products and services, we may experience a decline in use and engagement in key user demographics or more broadly, in which case our business would likely be harmed.

Our competitors may develop products, features, or services that are similar to ours or that achieve greater acceptance, may undertake more far-reaching and successful product development efforts or marketing campaigns, or may adopt more aggressive pricing policies. In addition, developers whose mobile and web applications are integrated with Facebook or our other products may use information shared by our users through our products in order to develop products or features that compete with us. Some

competitors may gain a competitive advantage against us in areas where we operate, including: by integrating competing platforms, applications, or features into products they control such as mobile device operating systems, search engines, or web browsers; by making acquisitions; by limiting or denying our access to advertising measurement or delivery systems; by limiting our ability to deliver, target, or measure the effectiveness of ads; by imposing fees or other charges related to our delivery of ads; by making access to our products more difficult; or by making it more difficult to communicate with our users. As a result, our competitors may acquire and engage users or generate advertising or other revenue at the expense of our own efforts, which may negatively affect our business and financial results. In addition, from time to time, we may take actions in response to competitive threats, but we cannot assure you that these actions will be successful or that they will not negatively affect our business and financial results.

We believe that our ability to compete effectively depends upon many factors both within and beyond our control, including:

- the popularity, usefulness, ease of use, performance, and reliability of our products compared to our competitors' products;
- the size and composition of our user base;
- the engagement of users with our products and competing products;
- the timing and market acceptance of products, including developments and enhancements to our or our competitors' products;
- our ability to distribute our products to new and existing users;
- our ability to monetize our products;
- the frequency, size, format, quality, and relative prominence of the ads displayed by us or our competitors;
- customer service and support efforts;
- marketing and selling efforts, including our ability to measure the effectiveness of our ads and to provide marketers with a compelling return on their investments;
- our ability to establish and maintain developers' interest in building mobile and web applications that integrate with Facebook and our other products;
- our ability to establish and maintain publisher interest in integrating their content with Facebook and our other products;
- changes mandated by legislation, regulatory authorities, or litigation, including settlements and consent decrees, some of which may have a disproportionate effect on us;
- acquisitions or consolidation within our industry, which may result in more formidable competitors;
- our ability to attract, retain, and motivate talented employees, particularly software engineers, designers, and product managers;
- our ability to cost-effectively manage and grow our operations; and
- our reputation and brand strength relative to those of our competitors.

If we are not able to compete effectively, our user base and level of user engagement may decrease, we may become less attractive to developers and marketers, and our revenue and results of operations may be materially and adversely affected.

Action by governments to restrict access to Facebook or our other products in their countries could substantially harm our business and financial results.

It is possible that governments of one or more countries may seek to censor content available on Facebook or our other products in their country, restrict access to our products from their country entirely, or impose other restrictions that may affect the accessibility of our products in their country for an extended period of time or indefinitely. For example, access to Facebook has been or is currently restricted in whole or in part in China, Iran, and North Korea. In addition, government authorities in other countries may seek to restrict access to our products if they consider us to be in violation of their laws or a threat to public safety or for other reasons, and certain of our products have been restricted by governments in other countries from time to time. In the event that content shown on Facebook or our other products is subject to censorship, access to our products is restricted, in whole or in part, in one or more countries, or other restrictions are imposed on our products, or our competitors are able to successfully penetrate new geographic markets or capture a greater share of existing geographic markets that we cannot access or where we face other restrictions, our ability to retain or increase our user base, user engagement, or the level of advertising by marketers may be adversely affected, we may not be able to maintain or grow our revenue as anticipated, and our financial results could be adversely affected.

Our new products and changes to existing products could fail to attract or retain users or generate revenue and profits.

Our ability to retain, increase, and engage our user base and to increase our revenue depends heavily on our ability to continue to evolve our existing products and to create successful new products, both independently and in conjunction with developers or other third parties. We may introduce significant changes to our existing products or acquire or introduce new and unproven products, including using technologies with which we have little or no prior development or operating experience. For example, in March 2016, we shipped our first virtual reality hardware product, the Oculus Rift. In addition, we have announced plans to develop augmented reality technology and products. We do not have significant experience with consumer hardware products or virtual or augmented reality technology, which may adversely affect our ability to successfully develop and market these products and technologies, and we will incur increased costs in connection with the development and marketing of such products and technologies. We have also invested, and expect to continue to invest, significant resources in growing our WhatsApp and Messenger products. We have historically monetized messaging in only a very limited fashion, and we may not be successful in our efforts to generate meaningful revenue from messaging over the long term. If these or other new or enhanced products fail to engage users, marketers, or developers, or if we are unsuccessful in our monetization efforts, we may fail to attract or retain users or to generate sufficient revenue, operating margin, or other value to justify our investments, and our business may be adversely affected.

We make product and investment decisions that may not prioritize short-term financial results and may not produce the long-term benefits that we expect.

We frequently make product and investment decisions that may not prioritize short-term financial results if we believe that the decisions are consistent with our mission and benefit the aggregate user experience and will thereby improve our financial performance over the long term. For example, from time to time we may change the size, frequency, or relative prominence of ads in order to improve ad quality and overall user experience. Similarly, from time to time we update our News Feed ranking algorithm to deliver the most relevant content to our users, which may adversely affect the distribution of content of marketers and developers and could reduce their incentive to invest in their development and marketing efforts on Facebook. We also may introduce new features or other changes to existing products, or introduce new stand-alone products, that attract users away from properties, formats, or use cases where we have more proven means of monetization. For example, we have made, and expect to continue to make, changes to our products to provide users with greater access to video content, and some of these changes have had, or will have, the effect of reducing user engagement with News Feed, which could adversely affect our financial results. In addition, we plan to continue focusing on growing users and engagement on Instagram, Messenger, and WhatsApp, and we may also introduce other stand-alone applications in the future. These efforts may reduce engagement with the core Facebook application, where we have the most proven means of monetization and which serves as the platform for many of our new user experiences. These decisions may adversely affect our business and results of operations and may not produce the long-term benefits that we expect.

If we are not able to maintain and enhance our brands, or if events occur that damage our reputation and brands, our ability to expand our base of users, marketers, and developers may be impaired, and our business and financial results may be harmed.

We believe that our brands have significantly contributed to the success of our business. We also believe that maintaining and enhancing our brands is critical to expanding our base of users, marketers, and developers. Many of our new users are referred by existing users. Maintaining and enhancing our brands will depend largely on our ability to continue to provide useful, reliable, trustworthy, and innovative products, which we may not do successfully. We may introduce new products or terms of service or policies that users do not like, which may negatively affect our brands. Additionally, the actions of our developers or advertisers may affect our brands if users do not have a positive experience using third-party mobile and web applications integrated with our products or interacting with parties that advertise through our products. We will also continue to experience media, legislative, or regulatory scrutiny of our decisions regarding user privacy, content, and other issues, which may adversely affect our reputation and brands. We also may fail to respond expeditiously to the sharing of objectionable content on our services or to otherwise address user concerns, which could erode confidence in our brands. Our brands may also be negatively affected by the actions of users that are deemed to be hostile or inappropriate to other users, by the actions of users acting under false or inauthentic identities, by the use of our products or services to disseminate information that is deemed to be misleading (or intended to manipulate opinions), by perceived or actual efforts by governments to obtain access to user information for security-related purposes, or by the use of our products or services for illicit, objectionable, or illegal ends. Maintaining and enhancing our brands may require us to make substantial investments and these investments may not be successful. Certain of our past actions have eroded confidence in our brands, and if we fail to successfully promote and maintain our brands or if we incur excessive expenses in this effort, our business and financial results may be adversely affected.

Security breaches and improper access to or disclosure of our data or user data, or other hacking and phishing attacks on our systems, could harm our reputation and adversely affect our business.

Our industry is prone to cyber-attacks by third parties seeking unauthorized access to our data or users' data or to disrupt our ability to provide service. Any failure to prevent or mitigate security breaches and improper access to or disclosure of our data or user data could result in the loss or misuse of such data, which could harm our business and reputation and diminish our competitive position. In addition, computer malware, viruses, social engineering (predominantly spear phishing attacks), and general hacking have become more prevalent in our industry, have occurred on our systems in the past, and will occur on our systems in the future. As a result of our prominence, we believe that we are a particularly attractive target for such breaches and attacks. Such attacks may cause interruptions to the services we provide, degrade the user experience, cause users to lose confidence and trust in our products, or result in financial harm to us. Our efforts to protect our company data or the information we receive may also be unsuccessful due to software bugs or other technical malfunctions; employee, contractor, or vendor error or malfeasance; government surveillance; or other threats that evolve. In addition, third parties may attempt to fraudulently induce employees or users to disclose information in order to gain access to our data or our users' data. Although we have developed systems and processes that are designed to protect our data and user data, to prevent data loss, and to prevent or detect security breaches, we cannot assure you that such measures will provide absolute security.

In addition, some of our developers or other partners, such as those that help us measure the effectiveness of ads, may receive or store information provided by us or by our users through mobile or web applications integrated with Facebook. We provide limited information to such third parties based on the scope of services provided to us. However, if these third parties or developers fail to adopt or adhere to adequate data security practices, or in the event of a breach of their networks, our data or our users' data may be improperly accessed, used, or disclosed.

Affected users or government authorities could initiate legal or regulatory actions against us in connection with any security breaches or improper disclosure of data, which could cause us to incur significant expense and liability or result in orders or consent decrees forcing us to modify our business practices. Any of these events could have a material and adverse effect on our business, reputation, or financial results.

Unfavorable media coverage could negatively affect our business.

We receive a high degree of media coverage around the world. Unfavorable publicity regarding, for example, our privacy practices, terms of service, product changes, product quality, litigation or regulatory activity, government surveillance, the actions of our advertisers, the actions of our developers whose products are integrated with our products, the use of our products or services for illicit, objectionable, or illegal ends, the actions of our users, the quality and integrity of content shared on our platform, or the actions of other companies that provide similar services to us, has in the past, and could in the future, adversely affect our reputation. Such negative publicity also could have an adverse effect on the size, engagement, and loyalty of our user base and result in decreased revenue, which could adversely affect our business and financial results.

Our financial results will fluctuate from quarter to quarter and are difficult to predict.

Our quarterly financial results have fluctuated in the past and will fluctuate in the future. Additionally, we have a limited operating history with the current scale of our business, which makes it difficult to forecast our future results. As a result, you should not rely upon our past quarterly financial results as indicators of future performance. You should take into account the risks and uncertainties frequently encountered by companies in rapidly evolving markets. Our financial results in any given quarter can be influenced by numerous factors, many of which we are unable to predict or are outside of our control, including:

- our ability to maintain and grow our user base and user engagement;
- our ability to attract and retain marketers in a particular period;
- fluctuations in spending by our marketers due to seasonality, such as historically strong spending in the fourth quarter of each year, episodic regional or global events, or other factors;
- the frequency, prominence, size, format, and quality of ads shown to users;
- the success of technologies designed to block the display of ads;
- the pricing of our ads and other products;
- the diversification and growth of revenue sources beyond advertising on Facebook and Instagram;
- our ability to generate revenue from Payments, or the sale of Oculus products and services or other products we may introduce in the future;
- the development and introduction of new products or services by us or our competitors;
- product changes that may reduce traffic to features or products that we successfully monetize;
- increases in marketing, sales, and other operating expenses that we will incur to grow and expand our operations and to remain competitive;
- costs and expenses related to the development and delivery of Oculus products and services;
- our ability to maintain gross margins and operating margins;
- costs related to acquisitions, including costs associated with amortization and additional investments to develop the acquired technologies;
- charges associated with impairment of any assets on our balance sheet;
- our ability to obtain equipment, components, and labor for our data centers and other technical infrastructure in a timely and cost-effective manner;
- system failures or outages, which could prevent us from serving ads for any period of time;
- breaches of security or privacy, and the costs associated with any such breaches and remediation;
- changes in the manner in which we distribute our products or inaccessibility of our products due to third-party actions;
- fees paid to third parties for content or the distribution of our products;
- share-based compensation expense, including acquisition-related expense;
- adverse litigation judgments, settlements, or other litigation-related costs;
- changes in the legislative or regulatory environment, including with respect to privacy and data protection, or enforcement by government regulators, including fines, orders, or consent decrees;
- the overall tax rate for our business, which may be affected by the mix of income we earn in the U.S. and in jurisdictions with comparatively lower tax rates, the tax effects of share-based compensation, the effects of integrating intellectual property from acquisitions, and the impact of new legislation;
- tax obligations that may arise from changes in laws or resolutions of tax examinations, including the examination

we are currently under by the Internal Revenue Service (IRS), that materially differ from the amounts we have anticipated;

- fluctuations in currency exchange rates and changes in the proportion of our revenue and expenses denominated in foreign currencies;
- fluctuations in the market values of our portfolio investments and in interest rates;
- changes in U.S. generally accepted accounting principles; and
- changes in global business or macroeconomic conditions.

We expect our rates of growth to decline in the future.

We expect that our user growth and revenue growth rates will decline over time as the size of our active user base increases and as we achieve greater market penetration. We expect our revenue growth rate will generally decline over time as our revenue increases to higher levels. As our growth rates decline, investors' perceptions of our business may be adversely affected and the trading price of our Class A common stock could decline.

Our costs are continuing to grow, which could reduce our operating margin and profitability. If our investments are not successful, our business and financial performance could be harmed.

Operating our business is costly, and we expect our expenses to continue to increase in the future as we broaden our user base, as users increase the amount and types of content they consume and the data they share with us, for example with respect to video, as we develop and implement new products, as we continue to expand our technical infrastructure, as we continue to invest in new and unproven technologies, and as we continue to hire additional employees to support our expanding operations. We will continue to invest in our messaging, video content, and global connectivity efforts, as well as other initiatives that may not have clear paths to monetization. In addition, we will incur increased costs in connection with the development and marketing of our Oculus products and services. Any such investments may not be successful, and any such increases in our costs may reduce our operating margin and profitability. In addition, if our investments are not successful, our ability to grow revenue will be harmed, which could adversely affect our business and financial performance.

Given our levels of share-based compensation, our tax rate may vary significantly depending on our stock price.

The tax effects of the accounting for share-based compensation may significantly impact our effective tax rate from period to period. In periods in which our stock price is higher than the grant price of the share-based compensation vesting in that period, we will recognize excess tax benefits that will decrease our effective tax rate. For example, in the first six months of 2017, excess tax benefits recognized from share-based compensation decreased our provision for income taxes by $577 million and our effective tax rate by seven percentage points as compared to the tax rate without such benefits. In future periods in which our stock price is lower than the grant price of the share-based compensation vesting in that period, our effective tax rate may increase. The amount and value of share-based compensation issued relative to our earnings in a particular period will also affect the magnitude of the impact of share-based compensation on our effective tax rate. These tax effects are dependent on our stock price, which we do not control, and a decline in our stock price could significantly increase our effective tax rate and adversely affect our financial results.

Our business is subject to complex and evolving U.S. and foreign laws and regulations regarding privacy, data protection, content, competition, consumer protection, and other matters. Many of these laws and regulations are subject to change and uncertain interpretation, and could result in claims, changes to our business practices, monetary penalties, increased cost of operations, or declines in user growth or engagement, or otherwise harm our business.

We are subject to a variety of laws and regulations in the United States and abroad that involve matters central to our business, including privacy, data protection and personal information, rights of publicity, content, intellectual property, advertising, marketing, distribution, data security, data retention and deletion, personal information, electronic contracts and other communications, competition, protection of minors, consumer protection, telecommunications, product liability, taxation, economic or other trade prohibitions or sanctions, securities law compliance, and online payment services. The introduction of new products, expansion of our activities in certain jurisdictions, or other actions that we may take may subject us to additional laws, regulations, or other government scrutiny. In addition, foreign data protection, privacy, content, competition, and other laws and regulations can impose different obligations or be more restrictive than those in the United States.

These U.S. federal and state and foreign laws and regulations, which in some cases can be enforced by private parties in addition to government entities, are constantly evolving and can be subject to significant change. As a result, the application, interpretation, and enforcement of these laws and regulations are often uncertain, particularly in the new and rapidly evolving industry in which we operate, and may be interpreted and applied inconsistently from country to country and inconsistently with our current policies and practices. For example, regulatory or legislative actions affecting the manner in which we display content to our users or obtain consent to various practices could adversely affect user growth and engagement. Such actions could affect the manner in which we provide our services or adversely affect our financial results.

We are also subject to laws and regulations that dictate whether, how, and under what circumstances we can transfer, process and/or receive certain data that is critical to our operations, including data shared between countries or regions in which we operate and data shared among our products and services. For example, in 2016, the European Union and United States agreed to an alternative transfer framework for data transferred from the European Union to the United States, called the Privacy Shield, but this new framework is subject to an annual review that could result in changes to our obligations and also may be challenged by national regulators or private parties. In addition, the other bases upon which Facebook relies to legitimize the transfer of such data, such as standard Model Contractual Clauses (MCCs), have been subjected to regulatory or judicial scrutiny. For example, the Irish Data Protection Commissioner is investigating and has challenged the legal grounds for transfers of user data to Facebook, Inc. We also face multiple inquiries, investigations, and lawsuits in Europe, India, and other jurisdictions regarding the August 2016 update to WhatsApp's terms of service and privacy policy and its sharing of certain data with other Facebook products and services, including a lawsuit currently pending before the Supreme Court of India. If one or more of the legal bases for transferring data from Europe to the United States is invalidated, if we are unable to transfer data between and among countries and regions in which we operate, or if we are prohibited from sharing data among our products and services, it could affect the manner in which we provide our services or adversely affect our financial results.

Proposed or new legislation and regulations could also significantly affect our business. There currently are a number of proposals pending before federal, state, and foreign legislative and regulatory bodies. In addition, the European Commission has approved a data protection regulation, known as the General Data Protection Regulation (GDPR), which has been finalized and is due to come into force in or around May 2018. The GDPR will include operational requirements for companies that receive or process personal data of residents of the European Union that are different than those currently in place in the European Union, and that will include significant penalties for non-compliance. Similarly, there are a number of legislative proposals in the United States, at both the federal and state level, that could impose new obligations in areas affecting our business, such as liability for copyright infringement by third parties. In addition, some countries are considering or have passed legislation implementing data protection requirements or requiring local storage and processing of data or similar requirements that could increase the cost and complexity of delivering our services.

These laws and regulations, as well as any associated inquiries or investigations or any other government actions, may be costly to comply with and may delay or impede the development of new products, result in negative publicity, increase our operating costs, require significant management time and attention, and subject us to remedies that may harm our business, including fines or demands or orders that we modify or cease existing business practices.

We have been subject to regulatory investigations and settlements, and we expect to continue to be subject to such proceedings and other inquiries in the future, which could cause us to incur substantial costs or require us to change our business practices in a manner materially adverse to our business.

From time to time, we receive formal and informal inquiries from government authorities and regulators regarding our compliance with laws and regulations, many of which are evolving and subject to interpretation. We are and expect to continue to be the subject of investigations, inquiries, actions, and audits in the United States, Europe, and around the world, particularly in the areas of privacy, data protection, consumer protection, and competition, as we continue to grow and expand our operations. For example, several data protection authorities in the European Union have initiated actions, investigations, or administrative orders seeking to assert jurisdiction over Facebook, Inc. and our subsidiaries and to restrict the ways in which we collect and use information, and other data protection authorities may do the same. Orders issued by, or inquiries or enforcement actions initiated by, government or regulatory authorities could cause us to incur substantial costs, expose us to unanticipated civil and criminal liability or penalties (including substantial monetary fines), or require us to change our business practices in a manner materially adverse to our business.

If we are unable to protect our intellectual property, the value of our brands and other intangible assets may be diminished, and our business may be adversely affected.

We rely and expect to continue to rely on a combination of confidentiality, assignment, and license agreements with our employees, consultants, and third parties with whom we have relationships, as well as trademark, copyright, patent, trade secret, and domain name protection laws, to protect our proprietary rights. In the United States and internationally, we have filed various applications for protection of certain aspects of our intellectual property, and we currently hold a significant number of issued trademarks and patents in multiple jurisdictions and have acquired patents and patent applications from third parties. In addition, in the future we may acquire additional patents or patent portfolios, which could require significant cash expenditures. Third parties may knowingly or unknowingly infringe our proprietary rights, third parties may challenge proprietary rights held by us, and pending and future trademark and patent applications may not be approved. In addition, effective intellectual property protection may not be available in every country in which we operate or intend to operate our business. In any or all of these cases, we may be required to expend significant time and expense in order to prevent infringement or to enforce our rights. Although we have generally taken measures to protect our proprietary rights, there can be no assurance that others will not offer products or concepts that are substantially similar to ours and compete with our business. In addition, we regularly contribute software source code under open source licenses and have made other technology we developed available under other open licenses, and we include open source software in our products. For example, we have contributed certain specifications and designs related to our data center equipment to the Open Compute Project Foundation, a non-profit entity that shares and develops such information with the technology community, under the Open Web Foundation License. As a result of our open source contributions and the use of open source in our products, we may license or be required to license or disclose code and/or innovations that turn out to be material to our business and may also be exposed to increased litigation risk. If the protection of our proprietary rights is inadequate to prevent unauthorized use or appropriation by third parties, the value of our brands and other intangible assets may be diminished and competitors may be able to more effectively mimic our products, services, and methods of operations. Any of these events could have an adverse effect on our business and financial results.

We are currently, and expect to be in the future, party to patent lawsuits and other intellectual property rights claims that are expensive and time consuming and, if resolved adversely, could have a significant impact on our business, financial condition, or results of operations.

Companies in the Internet, technology, and media industries own large numbers of patents, copyrights, trademarks, and trade secrets, and frequently enter into litigation based on allegations of infringement, misappropriation, or other violations of intellectual property or other rights. In addition, various "non-practicing entities" that own patents and other intellectual property rights often attempt to aggressively assert their rights in order to extract value from technology companies. Furthermore, from time to time we may introduce or acquire new products, including in areas where we historically have not competed, which could increase our exposure to patent and other intellectual property claims from competitors and non-practicing entities.

From time to time, we receive notice from patent holders and other parties alleging that certain of our products and services, or user content, infringe their intellectual property rights. We presently are involved in a number of intellectual property lawsuits, and as we face increasing competition and gain an increasingly high profile, we expect the number of patent and other intellectual property claims against us to grow. Defending patent and other intellectual property litigation is costly and can impose a significant burden on management and employees, and there can be no assurances that favorable final outcomes will be obtained in all cases. In addition, plaintiffs may seek, and we may become subject to, preliminary or provisional rulings in the course of any such litigation, including potential preliminary injunctions requiring us to cease some or all of our operations. We may decide to settle such lawsuits and disputes on terms that are unfavorable to us. Similarly, if any litigation to which we are a party is resolved adversely, we may be subject to an unfavorable judgment that may not be reversed upon appeal. The terms of such a settlement or judgment may require us to cease some or all of our operations or pay substantial amounts to the other party. In addition, we may have to seek a license to continue practices found to be in violation of a third party's rights, which may not be available on reasonable terms, or at all, and may significantly increase our operating costs and expenses. As a result, we may also be required to develop alternative non-infringing technology or practices or discontinue the practices. The development of alternative non-infringing technology or practices could require significant effort and expense or may not be feasible. Our business, financial condition, and results of operations could be adversely affected as a result of an unfavorable resolution of the disputes and litigation referred to above.

We are involved in numerous class action lawsuits and other litigation matters that are expensive and time consuming, and, if resolved adversely, could harm our business, financial condition, or results of operations.

In addition to intellectual property claims, we are also involved in numerous other lawsuits, including putative class action lawsuits, many of which claim statutory damages and/or seek significant changes to our business operations, and we anticipate that we will continue to be a target for numerous lawsuits in the future. Because of the scale of our user base, the plaintiffs in class action cases filed against us typically claim enormous monetary damages even if the alleged per-user harm is small or non-

existent. In addition, we may be subject to additional class action lawsuits based on product performance or other claims related to the use of consumer hardware and software, as well as virtual reality technology and products, which are new and unproven. Any negative outcome from any such lawsuits could result in payments of substantial monetary damages or fines, or undesirable changes to our products or business practices, and accordingly our business, financial condition, or results of operations could be materially and adversely affected. Although the results of such lawsuits and claims cannot be predicted with certainty, we do not believe that the final outcome of those matters relating to our products that we currently face will have a material adverse effect on our business, financial condition, or results of operations. In addition, we are currently the subject of stockholder class action suits in connection with our IPO and with our intention to create a new class of capital stock (Class C capital stock) and to declare and pay a dividend of two shares of Class C capital stock for each outstanding share of Class A and Class B common stock (the Reclassification). We believe these lawsuits are without merit and are vigorously defending these lawsuits.

There can be no assurances that a favorable final outcome will be obtained in all our cases, and defending any lawsuit is costly and can impose a significant burden on management and employees. Any litigation to which we are a party may result in an onerous or unfavorable judgment that may not be reversed upon appeal or in payments of substantial monetary damages or fines, or we may decide to settle lawsuits on similarly unfavorable terms, which could adversely affect our business, financial conditions, or results of operations.

We may incur liability as a result of information retrieved from or transmitted over the Internet or published using our products or as a result of claims related to our products.

We have faced, currently face, and will continue to face claims relating to information that is published or made available on our products. In particular, the nature of our business exposes us to claims related to defamation, dissemination of misinformation or news hoaxes, discrimination, intellectual property rights, rights of publicity and privacy, personal injury torts, or local laws regulating hate speech or other types of content. This risk is enhanced in certain jurisdictions outside the United States where our protection from liability for third-party actions may be unclear and where we may be less protected under local laws than we are in the United States. We could incur significant costs investigating and defending such claims and, if we are found liable, significant damages. We could also face fines or orders restricting or blocking our services in particular geographies as a result of content hosted on our services. For example, we will be subject to recently enacted legislation in Germany that may impose significant fines for failure to comply with certain content removal and disclusure obligations. If any of these events occur, our business and financial results could be adversely affected.

Our CEO has control over key decision making as a result of his control of a majority of the voting power of our outstanding capital stock.

Mark Zuckerberg, our founder, Chairman, and CEO, is able to exercise voting rights with respect to a majority nf the voting power of our outstanding capital stock and therefore has the ability to control the outcome of matters submitted to our stockholders for approval, including the election of directors and any merger, consolidation, or sale of all or substantially all of our assets. This concentrated control could delay, defer, or prevent a change of control, merger, consolidation, or sale of all or substantially all of our assets that our other stockholders support, or conversely this concentrated control could result in the consummation of such a transaction that our other stockholders do not support. This concentrated control could also discourage a potential investor from acquiring our Class A common stock, which has limited voting power relative to the Class B common stock, or if issued, our Class C capital stock, which will generally have no voting power, and might harm the trading price of our Class A common stock and, if issued, our Class C capital stock. In addition, Mr. Zuckerberg has the ability to control the management and major strategic investments of our company as a result of his position as our CEO and his ability to control the election or replacement of our directors. In the event of his death, the shares of our capital stock that Mr. Zuckerberg owns will be transferred to the persons or entities that he has designated. As a board member and officer, Mr. Zuckerberg owes a fiduciary duty to our stockholders and must act in good faith in a manner he reasonably believes to be in the best interests of our stockholders. As a stockholder, even a controlling stockholder, Mr. Zuckerberg is entitled to vote his shares, and shares over which he has voting control as governed by a voting agreement, in his own interests, which may not always be in the interests of our stockholders generally.

Moreover, since our Class C capital stock, if issued, will generally have no voting power, the issuance of the Class C capital stock, including in connection with future financings, acquisitions, or the issuance of future equity awards, could have the effect of prolonging the duration of Mr. Zuckerberg's ability to exercise voting rights with respect to a majority of the voting power of our outstanding capital stock and therefore his ability to control the outcome of matters submitted to our stockholders for approval, including the election of directors, and any merger, consolidation, or sale of all or substantially all of our assets. We believe that Mr. Zuckerberg's continued control of a majority of the voting power of our outstandiog capital stock is beneficial to us and is in the best interests of our stockholders. In the event that Mr. Zuckerberg no longer controls a majority of the voting power, whether as a result of the disposition of some or all of his shares of Class A or Class B common stock or otherwise, our business or the trading price of our Class A common stock and, if issued, our Class C capital stock may be adversely affected.

We plan to continue to make acquisitions, which could harm our financial condition or results of operations and may adversely affect the price of our common stock.

As part of our business strategy, we have made and intend to continue to make acquisitions to add specialized employees and complementary companies, products, or technologies. We may not be able to find suitable acquisition candidates, and we may not be able to complete acquisitions on favorable terms, if at all. In some cases, the costs of such acquisitions may be substantial. For example, in 2014 we paid approximately $4.6 billion in cash and issued 178 million shares of our Class A common stock in connection with our acquisition of WhatsApp, and we paid approximately $400 million in cash and issued 23 million shares of our Class B common stock in connection with our acquisition of Oculus. We also issued a substantial number of RSUs to help retain the employees of these companies. There is no assurance that we will receive a favorable return on investment for these or other acquisitions.

We may pay substantial amounts of cash or incur debt to pay for acquisitions, which could adversely affect our liquidity. The incurrence of indebtedness would also result in increased fixed obligations and increased interest expense, and could also include covenants or other restrictions that would impede our ability to manage our operations. We may also issue equity securities to pay for acquisitions and we regularly grant RSUs to retain the employees of acquired companies, which could increase our expenses, adversely affect our financial results, and result in dilution to our stockholders. In addition, any acquisitions we announce could be viewed negatively by users, marketers, developers, or investors, which may adversely affect our business or the price of our Class A common stock.

In the future, if issued, we may use shares of Class C capital stock as consideration in connection with acquisitions. However, we may not be able to use shares of Class C capital stock as consideration because companies that we are interested in acquiring may not agree to accept shares that carry no voting rights, or for other reasons. If the Class C capital stock trades at a discount to the Class A common stock, companies that we seek to acquire may also demand more shares of Class C capital stock in exchange for accepting such stock as consideration. In such instances, we may need to pay cash, issue shares of our Class A or Class B common stock as consideration, or issue a relatively greater number of shares of Class C capital stock to consummate the acquisitions.

We may also discover liabilities or deficiencies associated with the companies or assets we acquire that were not identified in advance, which may result in significant unanticipated costs. The effectiveness of our due diligence review and our ability to evaluate the results of such due diligence are dependent upon the accuracy and completeness of statements and disclosures made or actions taken by the companies we acquire or their representatives, as well as the limited amount of time in which acquisitions are executed. In addition, we may fail to accurately forecast the financial impact of an acquisition transaction, including tax and accounting charges. Acquisitions may also result in our recording of significant additional expenses to our results of operations and recording of substantial finite-lived intangible assets on our balance sheet upon closing. Any of these factors may adversely affect our financial condition or results of operations.

We may not be able to successfully integrate our acquisitions, and we may incur significant costs to integrate and support the companies we acquire.

The integration of acquisitions requires significant time and resources, and we may not manage these processes successfully. Our ability to successfully integrate complex acquisitions is unproven, particularly with respect to companies that have significant operations or that develop products where we do not have prior experience. For example, Oculus and WhatsApp are larger and more complex than companies we have historically acquired. In particular, Oculus builds technology and products that are relatively new to Facebook and with which we did not have significant experience or structure in place to support prior to the acquisition. We continue to make substantial investments of resources to support these acquisitions, which will result in significant ongoing operating expenses and may divert resources and management attention from other areas of our business. We cannot assure you that these investments will be successful. If we fail to successfully integrate the companies we acquire, we may not realize the benefits expected from the transaction and our business may be harmed.

If our goodwill or finite-lived intangible assets become impaired, we may be required to record a significant charge to earnings.

We review our finite-lived intangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable, such as a decline in stock price and market capitalization. We test goodwill for impairment at least annually. If such goodwill or finite-lived intangible assets are deemed to be impaired, an impairment loss equal to the amount by which the carrying amount exceeds the fair value of the assets would be recognized. We may be required to record a significant charge in our financial statements during the period in which any impairment of our goodwill or finite-lived intangible assets is determined, which would negatively affect our results of operations.

Our business is dependent on our ability to maintain and scale our technical infrastructure, and any significant disruption in our service could damage our reputation, result in a potential loss of users and engagement, and adversely affect our financial results.

Our reputation and ability to attract, retain, and serve our users is dependent upon the reliable performance of our products and our underlying technical infrastructure. Our systems may not be adequately designed with the necessary reliability and redundancy to avoid performance delays or outages that could be harmful to our business. If our products are unavailable when users attempt to access them, or if they do not load as quickly as expected, users may not use our products as often in the future, or at all, and our ability to serve ads may be disrupted. As our user base and engagement continue to grow, and the amount and types of information shared on Facebook and our other products continue to grow and evolve, such as increased engagement with video, we will need an increasing amount of technical infrastructure, including network capacity and computing power, to continue to satisfy the needs of our users. It is possible that we may fail to continue to effectively scale and grow our technical infrastructure to accommodate these increased demands. In addition, our business may be subject to interruptions, delays, or failures resulting from earthquakes, adverse weather conditions, other natural disasters, power loss, terrorism, geopolitical conflict, cyber-attacks, or other catastrophic events. If such an event were to occur, users may be subject to service disruptions or outages and we may not be able to recover our technical infrastructure and user data in a timely manner to restart or provide our services, which may adversely affect our financial results.

A substantial portion of our network infrastructure is provided by third parties. Any disruption or failure in the services we receive from these providers could harm our ability to handle existing or increased traffic and could significantly harm our business. Any financial or other difficulties these providers face may adversely affect our business, and we exercise little control over these providers, which increases our vulnerability to problems with the services they provide.

We could experience unforeseen difficulties in building and operating key portions of our technical infrastructure.

We have designed and built our own data centers and key portions of our technical infrastructure through which we serve our products, and we plan to continue to significantly expand the size of our infrastructure primarily through data centers and other projects. The infrastructure expansion we are undertaking is complex, and unanticipated delays in the completion of these projects, including due to any shortage of labor necessary in building portions of such projects, or availability of components may lead to increased project costs, operational inefficiencies, or interruptions in the delivery or degradation of the quality of our products. In addition, there may be issues related to this infrastructure that are not identified during the testing phases of design and implementation, which may only become evident after we have started to fully utilize the underlying equipment, that could further degrade the user experience or increase our costs.

Our products and internal systems rely on software that is highly technical, and if it contains undetected errors or vulnerabilities, our business could be adversely affected.

Our products and internal systems rely on software, including software developed or maintained internally and/or by third parties, that is highly technical and complex. In addition, our products and internal systems depend on the ability of such software to store, retrieve, process, and manage immense amounts of data. The software on which we rely has contained, and will in the future contain, undetected errors, bugs, or vulnerabilities. Some errors may only be discovered after the code has been released for external or internal use. Errors, vulnerabilities, or other design defects within the software on which we rely may result in a negative experience for users and marketers who use our products, delay product introductions or enhancements, result in targeting, measurement, or billing errors, compromise our ability to protect the data of our users and/or our intellectual property or lead to reductions in our ability to provide some or all of our services. In addition, any errors, bugs, vulnerabilities, or defects discovered in the software on which we rely, and any associated degradations or interruptions of service, could result in damage to our reputation, loss of users, loss of revenue, or liability for damages, any of which could adversely affect our business and financial results.

Technologies have been developed that can block the display of our ads, which could adversely affect our financial results.

Technologies have been developed, and will likely continue to be developed, that can block the display of our ads, particularly advertising displayed on personal computers. We generate substantially all of our revenue from advertising, including revenue resulting from the display of ads on personal computers. Revenue generated from the display of ads on personal computers has been impacted by these technologies from time to time. As a result, these technologies have had an adverse effect on our financial results and, if such technologies continue to proliferate, in particular with respect to mobile platforms, our future financial results may be harmed.

Real or perceived inaccuracies in our user and other metrics may harm our reputation and negatively affect our business.

The numbers for our key metrics, which include our DAUs, MAUs, and average revenue per user (ARPU), are calculated

using internal company data based on the activity of user accounts. While these numbers are based on what we believe to be reasonable estimates of our user base for the applicable period of measurement, there are inherent challenges in measuring usage of our products across large online and mobile populations around the world. In addition, we are continually seeking to improve our estimates of our user base, and such estimates may change due to improvements or changes in our methodology.

In 2016, we estimate that "duplicate" accounts (an account that a user maintains in addition to his or her principal account) may have represented approximately 6% of our worldwide MAUs. We also seek to identify "false" accounts, which we divide into two categories: (1) user-misclassified accounts, where users have created personal profiles for a business, organization, or non-human entity such as a pet (such entities are permitted on Facebook using a Page rather than a personal profile under our terms of service); and (2) undesirable accounts, which represent user profiles that we determine are intended to be used for purposes that violate our terms of service, such as spamming. In 2016, for example, we estimate that such user-misclassified and undesirable accounts may have represented approximately 1% of our worldwide MAUs. However, these estimates are based on an internal review of a limited sample of accounts and we apply significant judgment in making this determination, such as identifying names that appear to be fake or other behavior that appears inauthentic to the reviewers. Our estimates may change as our methodologies evolve, including through the application of new technologies, which may allow us to identify previously undetected false or duplicate accounts and improve our ability to evaluate a broader population of our users. As such, our estimation of duplicate or false accounts may not accurately represent the actual number of such accounts.

Our data limitations may affect our understanding of certain details of our business. For example, while user-provided data indicates a decline in usage among younger users, this age data is unreliable because a disproportionate number of our younger users register with an inaccurate age. Accordingly, our understanding of usage by age group may not be complete.

In addition, our data regarding the geographic location of our users is estimated based on a number of factors, such as the user's IP address and self-disclosed location. These factors may not always accurately reflect the user's actual location. For example, a user may appear to be accessing Facebook from the location of the proxy server that the user connects to rather than from the user's actual location. The methodologies used to measure user metrics may also be susceptible to algorithm or other technical errors. Our estimates for revenue by user location and revenue by user device are also affected by these factors. For example, in late 2015, we discovered an error in the algorithm we used to attribute our revenue by user geography. While this issue did not affect our overall worldwide revenue, it did affect our attribution of revenue to different geographic regions. The fourth quarter of 2015 revenue by user geography and ARPU amounts were adjusted to reflect this reclassification.

We regularly review our processes for calculating these metrics, and from time to time we may discover inaccuracies in our metrics or make adjustments to improve their accuracy, including adjustments that may result in the recalculation of our historical metrics. We believe that any such inaccuracies or adjustments are immaterial unless otherwise stated. In addition, our DAU and MAU estimates will differ from estimates published by third parties due to differences in methodology.

In addition, from time to time we provide, or rely on, certain other metrics, including those relating to the reach and effectiveness of our ads. All of our metrics are subject to software bugs, inconsistencies in our systems, and human error. If marketers, developers, or investors do not perceive our metrics to be accurate, or if we discover material inaccuracies in our metrics, we may be subject to liability, our reputation may be harmed, and marketers and developers may be less willing to allocate their budgets or resources to Facebook, which could negatively affect our business and financial results.

We cannot assure you that we will effectively manage our growth.

Our employee headcount and the scope and complexity of our business have increased significantly, with the number of employees increasing to 20,658 as of June 30, 2017 from 14,495 as of June 30, 2016 , and we expect such headcount growth to continue for the foreseeable future. The growth and expansion of our business and products create significant challenges for our management, operational, and financial resources, including managing multiple relationships with users, marketers, developers, and other third parties. As our operations and the number of our third-party relationships continue to grow, our information technology systems or our internal controls and procedures may not be adequate to support such growth. In addition, some members of our management do not have significant experience managing a large global business operation, so our management may not be able to manage such growth effectively. To effectively manage our growth, we must continue to improve our operational, financial, and management processes and systems and to effectively expand, train, and manage our employee base. As our organization continues to grow, and we are required to implement more complex organizational management structures, we may find it increasingly difficult to maintain the benefits of our corporate culture, including our ability to quickly develop and launch new and innovative products. This could negatively affect our business performance.

The loss of one or more of our key personnel, or our failure to attract and retain other highly qualified personnel in the future, could harm our business.

We currently depend on the continued services and performance of our key personnel, including Mark Zuckerberg and Sheryl K. Sandberg. Although we have entered into employment agreements with Mr. Zuckerberg and Ms. Sandberg, the agreements have no specific duration and constitute at-will employment. In addition, many of our key technologies and systems are custom-made for our business by our personnel. The loss of key personnel, including members of management as well as key engineering, product development, marketing, and sales personnel, could disrupt our operations and have an adverse effect on our business.

As we continue to grow, we cannot guarantee we will continue to attract and retain the personnel we need to maintain our competitive position. In particular, we intend to continue to hire a significant number of technical personnel in the foreseeable future, and we expect to continue to face significant competition from other companies in hiring such personnel, particularly in the San Francisco Bay Area, where our headquarters are located and where the cost of living is high. As we continue to mature, the incentives to attract, retain, and motivate employees provided by our equity awards or by future arrangements may not be as effective as in the past, and if we issue significant equity to attract additional employees or to retain our existing employees, we would incur substantial additional share-based compensation expense and the ownership of our existing stockholders would be further diluted. Our ability to attract, retain, and motivate employees may also be adversely affected by stock price volatility. Additionally, we have a number of current employees whose equity ownership in our company has provided them a substantial amount of personal wealth, which could affect their decisions about whether or not to continue to work for us. As a result of these factors, it may be difficult for us to continue to retain and motivate our employees. If we do not succeed in attracting, hiring, and integrating excellent personnel, or retaining and motivating existing personnel, we may be unable to grow effectively.

We may not be able to continue to successfully grow usage of and engagement with mobile and web applications that integrate with Facebook and our other products.

We have made and are continuing to make investments to enable developers to build, grow, and monetize mobile and web applications that integrate with Facebook and our other products. Such existing and prospective developers may not be successful in building, growing, or monetizing mobile and/or web applications that create and maintain user engagement. Additionally, developers may choose to build on other platforms, including mobile platforms controlled by third parties, rather than building products that integrate with Facebook and our other products. We are continuously seeking to balance the distribution objectives of our developers with our desire to provide an optimal user experience, and we may not be successful in achieving a balance that continues to attract and retain such developers. For example, from time to time, we have taken actions to reduce the volume of communications from these developers to users on Facebook and our other products with the objective of enhancing the user experience, and such actions have reduced distribution from, user engagement with, and our monetization opportunities from, mobile and web applications integrated with our products. In some instances, these actions, as well as other actions to enforce our policies applicable to developers, have adversely affected our relationships with such developers. If we are not successful in our efforts to continue to grow the number of developers that choose to build products that integrate with Facebook and our other products or if we are unable to continue to build and maintain good relations with such developers, our user growth and user engagement and our financial results may be adversely affected.

We currently generate substantially all of our Payments revenue from developers that use Facebook on personal computers, and we expect that our Payments revenue will continue to decline as usage of Facebook on personal computers continues to decline.

We currently generate substantially all of our Payments revenue from developers that use Facebook on personal computers. Specifically, applications built by developers of social games are currently responsible for substantially all of our revenue derived from Payments, and the majority of the revenue from these applications has historically been generated by a limited number of the most popular games. We have experienced and expect to see the continued decline in usage of Facebook on personal computers, which we expect will result in a continuing decline in Payments revenue. In addition, only a relatively small percentage of our users have transacted with Facebook Payments. If the Facebook-integrated applications fail to grow or maintain their users and engagement, whether as a result of the continued decline in the usage of Facebook on personal computers or otherwise, if developers do not continue to introduce new applications that attract users and create engagement on Facebook, or if Facebook-integrated applications outside of social games do not gain popularity and generate significant revenue for us, our financial performance could be adversely affected.

Payment transactions may subject us to additional regulatory requirements and other risks that could be costly and difficult to comply with or that could harm our business.

Our users can purchase virtual and digital goods from developers that offer applications using our Payments infrastructure on the Facebook website. In addition, certain of our users can use our Payments infrastructure, including on Messenger, for other activities, such as sending money to other users and making donations to certain charitable organizations. We are subject to a variety of laws and regulations in the United States, Europe, and elsewhere, including those governing anti-money laundering and counter-terrorist financing, money transmission, gift cards and other prepaid access instruments, electronic funds transfer, charitable fundraising, and import and export restrictions. Depending on how our Payments product evolves, we may also be subject to other laws and regulations including those governing gambling, banking, and lending. In some jurisdictions, the application or interpretation of these laws and regulations is not clear. To increase flexibility in how our use of Payments may evolve and to mitigate regulatory uncertainty, we have received certain money transmitter licenses in the United States and an Electronic Money (E-Money) license that allows us to conduct certain regulated payment activities in the participating member countries of the European Economic Area, which will generally require us to demonstrate compliance with many domestic and foreign laws in these areas. Our efforts to comply with these laws and regulations could be costly and result in diversion of management time and effort and may still not guarantee compliance. In the event that we are found to be in violation of any such legal or regulatory requirements, we may be subject to monetary fines or other penalties such as a cease and desist order, or we may be required to make product changes, any of which could have an adverse effect on our business and financial results.

In addition, we may be subject to a variety of additional risks as a result of Payments transactions, including:

- increased costs and diversion of management time and effort and other resources to deal with bad transactions or customer disputes;
- potential fraudulent or otherwise illegal activity by users, developers, employees, or third parties;
- restrictions on the investment of consumer funds used to transact Payments; and
- additional disclosure and reporting requirements.

We have significant international operations and plan to continue expanding our operations abroad where we have more limited operating experience, and this may subject us to increased business and economic risks that could affect our financial results.

We have significant international operations and plan to continue the international expansion of our business operations and the translation of our products. We currently make Facebook available in more than 100 different languages, and we have offices or data centers in more than 30 different countries. We may enter new international markets where we have limited or no experience in marketing, selling, and deploying our products. Our products are generally available globally through the web and on mobile, but some or all of our products or functionality may not be available in certain markets due to legal and regulatory complexities. For example, Facebook is not generally available in China. We also outsource certain operational functions to third-party vendors globally. If we fail to deploy, manage, or oversee our international operations successfully, our business may suffer. In addition, we are subject to a variety of risks inherent in doing business internationally, including:

- political, social, or economic instability;
- risks related to legal, regulatory, and other government scrutiny applicable to U.S. companies with sales and operations in foreign jurisdictions, including with respect to privacy, tax, law enforcement, content, trade compliance, intellectual

property, and terrestrial infrastructure matters;

- potential damage to our brand and reputation due to compliance with local laws, including potential censorship or requirements to provide user information to local authorities;
- fluctuations in currency exchange rates and compliance with currency controls;
- foreign exchange controls and tax and other regulations and orders that might prevent us from repatriating cash earned in countries outside the United States or otherwise limit our ability to move cash freely, and impede our ability to invest such cash efficiently;
- higher levels of credit risk and payment fraud;
- enhanced difficulties of integrating any foreign acquisitions;
- burdens of complying with a variety of foreign laws;
- reduced protection for intellectual property rights in some countries;
- difficulties in staffing, managing, and overseeing global operations and the increased travel, infrastructure, and legal compliance costs associated with multiple international locations;
- compliance with the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act, and similar laws in other jurisdictions; and
- compliance with statutory equity requirements and management of tax consequences.

If we are unable to expand internationally and manage the complexity of our global operations successfully, our financial results could be adversely affected.

We face design, manufacturing, and supply chain risks that, if not properly managed, could adversely impact our financial results.

We face a number of risks related to design, manufacturing, and supply chain management with respect to our Oculus products. For example, the Oculus products we sell may have quality issues resulting from the design or manufacture of the products, or from the software used in the products. Sometimes, these issues may be caused by components we purchase from other manufacturers or suppliers. If the quality of our Oculus products does not meet our customers' expectations or such products are found to be defective, then our financial results could be adversely affected.

We rely on third parties to manufacture our Oculus products. We may experience supply shortages or other supply chain disruptions in the future that could result in shipping delays and negatively impact our operations. We could be negatively affected if we are not able to engage third parties with the necessary capabilities or capacity on reasonable terms, or if those we engage with fail to meet their obligations (whether due to financial difficulties or other reasons), or make adverse changes in the pricing or other material terms of such arrangements with them.

We also require the suppliers and business partners of our Oculus products to comply with laws and certain company policies regarding sourcing practices, but we do not control them or their practices. If any of them violates laws or implements practices regarded as unethical or corrupt, we could experience supply chain disruptions, canceled orders, or damage to our reputation.

In addition, the Securities and Exchange Commission's (SEC) conflict minerals rule requires disclosure by public companies of information relating to the origin, source and chain of custody of specified minerals, known as conflict minerals, that are necessary to the functionality or production of products manufactured or contracted to be manufactured. Although the SEC has recently provided guidance with respect to a portion of the conflict minerals filing requirements that will somewhat relax the reporting required, we may incur significant costs associated with complying with the other portions of the rule, such as costs related to the determination of the origin, source and chain of custody of the minerals used in Oculus products, the adoption of conflict minerals-related governance policies, processes and controls, and possible changes to products or sources of supply as a result of such activities.

We may face inventory risk with respect to our Oculus products.

We may be exposed to inventory risks with respect to our Oculus products as a result of rapid changes in product cycles and pricing, unsafe or defective merchandise, changes in consumer demand and consumer spending patterns, changes in consumer tastes with respect to Oculus products, and other factors. We endeavor to accurately predict these trends and avoid overstocking

or understocking products Oculus may sell. Demand for products, however, can change significantly between the time inventory or components are ordered and the date of sale. In addition, when we begin selling or manufacturing a new Oculus product, it may be difficult to establish vendor relationships, determine appropriate product or component selection, and accurately forecast demand. The acquisition of certain types of inventory or components may require significant lead-time and prepayment and they may not be returnable. Any one of these factors may adversely affect our operating results.

We may have exposure to greater than anticipated tax liabilities.

Our income tax obligations are based in part on our corporate operating structure and intercompany arrangements, including the manner in which we operate our business, develop, value, manage, protect, and use our intellectual property and the valuations of our intercompany transactions. We may also be subject to additional indirect or non-income taxes. The tax laws applicable to our business, including the laws of the United States and other jurisdictions, are subject to interpretation and certain jurisdictions are aggressively interpreting their laws in new ways in an effort to raise additional tax revenue from companies such as Facebook. The taxing authorities of the jurisdictions in which we operate may challenge our methodologies for valuing developed technology or intercompany arrangements, which could increase our worldwide effective tax rate and harm our financial position and results of operations. For example, the IRS recently issued us a formal assessment relating to transfer pricing with our foreign subsidiaries in conjunction with the examination of the 2010 tax year, and although we disagree with the IRS's position and are contesting this issue, the ultimate resolution is uncertain and, if resolved in a manner unfavorable to us, may adversely affect our financial results. We are subject to regular review and audit by U.S. federal and state, and foreign tax authorities. Tax authorities may disagree with certain positions we have taken and any adverse outcome of such a review or audit could have a negative effect on our financial position and results of operations. In addition, the determination of our worldwide provision for income taxes and other tax liabilities requires significant judgment by management, and there are many transactions where the ultimate tax determination is uncertain. Our provision for income taxes is also determined by the manner in which we operate our business, and any changes to such operations or laws applicable to such operations may affect our effective tax rate. Although we believe that our provision for income taxes is reasonable, the ultimate tax outcome may differ from the amounts recorded in our financial statements and may materially affect our financial results in the period or periods for which such determination is made. In addition, our future income taxes could be adversely affected by earnings being lower than anticipated in jurisdictions that have lower statutory tax rates and higher than anticipated in jurisdictions that have higher statutory tax rates, by changes in the valuation of our deferred tax assets and liabilities, or by changes in tax laws, regulations, or accounting principles. For example, we have previously incurred losses in certain international subsidiaries that resulted in an effective tax rate that is significantly higher than the statutory tax rate in the United States and this could continue to happen in the future.

Changes in tax laws or tax rulings could materially affect our financial position and results of operations.

The income and non-income tax regimes we are subject to or operate under are unsettled and may be subject to significant change. Changes in tax laws or tax rulings, or changes in interpretations of existing laws, could materially affect our financial position and results of operations. Many countries in Europe, as well as a number of other countries and organizations, have recently proposed or recommended changes to existing tax laws or have enacted new laws that could significantly increase our tax obligations in many countries where we do business or require us to change the manner in which we operate our business. The Organization for Economic Cooperation and Development has been working on a Base Erosion and Profit Sharing Project, and issued in 2015, and is expected to continue to issue, guidelines and proposals that may change various aspects of the existing framework under which our tax obligations are determined in many of the countries in which we do business. The European Commission has conducted investigations in multiple countries focusing on whether local country tax rulings or tax legislation provides preferential tax treatment that violates European Union state aid rules and concluded that certain countries, including Ireland, have provided illegal state aid in certain cases. These investigations may result in changes to the tax treatment of our foreign operations. In addition, the current U.S. administration and key members of Congress have made public statements indicating that tax reform is a priority. Certain changes to U.S. tax laws, including limitations on the ability to defer U.S. taxation on earnings outside of the United States until those earnings are repatriated to the United States, could affect the tax treatment of our foreign earnings. Due to the large and expanding scale of our international business activities, many of these types of changes to the taxation of our activities could increase our worldwide effective tax rate and harm our financial position and results of operations.

We cannot guarantee that our share repurchase program will be fully consummated or that it will enhance long-term stockholder value. Share repurchases could also increase the volatility of the trading price of our stock and could diminish our cash reserves.

In November 2016, our board of directors authorized a share repurchase program of up to $6.0 billion of our Class A common stock that commenced in 2017 and does not have an expiration date. Although our board of directors has authorized this share repurchase program, the program does not obligate us to repurchase any specific dollar amount or to acquire any specific number of shares. The program could affect the trading price of our stock and increase volatility, and any announcement of a termination of this program may result in a decrease in the trading price of our stock. In addition, this program could diminish our cash reserves.

Risks Related to Ownership of Our Class A Common Stock

The trading price of our Class A common stock has been and will likely continue to be volatile, and if the creation and dividend of Class C capital stock is effected, the trading price of that class will likely be volatile and may impact the trading price for the Class A common stock.

The trading price of our Class A common stock has been, and is likely to continue to be, volatile. Since shares of our Class A common stock were sold in our IPO in May 2012 at a price of $38.00 per share, our stock price has ranged from $17.55 to $156.50 through June 30, 2017 . In addition to the factors discussed in this Quarterly Report on Form 10-Q, the trading price of our Class A common stock may fluctuate significantly in response to numerous factors, many of which are beyond our control, including:

- actual or anticipated fluctuations in our revenue and other operating results;
- the financial projections we may provide to the public, any changes in these projections or our failure to meet these projections;
- actions of securities analysts who initiate or maintain coverage of us, changes in financial estimates by any securities analysts who follow our company, or our failure to meet these estimates or the expectations of investors;
- additional shares of our stock being sold into the market by us, our existing stockholders, or in connection with acquisitions or the anticipation of such sales;
- investor sentiment with respect to our competitors, our business partners, and our industry in general;
- announcements by us or our competitors of significant products or features, technical innovations, acquisitions, strategic partnerships, joint ventures, or capital commitments;
- announcements by us or estimates by third parties of actual or anticipated changes in the size of our user base, the level of user engagement, or the effectiveness of our ad products;
- changes in operating performance and stock market valuations of technology companies in our industry, including our developers and competitors;
- price and volume fluctuations in the overall stock market, including as a result of trends in the economy as a whole;
- the inclusion, exclusion, or deletion of our stock from any trading indices, such as the S&P 500 Index;
- media coverage of our business and financial performance;
- lawsuits threatened or filed against us;
- developments in anticipated or new legislation and pending lawsuits or regulatory actions, including interim or final rulings by tax, judicial, or regulatory bodies;
- trading activity in our share repurchase program; and
- other events or factors, including those resulting from war or incidents of terrorism, or responses to these events.

In addition, in 2016 we announced a proposal to create a new class of non-voting capital stock, known as Class C capital stock, and to distribute two shares of Class C capital stock as a dividend to the holders of our Class A and Class B common stock for each share of Class A and Class B common stock held by them. While this proposal has been approved by our stockholders, the record and payment dates for this dividend will be determined by our board of directors in its discretion and there can be no assurance as to the timing of such dates. Once the dividend is distributed, we expect that the market price for the shares of our Class A common stock will generally reflect the effect of a three-for-one stock split. The pending Reclassification is currently subject to class action lawsuits that were filed on behalf of our stockholders.

If issued, we plan to list the Class C capital stock on the NASDAQ Stock Market LLC. The trading price for the Class C capital stock may be volatile and affected by the factors noted with respect to our Class A common stock above. The trading price of the Class C capital stock may also be affected by the difference in voting rights compared to our Class A and Class B common shares, the liquidity of the market for Class C capital stock, and investor demand for Class C capital stock, including that of institutional investors that may be unwilling, unable, or choose not to hold non-voting shares of our capital stock.

In addition, the stock markets have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many technology companies. Stock prices of many technology companies have

fluctuated in a manner unrelated or disproportionate to the operating performance of those companies. We are currently subject to securities litigation in connection with our IPO. We may experience more such litigation following future periods of volatility. Any securities litigation could subject us to substantial costs, divert resources and the attention of management from our business, and adversely affect our business.

We do not intend to pay cash dividends for the foreseeable future.

We have never declared or paid cash dividends on our capital stock. We currently intend to retain any future earnings to finance the operation and expansion of our business, and we do not expect to declare or pay any cash dividends in the foreseeable future. As a result, you may only receive a return on your investment in our Class A common stock and, if issued, our Class C capital stock if the trading price of your shares increases.

The dual class structure of our common stock and a voting agreement between certain stockholders have the effect of concentrating voting control with our CEO and certain other holders of our Class B common stock; this will limit or preclude your ability to influence corporate matters.

Our Class B common stock has ten votes per share, and our Class A common stock has one vote per share, and we intend to create Class C capital stock that generally has no voting rights. Stockholders who hold shares of Class B common stock, including certain of our executive officers, employees, and directors and their affiliates, together hold a substantial majority of the voting power of our outstanding capital stock. Because of the ten-to-one voting ratio between our Class B and Class A common stock, the holders of our Class B common stock collectively control a majority of the combined voting power of our common stock and therefore are able to control all matters submitted to our stockholders for approval so long as the shares of Class B common stock represent at least 9.1% of all outstanding shares of our Class A and Class B common stock. This concentrated control will limit or preclude your ability to influence corporate matters for the foreseeable future.

Transfers by holders of Class B common stock will generally result in those shares converting to Class A common stock, subject to limited exceptions, such as certain transfers effected for estate planning or charitable purposes. The conversion of Class B common stock to Class A common stock will have the effect, over time, of increasing the relative voting power of those holders of Class B common stock who retain their shares in the long term. If, for example, Mr. Zuckerberg retains a significant portion of his holdings of Class B common stock for an extended period of time, he could, in the future, continue to control a majority of the combined voting power of our outstanding capital stock.

Our status as a "controlled company" could make our Class A common stock less attractive to some investors or otherwise harm our stock price.

Because we qualify as a "controlled company" under the corporate governance rules for NASDAQ-listed companies, we are not required to have a majority of our board of directors be independent, nor are we required to have a compensation committee or an independent nominating function. In connection with the pending Reclassification, contingent upon our payment of a dividend of Class C capital stock as described in last year's proxy statement, our corporate governance guidelines will be amended to provide that our compensation & governance committee will be comprised solely of independent directors. We do not have a separate and independent nominating function and will continue to have the full board of directors be directly responsible for nominating members of our board. In addition, in the future we could elect not to have a majority of our board of directors be independent or not to have a compensation committee. Accordingly, should the interests of our controlling stockholder differ from those of other stockholders, the other stockholders may not have the same protections afforded to stockholders of companies that are subject to all of the corporate governance rules for NASDAQ-listed companies. Our status as a controlled company could make our Class A common stock and, if issued, our Class C capital stock less attractive to some investors or otherwise harm our stock price.

Delaware law and provisions in our restated certificate of incorporation and bylaws could make a merger, tender offer, or proxy contest difficult, thereby depressing the trading price of our Class A common stock.

Our status as a Delaware corporation and the anti-takeover provisions of the Delaware General Corporation Law may discourage, delay, or prevent a change in control by prohibiting us from engaging in a business combination with an interested stockholder for a period of three years after the person becomes an interested stockholder, even if a change of control would be beneficial to our existing stockholders. In addition, our current restated certificate of incorporation and bylaws contain provisions that may make the acquisition of our company more difficult, including the following:

- until the first date on which the outstanding shares of our Class B common stock represent less than 35% of the combined voting power of our common stock, any transaction that would result in a change in control of our company requires the approval of a majority of our outstanding Class B common stock voting as a separate class;
- we currently have a dual class common stock structure, which provides Mr. Zuckerberg with the ability to control

the outcome of matters requiring stockholder approval, even if he owns significantly less than a majority of the shares of our outstanding Class A and Class B cnmmon stock;

- when the outstanding shares of our Class B common stock represent less than a majority of the combined voting power of common stock, certain amendments to our restated certificate of incorporation or bylaws will require the approval of two-thirds of the combined vote of our then-outstanding shares of Class A and Class B common stock;
- when the outstanding shares of nur Class B common stock represent less than a majority of the combined voting power of our common stock, vacancies on our board of direetors will be able to be filled only by our board of directors and not by stockholders;
- when the outstanding shares of our Class B common stock represent less than a majority of the combined voting power of our common stock, our board of directors will be classified into three classes of direetors with staggered three-year terms and directors will only be able to be removed from office for cause;
- when the outstanding shares of our Class B common stock represent less than a majority of the combined voting power of our common stock, our stockholders will only be able to take action at a meeting of stockholders and not by written consent;
- only our chairman, our chief executive officer, our president, or a majority of our buard of directors are authorized to call a special meeting of stockholders;
- advance notice procedures apply for stockholders to nominate candidates for election as directors or to bring matters before an annual meeting of stockholders;
- our restated certificate of incorporation authorizes undesignated preferred stock, the terms of which may be established, and shares of which may be issued, without stockholder approval; and
- certain litigation against us can only be brought in Delaware.

We intend to amend and restate our restated certificate of incorporation to create, as further described above, a new class of non-voting capital stock which may prolong Mr. Zuckerberg's ability to control the outcome of matters submitted to our stockholders for approval, including the election of directors and any merger, consolidation, or sale of all or substantially all of our assets.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

a) Sales of Unregistered Securities

None.

c) Issuer Purchases of Equity Securities

The following table summarizes the share repurchase activity for the three months ended June 30, 2017 :

	Total Number of Shares Purchased [1]	Average Price Paid Per Share [2]	Total Number of Shares Purchased as Part of Publicly Announced Programs [1]	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs
	(in thousands)		(in thousands)	(in millions)
April 1 – 30, 2017	—	$ —	—	$ 5,772
May 1 – 31, 2017	—	$ —	—	$ 5,772
June 1 – 30, 2017	1,185	$ 151.91	1,185	$ 5,592
	1,185		1,185	

(1) In November 2016, our board of directors authorized a share repurchase program of up to $6.0 billion of our Class A common stock, which commenced in January 2017 and does not have an expiration date. The timing and actual number of shares repurchased depend on a variety of factors, including price, general business and market conditions, and other investment opportunities, and shares may be repurchased through open market purchases or privately negotiated transactions, including through the use of trading plans intended to qualify under Rule 10b5-1 under the Exchange Act.

(2) Average price paid per share includes costs associated with the repurchases.

Item 6. Exhibits

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit	Filing Date	
10.1	2012 Equity Incentive Plan forms of award agreements.					X
31.1	Certification of Mark Zuckerberg, Chief Executive Officer, pursuant to Rule 13a-14(a)/15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2	Certification of David M. Wehner, Chief Financial Officer, pursuant to Rule 13a-14(a)/15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.1#	Certification of Mark Zuckerberg, Chief Executive Officer, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
32.2#	Certification of David M. Wehner, Chief Financial Officer, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
101.INS	XBRL Instance Document.					X
101.SCH	XBRL Taxonomy Extension Schema Document.					X
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.					X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.					X
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document.					X
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.					X

This certification is deemed not filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (Exchange Act), or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference into any filing under the Securities Act of 1933, as amended (Securities Act), or the Exchange Act.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this Quarterly Report on Form 10-Q to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Menlo Park, State of California, on this 27th day of July 2017 .

FACEBOOK, INC.

Date: July 27, 2017

/s/ DAVID M. WEHNER

David M. Wehner
Chief Financial Officer
(Principal Financial Officer)

Date: July 27, 2017

/s/ SUSAN J.S. TAYLOR

Susan J.S. Taylor
Chief Accounting Officer
(Principal Accounting Officer)

FACEBOOK, INC.
2012 EQUITY INCENTIVE PLAN
NOTICE OF RESTRICTED STOCK UNIT AWARD
GRANT NUMBER:

Unless otherwise defined herein, the terms defined in the Facebook, Inc. (the " ***Company*** ") 2012 Equity Incentive Plan (the " ***Plan*** ") shall have the same meanings in this Notice of Restricted Stock Unit Award (the " ***Notice*** ").

Name:

Address:

You (" ***Participant*** ") have been granted an award of Restricted Stock Units (" ***RSUs*** ") under the Plan subject to the terms and conditions of the Plan, this Notice and the attached Award Agreement (Restricted Stock Units) (hereinafter " ***RSU Agreement*** ").

Number of RSUs:

Date of Grant:

Vesting Commencement Date:

Expiration Date: The date on which settlement of all RSUs granted hereunder occurs, with earlier expiration upon the Termination Date

Vesting Schedule: Subject to the limitations set forth in this Notice, the Plan and the RSU Agreement, the RSUs will vest in accordance with the following schedule:

By accepting (whether in writing, electronically or otherwise) the RSUs, and as a condition to and in consideration of the grant, vesting, and settlement of the RSUs, Participant acknowledges and agrees to the following:

Participant agrees and acknowledges that in the event Participant's service status with the Company (or a Subsidiary or affiliate, as the case by may be) changes: (i) the Vesting Schedule may change prospectively, or (ii) a portion of the award may be subject to forfeiture. Any such changes or forfeiture will occur in accordance with Company policies including but not limited to policies relating to full- or part-time status, leaves of absence, work schedules, and vesting of awards.

Participant understands that Participant's employment or consulting relationship or service with the Company (or a Subsidiary or affiliate, as the case may be) is for an unspecified duration, can be terminated at any time in accordance with the applicable law (which may include "at-will" employment) and that nothing in this Notice, the RSU Agreement or the Plan changes the nature of that relationship. Participant acknowledges that the vesting of the RSUs pursuant to this Notice is earned only by continuing service as an Employee, Director or Consultant of the Company (or a Subsidiary or affiliate, as the case may be). By receiving the RSUs, Shares, or otherwise any benefit relating to the RSUs, Participant also acknowledges that this Notice is subject to the terms and conditions of both the RSU Agreement and the Plan, both of which are incorporated herein by reference, Participant has read both the RSU Agreement and the Plan, and Participant consents to the electronic delivery as set forth in the RSU Agreement.

Finally, please note that the RSU Agreements includes the Country-Specific Addendum, which provides additional notices, disclaimers, and/or terms and conditions that apply to employees in the countries listed. Participant understands and agrees that if Participant works, resides, moves to, or otherwise is or becomes subject to applicable laws or Company policies of any such jurisdictions at any time, such country-specific notices, disclaimers and/or terms and conditions will apply to Participant, unless otherwise determined by the Company in its sole discretion. In particular, any elections or special provisions for such country

(including but not limited to provisions for certain tax treatment; social contributions, e.g., the pass-through of employer National Insurance Contributions in the United Kingdom; potential or mandatory forfeiture of grants in certain circumstances or countries, e.g., Israel or China; and applicable holding periods, sale restrictions, or processing of proceeds) may apply to Participant's RSUs or Shares as from the date of grant, even if Participant was not subject to such country laws or policies at the time of grant. However, because applicable laws and policies are subject to change, the Country-Specific Addendum is not exhaustive. As provided for in the RSU Agreement, the Company also retains the right to impose other requirements in relation to Participant's participation in the Plan to the extent necessary or advisable in order to comply with applicable laws or facilitate the administration of the Plan or this Agreement and to require Participant to sign any additional agreements or undertakings that may be necessary or advisable to accomplish the foregoing.

FACEBOOK, INC.
2012 EQUITY INCENTIVE PLAN
RESTRICTED STOCK UNIT AWARD AGREEMENT

Unless otherwise defined herein, the terms defined in the Facebook, Inc. (the " ***Company*** ") 2012 Equity Incentive Plan (the " ***Plan*** ") shall have the same defined meanings in this Award Agreement (Restricted Stock Units) (the " ***Agreement*** ").

Participant has been granted Restricted Stock Units (" ***RSUs*** ") subject to the terms, restrictions and conditions of the Plan, the Notice of Restricted Stock Unit Award (the " ***Notice*** ") and this Agreement.

1. **Settlement**. Settlement of RSUs shall be made within 30 days following the applicable date of vesting under the vesting schedule set forth in the Notice. Settlement of RSUs shall be in Shares.

2. **No Stockholder Rights**. Unless and until such time as Shares are issued in settlement of vested RSUs, Participant shall have no ownership of the Shares allocated to the RSUs and shall have no right to dividends or to vote such Shares.

3. **Dividend Equivalents**. Dividends, if any (whether in cash or Shares), shall not be credited to Participant.

4. **Non-Transferability of RSUs**. RSUs may not be sold, assigned, transferred, pledged, hypothecated, or otherwise disposed of in any manner other than by will or by the laws of descent or distribution or court order or unless otherwise permitted by the Committee on a case-by-case basis.

5. **Termination**. If Participant's service Terminates for any reason, all unvested RSUs shall be forfeited to the Company forthwith, and all rights of Participant to such RSUs shall immediately terminate. In case of any dispute as to whether Termination has occurred, the Company shall have sole discretion to determine whether such Termination has occurred and the effective date of such Termination for purposes of the Plan. For the avoidance of doubt, it is noted that, except as may be agreed to in the sole discretion of the Company, if Participant is Terminated by his/her employer for any reason or if Participant's Termination is due to his/her voluntary resignation, all unvested RSUs shall be forfeited as of the date on which Participant is no longer actively providing services, and no vesting shall continue during any notice period that may be mandated in relation to his Termination, whether specified under contract or applicable law, including any "garden leave" or similar period.

6. **Withholding Taxes**. Prior to the settlement of Participant's RSUs and as a condition to and in consideration of the grant, vesting, and settlement of the RSUs, Participant shall pay or make adequate arrangements satisfactory to the Company (and any Subsidiary or affiliate) to satisfy all withholding obligations of the Company (and any Subsidiary or affiliate) and any other amounts in relation to the RSUs, including any applicable taxes, social contributions, required deductions, or other payments. In this regard, Participant authorizes the Company (and any Subsidiary or affiliate) to withhold all such amounts legally payable by Participant. In this regard, Participant authorizes the Company (and any Subsidiary or affiliate), at the direction and discretion of the Committee, to satisfy all obligations by one or a combination of the following: (i) payment of a cash amount by Participant, (ii) by withholding from Participant's wages or other cash compensation paid to Participant by the Company (and any Subsidiary or affiliate), (iii) withholding Shares based on the Fair Market Value of the Shares that otherwise would be issued to Participant when Participant's RSUs are settled, provided that the Company does not withhold more than the amount of Shares necessary to satisfy the maximum statutory withholding amount, (iv) by withholding from proceeds of the sale of Shares acquired upon settlement of the RSUs through a voluntary or mandatory sale arranged by the Company (on Participant's behalf pursuant to this authorization without further action by Participant), or (v) by any other arrangement approved by the Committee, all under such rules as may be established by the Committee and in compliance with the Company's Insider Trading Policy and 10b5-1 Trading Plan Policy, if applicable. The Company may refuse to deliver the Shares if Participant fails to comply with Participant's obligations in connection with the tax withholding or other payments as described in this section.

7. **Acknowledgement**. As a condition to, and in consideration of, the grant, vesting, and settlement of the RSUs, the Company and Participant agree that the RSUs are granted under and governed by the Notice, this Agreement (including the Country-Specific Addendum hereto) and the provisions of the Plan. By receiving the RSUs, Shares, or otherwise any benefit relating to the RSUs, Participant: (i) acknowledges receipt of a copy of the Plan and the Plan prospectus, (ii) represents that Participant has carefully read and is familiar with their provisions, and (iii) hereby accepts the RSUs subject to all of the terms and conditions set forth herein and those set forth in the Plan and the Notice.

8. **Entire Agreement; Enforcement of Rights**. This Agreement, the Plan and the Notice constitute the entire agreement and understanding of the parties relating to the subject matter herein and supersede all prior discussions between them. Any prior

agreements, commitments or negotiations concerning the purchase of the Shares hereunder are superseded. No modification of or amendment to this Agreement, nor any waiver of any rights under this Agreement, shall be effective unless in writing and signed by the parties to this Agreement. The failure by either party to enforce any rights under this Agreement shall not be construed as a waiver of any rights of such party.

9. **Data Protection**. In order to enable the Company to properly administer the Plan and the RSUs received by the Participant pursuant to the Plan, Participant hereby gives explicit consent to the Company, any Subsidiary or Parent of the Company, and/or any delegates to collect and process (electronically or otherwise) personal data, including sensitive and financial data, about himself or herself necessary to administer the Plan and RSUs received by Participant pursuant to the Plan. Such data may include, but is not limited to, Participant's name, work authorization, government or tax identification number, date of birth, beneficiaries' contact information, RSU grant history, and compensation information. Participant also hereby gives explicit consent to the Company and related entities to transfer (electronically or otherwise) any such data outside the country in which Participant is living or employed (including to the United States), as well as to third-party providers (in Participant's home country or the United States or other countries) of legal, tax, benefits, administration or other services to the Company, related entities, or employees. The legal person for whom such personal data is intended to be used is the Company and/or its related entities. Participant further understands that the Company and/or its Subsidiary or Parent may report information regarding the Participant and/or the RSU to tax authorities or other governmental agencies as may be required to comply with applicable laws.

10. **Compliance with Laws and Regulations**. The issuance of Shares will be subject to and conditioned upon compliance by the Company and Participant with all applicable national or local laws and regulations and with all applicable requirements of any stock exchange or automated quotation system on which the Company's Common Stock may be listed or quoted at the time of such issuance or transfer. Furthermore, Participant understands that the applicable laws of the country and/or state or province in which Participant is living or working at the time of grant, vesting and/or settlement of the RSUs and/or disposition of the Shares received thereunder (including any rules or regulations governing securities, foreign exchange, tax, labor or other matters) and any other applicable laws may restrict or prevent settlement of the RSUs and/or disposition of the Shares received thereunder or may subject Participant to additional procedural or regulatory requirements Participant is solely responsible for and will have to independently fulfill in relation to the RSUs or ownership or sale of Shares or in order to otherwise receive any benefit under this RSU. Such local requirements may be outlined in but are not limited to the Country-Specific Addendum attached hereto.

11. **Addendum and Additional Requirements**. Notwithstanding any provisions in the Plan, the Notice or this Agreement, the RSUs and any Shares to be issued thereunder shall be subject to the terms and conditions set forth in the Country-Specific Addendum that may apply due to Participant's country of residence or work upon grant, vesting or settlement of RSUs or the disposition of Shares received thereunder or upon Participant's relocation to another country. Moreover, the Company reserves the right to impose other requirements in relation to Participant's participation in the Plan to the extent necessary or advisable in order to comply with applicable laws or facilitate the administration of the Plan or this Agreement and to require Participant to sign any additional agreements or undertakings that may be necessary or advisable to accomplish the foregoing. Such requirements will apply as from the date of grant, including in circumstances where Participant moves to another country, unless otherwise determined by the Company in its sole discretion.

12. **Governing Law; Severability**. If one or more provisions of this Agreement are held to be unenforceable under applicable law, the parties agree to renegotiate such provision in good faith. In the event that the parties cannot reach a mutually agreeable and enforceable replacement for such provision, then (i) such provision shall be excluded from this Agreement, (ii) the balance of this Agreement shall be interpreted as if such provision were so excluded and (iii) the balance of this Agreement shall be enforceable in accordance with its terms. This Agreement and all acts and transactions pursuant hereto and the rights and obligations of the parties hereto shall be governed, construed and interpreted in accordance with the laws of the State of Delaware, without giving effect to principles of conflicts of law. For purposes of litigating any dispute that may arise directly or indirectly from the Plan, the Notice and this Agreement, the parties hereby submit and consent to litigation in the exclusive jurisdiction of the State of California and agree that any such litigation shall be conducted only in the courts of California or the federal courts of the United States for the Northern District of California and no other courts.

13. **No Rights as Employee, Director or Consultant**. Nothing in this Agreement shall affect in any manner whatsoever the right or power of the Company, or a Parent or Subsidiary of the Company, to terminate Participant's service in accordance with applicable laws, which may provide for the termination of Participant's service for any reason, with or without cause.

14. **Discretionary and Voluntary Notice of Grant**. As a condition to, and in consideration of, the grant, vesting, and settlement of RSUs, and in receiving the award of RSUs, Shares, or any other benefit relating to the RSUs, Participant acknowledges and agrees that:

(a) the Plan is established voluntarily by the Company, it is discretionary in nature, and it may be unilaterally modified, amended, suspended or terminated by the Company at any time, unless otherwise provided in the Plan and this Agreement;

(b) the grant of the RSUs is voluntary and occasional and does not create any contractual or other right to receive future grants of RSUs or other Awards, or benefits in lieu of RSUs, even if RSUs have been awarded repeatedly in the past;

(c) all decisions with respect to future grants of RSUs, if any, will be at the sole discretion of the Company;

(d) Participant is voluntarily participating in the Plan;

(e) the RSUs and any Shares acquired under the Plan are an extraordinary item that do not constitute compensation of any kind for services of any kind rendered to the employer, the Company or any Subsidiary or Parent of the Company and are outside the scope of Participant's employment nr service contract, if any;

(f) the RSUs and any Shares acquired under the Plan are not part of normal or expected compensation or salary for any purposes, including, but not limited to, calculation of any severance, resignation, termination, redundancy, end of service payments, bonuses, long-service awards, pension or retirement or welfare benefits or similar payments and in no event should be considered as compensation for, or relating in any way to, past services for the employer, the Company or any Subsidiary or Parent;

(g) in the event that Participant is not an Employee of the Company, the RSUs and Participant's participation in the Plan will not be interpreted to form an employment or service contract or relationship with the Company; and, furthermore, the RSUs and Participant's participation in the Plan will not be interpreted to form an employment or service contract or relationship with any Subsidiary or affiliate of the Company;

(h) the future value of the underlying Shares to be issued when the RSUs vest or are settled, if any, is unknown and cannot be predicted with certainty, and the Company is not liable for any decrease in the value of such RSUs or Shares nor for any foreign exchange fluctuations between Participant's local currency and the United States Dollar that may affect the value of any benefit Participant may receive in relation to the RSUs or the Shares received thereunder; and

(i) no claim or entitlement to compensation or damages shall arise from termination of the RSUs or from any diminution in value of the RSUs or the Shares acquired upon vesting or settlement of the RSUs, and Participant irrevocably releases the employer, the Company and any Subsidiary or Parent from any such claim that may arise; if, notwithstanding the foregoing, any such claim is found by a court of competent jurisdiction to have arisen, then, by signing the Notice, Participant shall be deemed irrevocably to have waived his or her entitlement to pursue such claim.

By Participant's acceptance (whether in writing, electronically or otherwise) of the Notice or receipt of the RSUs or Shares, and as a condition to and in consideration of the grant, vesting, and settlement of the RSUs, Participant and the Company agree that this RSU is granted under and governed by the terms and conditions of the Plan, the Notice and this Agreement (including any applicable terms as provided in the Country-Specific Addendum). To the extent Participant has been provided with a copy nf the Notice, the Plan, this Agreement or any other documents relating to the RSU in a language other than English, the English language documents will prevail in the case of any ambiguities or divergences as a result of translation. Participant has reviewed the Plan, the Notice and this Agreement in their entirety, has had an opportunity to obtain the advice nf counsel prior to executing this Agreement, and fully understands all provisions of the Plan, the Notice and this Agreement. As a condition, and in consideration of, the grant, vesting, and settlement the RSUs and the issuance of Shares and Participant's receipt thereof, Participant hereby agrees to accept as binding, conclusive and final all decisions or interpretations of the Committee upon any questions relating to the Plan, the Notice and this Agreement. Participant further agrees to notify the Company upon any change in Participant's residence address. By acceptance of this RSU as described herein, Participant consents to the electronic delivery of the Notice, this RSU Agreement, the Plan, account statements, Plan prospectuses required by the Securities and Exchange Commission, U.S. financial reports of the Company, and all other documents that the Company is required to deliver to its security holders (including, without limitation, annual reports and proxy statements) or other communications or information related to the RSU. Electronic delivery may include the delivery of a link to a Company intranet or the internet site of a third party involved in administering the Plan, the delivery of the document via e-mail or such other delivery determined at the Company's discretion.

Country-Specific Addendum

This Addendum includes additional country-specific notices, disclaimers, and/or terms and conditions that apply to Participants who work or live in the countries listed below and that may be material to Participant's participation in the Plan. Such notices, disclaimers, and/or terms and conditions may also apply if Participant moves to or otherwise is or becomes subject to the applicable laws or Company policies of the country listed. However, because foreign exchange regulations and other local laws are subject to frequent change, Participant is advised to seek advice from Participant's own personal legal and tax advisor prior to accepting a grant or holding or selling Shares acquired under the Plan. Unless otherwise noted below, capitalized terms shall take the same definitions assigned to them under the Plan and the Agreement. This Addendum forms part of the Agreement and should be read in conjunction with the Plan.

Unless otherwise noted, neither the Company nor the Shares are registered with any local stock exchange or under the control of any local securities regulator outside the U.S. This Agreement (of which this Addendum is a part), the Plan, and any other communications or materials that you may receive regarding participation in the Plan do not constitute advertising or an offering of securities outside the U.S. The issuance of securities described in any Plan-related documents is not intended for offering or public circulation in your jurisdiction.

European Union	**Data Privacy** The following supplements Section 9 of the Agreement: Participant understands that personal data will be held only as long as is necessary to implement, administer and manage Participant's participation in the Plan. Participant understands that he or she may, at any time, view his or her personal data, request additional information about the storage and processing of personal data, require any necessary amendments to personal data without cost, request a list of the names and addresses of any recipients of the personal data, or refuse or withdraw the consents herein or by contacting in writing Participant's local human resources representative.
Argentina	**Foreign Exchange Restrictions** US dollar transactions must be conducted through a financial intermediary authorized by the Argentine Central Bank. US dollar proceeds from the sale of stock by a participant, when remitted to Argentina, are subject to conversion to Argentine pesos at applicable exchange rates, as well as relevant regulations of the Central Bank. Depending on the amount, you may also be required to file certain documentation of the sale with the local bank or otherwise place the funds in a non-interest-bearing US dollar-denominated mandatory deposit account for a holding period of 365 days. As the restrictions may change, please confirm the foreign exchange requirements with your local bank before any transfer of funds into or out of Argentina.
Australia	**Securities Law Notice** This disclosure has been prepared in connection with offers to employees in Australia under the Plan and the Agreement (copies of which are enclosed). It has been prepared to ensure that this grant and any other grant under the Plan (the "Offer") satisfies the conditions for exemptions granted by the Australian Securities and Investments Commission ("ASIC") under ASIC Class order 14/1000. Any advice given to you in connection with the Offer is general advice only. It does not take into account the objectives, financial situation and needs of any particular person. No financial product advice is provided in the documentation relating to the Plan and nothing in the documentation should be taken to constitute a recommendation or statement of opinion that is intended to influence you in making a decision to participate in the Plan. This means that you should consider obtaining your own financial product advice from an independent person who is licensed by the ASIC to give such advice. Facebook, Inc. will make available upon your request the Australian dollar equivalent of the current market price of the underlying Shares subject to your RSUs. You can get those details by contacting peeps@fb.com. **Issue of RSUs** RSUs will be issued for no consideration. **Risks of Participation in the Plan** Participation in the Plan and acquiring Shares in Facebook, Inc. carries inherent risks. You should carefully consider these risks in light of your investment objectives and personal circumstances. **Settlement** Notwithstanding any discretion in the Plan, the Notice or the Agreement to the contrary, settlement of the RSUs shall be in Shares and not, in whole or in part, in the form of cash.

Belgium	**Foreign Assets Reporting** If you are a resident of Belgium, you will be required to submit an annual form declaring your income or assets (including shares acquired under an employee share plan) held outside of Belgium to the National Bank of Belgium. The reporting should be completed prior to filing your annual Belgian income tax return.
Brazil	**Foreign Assets Reporting** If you are a resident of Brazil, you will be required to submit an annual declaration of assets and rights held outside of Brazil to the Central Bank of Brazil ("BACEN") if the aggregate value of such assets and rights (including any capital gain, dividend or profit attributable to such assets) is equal to or greater than US $100,000. The reporting should be completed at the beginning of the year.
Canada	**Employee Tax Treatment** For Canadian federal income tax purposes, the RSU is intended to be treated as an agreement by the Company to sell or issue shares to the Employee and, as such, is intended to be subject to the rules in section 7 of the *Income Tax Act* (Canada). Under those rules, the Employee will be considered to have received an employment benefit at the time of settlement of the vested RSUs equal to the full value of the Shares received, which amount will be taxed as employment income and will be subject to withholding at source. **Settlement** Notwithstanding any discretion in the Plan, the Notice or the Agreement to the contrary, settlement of the RSUs shall only be made in Shares issued by the Company from treasury and not, in whole or in part, in the form of cash or other consideration. **Foreign Share Ownership Reporting** If you are a Canadian resident, your ownership of certain foreign property (including shares of foreign corporations) in excess of $100,000 may be subject to ongoing annual reporting obligations. Please refer to CRA Form T1135 (Foreign Income Verification Statement) and consult your tax advisor for further details. It is your responsibility to comply with all applicable tax reporting requirements. **Securities Law Notice** The security represented by the Notice and the Agreement was issued pursuant to an exemption from the prospectus requirements of applicable securities legislation in Canada. Participant acknowledges that as long as the Company is not a reporting issuer in any jurisdiction in Canada, the RSUs and the underlying Shares will be subject to an indefinite hold period and that the RSUs and the underlying Shares are subject to restrictions on their transfer pursuant to such applicable securities legislation. Participant further acknowledges that (i), unless permitted under applicable securities legislation, the Participant is not permitted to transfer the RSUs or the underlying Shares before the date that is 4 months and a day after the later of (a) the date of this Agreement and (b) the date the Company became a reporting issuer (as such term is defined under applicable securities legislation) in any province of territory in Canada; (ii) the certificates representing the RSUs and the underlying Shares will bear the legend required by applicable securities legislation indicating that the resale of such securities is restricted; and (iii) the Participant has been advised to consult the Participant's own legal counsel for full particulars of the resale restrictions applicable to the Participant. **Quebec: Consent to Receive Information in English** The following applies if you are a resident of Quebec: The parties acknowledge that it is their express wish that this Agreement, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. *Les parties reconnaissent avoir exigé la redaction en anglais de cette convention , ainsi que de tous documents exécutés, avis donnés et procedures judiciaries intentées, directement ou indirectement, relativement à la présente convention.*
Colombia	**Foreign Ownership Reporting** Prior approval from a government authority is not required to purchase and hold foreign securities or to receive an equity award. However, if the value of foreign investments, including the value of any equity awards, equals or exceeds US $500,000, such investments must be registered with the Colombian Central Bank by June 30th of each year.
Denmark	**Employer Statement.** Your participation in the Plan is also subject to the Danish Employer Statement, which has been provided to you separately and may also be obtained by contacting peeps@fb.com . By accepting your grant, you acknowledge that you have received and agree to the Danish Employer Statement. **Foreign Account Reporting.** Danish resident holders of non-Danish bank accounts or accounts with non-Danish brokers should submit certain forms to the Danish tax authorities: Erklæring V regarding shares deposited with a non-Danish bank or broker (https://www.skat.dk/SKAT.aspx?oId=90030) Erklæring K regarding money deposited with a non-Danish bank or broker (https://www.skat.dk/SKAT.aspx?oId=73344)

France

French Sub-Plan
The RSUs are intended to qualify for preferred treatment under French tax and social security laws and are subject to the provisions below and the Sub-Plan to the Facebook, Inc. 2012 Equity Incentive Plan, Qualified Restricted Stock Units (FRANCE) (the "French Sub-Plan"), which has been provided to you and is incorporated herein. Capitalized terms below shall take the same definitions assigned to them under the French Sub-Plan and the Agreement.

Settlement
Notwithstanding anything to the contrary stated herein, in the Notice, the Plan or the French Sub-Plan, in the case of Participant's death, if the Participant's heir or heirs request the delivery of the Shares subject to the RSUs within a period of six (6) months following the Participant's death, then the RSUs will be settled in Shares as soon as practicable following the request. If no such request in made within six (6) months following the Participant's death, the RSUs will be forfeited. In any case, settlement of RSUs shall be in Shares only and not, in whole or in part, in the form of cash.

Non-Transferability of RSUs
RSUs may not be sold, assigned, transferred, pledged, hypothecated, or otherwise disposed of in any manner other than by will or by the laws of descent and, in any event, always in accordance with applicable laws.

Termination
Notwithstanding anything to the contrary stated herein, in the Notice, the Plan or the French Sub-Plan, death of a Participant's will not cause such Participant's unvested RSUs to be immediately forfeited to the Company.

Minimum Vesting Period
Notwithstanding anything to the contrary stated herein, in the Notice, the Plan or the French Sub-Plan, save the case of death a Participant, RSUs will not vest nor be settled before the first (1st) annual anniversary of the Grant Date (as defined under the French Sub-Plan) or such other period as is required to comply with the minimum mandatory holding period applicable to Shares underlying French-qualified Restricted Stock Units under Section L. 225-197-1 of the French Commercial Code, as amended, or by the French Tax Code or French Social Security Code, as amended.

Mandatory Holding Period
Notwithstanding anything to the contrary stated herein, in the Notice, the Plan or the French Sub-Plan, any Shares issued to Participant upon settlement of the RSUs must be held (and cannot be sold or transferred) until expiration of a period which, together with the vesting period, can be no less than two years of the Grant Date, or such other period as is required to comply with the minimum mandatory holding period applicable to Shares underlying French-qualified Restricted Stock Units under Section L. 225-197-1 of the French Commercial Code, as amended, or by the French Tax Code or French Social Security Code, as amended; provided that if Participant dies or becomes Disabled, this mandatory holding period will not apply. In order to enforce this provision, the Company may, in its discretion, issue appropriate "stop transfer" instructions to its transfer agent or hold the Shares until the expiration of the holding period set forth above (such Shares may be held by the Company, a transfer agent designated by the Company or with a broker designated by the Company).

Closed Periods
Pursuant to article L 225-197-1 of the French *Code de commerce*, shares of a listed company cannot be sold (i) during the period of ten (10) stock-exchange trading days that precede or three (3) stock-exchange trading days that follow the date on which the consolidated accounts, or failing that, the annual accounts are made public; and (ii) during the period between the date on which the company's management has knowledge of information which, if it were made public, could have a significant impact on the price of the company's securities, and the date ten (10) stock-exchange trading days after that on which the said information is made public. These rules will apply to Participant unless Participant is otherwise restricted from selling Shares received upon settlement of RSUs under similar rules applicable under U.S. law, in which case the U.S. rules shall prevail. In any event, you are at all times required to comply with the Facebook, Inc. Insider Trading Policy as may be amended from time to time, which may be accessed at https://our.intern.facebook.com/intern/wiki/Legal/Insider_Trading_Policy/ and in particular Section II re No Trading on Material Non-Public Information, Black-Out Periods, and other important matters. Persons who violate these general rules and the Insider Trading Policy may be subject to legal and financial penalties. If you trade during any applicable Black-Out Period as described in the Insider Trading Policy, or if the French tax authorities deem that you have not complied with the French closed period restrictions and/or similar rules under applicable U.S. law, the RSUs and shares received under the RSUs may lose Qualified status, and you will not receive preferential tax treatment.

Acknowledgement
The Company and Participant agree that the RSUs are granted under and governed by the Notice, this Agreement (including the France section of the Country-Specific Addendum), the provisions of the Plan and the French Sub-Plan. Participant: (i) acknowledges receipt of a copy of the Plan and the Plan prospectus and the French Sub-Plan, (ii) represents that Participant has carefully read and is familiar with

	their provisions, and (iii) hereby accepts the RSUs subject to all of the terms and conditions set forth herein and those set forth in the Plan, the French Sub-Plan, the Notice, and the Agreement. **Consent to Receive Information in English** By accepting the Restricted Stock Units, Participant confirms he has read and understood the Plan and the French Sub-Plan and the Agreement including the French Country-Specific Addendum, which were provided in the English language. Participant accepts the terms of those documents accordingly. *En acceptant cette attribution gratuite d'actions, vous confirmez avoir lu et comprenez le Plan, le Sous-Plan Français et le présent Contrat, incluant tous leurs termes et conditions, qui ont été transmis en langue anglaise. Vous acceptez les dispositions de ces documents en connaissance de cause.* **Foreign Ownership Reporting** Residents of France with foreign account balances in excess of EUR 1 million or its equivalent must report monthly to the Bank of France.
Hong Kong	**Securities Law Notice** The RSUs and any Shares issued upon vesting of the RSUs do not constitute a public offering of securities under Hong Kong law and are available only to employees of the Company and its affiliates. The Plan, the RSU Agreement, including this Addendum, and other incidental communication materials have not been prepared in accordance with and are not intended to constitute a "prospectus" for a public offering of securities under the applicable companies and securities legislation in Hong Kong and have not been registered with or authorized by any regulatory authority, including the Securities and Future Commission, in Hong Kong. This Agreement and the incidental communication materials are intended only for the personal use of each eligible Participant and not for distribution to any other persons. If you have any questions about any of the contents of this Agreement or the Plan or other incidental communication materials, you should obtain independent professional advice.
India	**Repatriation Requirement** You shall take all reasonable steps to repatriate to India immediately all foreign exchange received by you as a consequence of your participation in Facebook's Plan and in any case not later than 90 days from the date of sale of the stocks so acquired by you under the Plan. Further, you shall in no case take any action (or refrain from taking any action) that has the effect of: (a) Delaying the receipt by you of the whole or part of such foreign exchange; or (b) Eliminating the foreign exchange in whole or in part to be receivable by you. Upon receipt or realization of the foreign exchange in India, including in relation to any dividend payments, you shall surrender the received or realised foreign exchange to an authorised person within a period of 180 days from the date of such receipt or realisation, as the case may be. Please note that you should keep the remittance certificate received from the bank where foreign currency is deposited in the event that the Reserve Bank of India, Facebook or your employer requests proof of repatriation.
Ireland	**Director Reporting** If you are a director or shadow director of the Company or related company, you may be subject to special reporting requirements with regard to the acquisition of shares or rights over shares. Please contact your personal legal advisor for further details if you are a director or shadow director. **Settlement** Notwithstanding any discretion in the Plan, the Notice or the Agreement to the contrary, settlement of the RSUs shall be in Shares and not, in whole or in part, in the form of cash.

Israel

Sub-Plan for Israeli Participants
Your RSUs are granted under the Sub-Plan for Israeli Participants (the "Israeli Sub-Plan"), which is considered part of the Plan. The terms used herein shall have the meaning ascribed to them in the Plan or Israeli Sub-Plan. In the event of any conflict, whether explicit or implied, between the provision of this Agreement and the Israeli Sub-Plan, the provisions set out in the Israeli Sub-Plan shall prevail. By accepting this grant, you acknowledge that a copy of the Israeli Sub-Plan has been provided to you. The Israeli Sub-Plan may also be obtained by contacting peeps@fb.com .

Further Acknowledgement
The following language shall be read in continuation to Section 7 of the Agreement:

Participant also (iii) declares that she/he is familiar with Section 102 and the regulations and rules promulgated thereunder, including without limitations the provisions of the tax route applicable to the RSUs, and agrees to comply with such provisions, as amended from time to time, provided that if such terms are not met, Section 102 may not apply, and (iv) agrees to the terms and conditions of the trust deed signed between the Trustee and the Company and/or the applicable Subsidiary, which is available for the Participant's review, during normal working hours, at Company's offices, (v) acknowledges that releasing the RSUs and Shares from the control of the Trustee prior to the termination of the Holding Period constitutes a violation of the terms of Section 102 and agrees to bear the relevant sanctions, (vi) authorizes the Company and/or the applicable Subsidiary to provide the Trustee with any information required for the purpose of administering the Plan including executing its obligations under the Ordinance, the trust deed and the trust agreement, including without limitation information about his/her RSUs, Shares, income tax rates, salary bank account, contact details and identification number, (vii) declares that he/she is a resident of the State of Israel for tax purposes on the grant date and agrees to notify the Company upon any change in the residence address indicated above and acknowledges that if his/her engagement with the Company or Subsidiary is terminated and he/she is no longer employed by the Company or any Subsidiary, the RSUs and Shares shall remain subject to Section 102, the trust agreement, the Plan and this Agreement; (viii) understands and agrees that if he/she ceases to be employed or engaged by an Israeli resident Subsidiary but remains employed by the Company or any Subsidiary thereof, all unvested RSUs shall be forfeited to the Company with all rights of the Participant to such RSUs immediately terminating prior to his/her termination of employment or services, and any Shares already issued upon the previous vesting of RSUs shall remain subject to Section 102, the trust agreement, the Plan and this Agreement; (ix) warrants and undertakes that at the time of grant of the RSUs herein, or as a consequence of the grant, the Participant is not and will not become a holder of a "controlling interest" in the Company, as such term is defined in Section 32(9) of the Ordinance, (x) the grant of RSUs is conditioned upon the Participant signing all documents requested by the Company or the Trustee.

Section 102 Capital Gains Trustee Route
The RSUs are intended to be subject to the Capital Gains Route under Section 102 of the Ordinance, subject to you consenting to the requirements of such tax route by accepting the terms of this agreement and the grant of RSUs, and subject further to the compliance with all the terms and conditions of such tax route. Under the Capital Gains Route tax is only due upon sale of the Shares or upon release of the Shares from the holding or control of the Trustee.

Trustee Arrangement
The RSUs, the Shares issued upon vesting and/or any additional rights, including without limitation any right to receive any dividends or any shares received as a result of an adjustment made under the Plan that may be granted in connection with the RSUs (the "Additional Rights"), shall be issued to or controlled by the Trustee for the benefit of the Participant under the provisions of the 102 Capital Gains Route and will be controlled by the Trustee for at least the period stated in Section 102 of the Ordinance and the Income Tax Rules (Tax Benefits in Share Issuance to Employees) 5763-2003 (the "Rules"). In the event the RSUs do not meet the requirements of Section 102 of the Ordinance, such RSUs and the underlying Shares shall not qualify for the favorable tax treatment under Section 102 of the Ordinance. The Company makes no representations or guarantees that the RSUs will qualify for favorable tax treatment and will not be liable or responsible if favorable tax treatment is not available under Section102 of the Ordinance. Any fees associated with any exercise, sale, transfer or any act in relation to the RSUs shall be borne by the Participant and the Trustee and/or the Company and/or any Subsidiary shall be entitled to withhold or deduct such fees from payments otherwise due to you from the Company or a Subsidiary or the Trustee.

Restrictions on Sale
In accordance with the requirements of Section 102 of the Ordinance and the Capital Gains Route, the Participant shall not sell nor transfer the Shares or Additional Rights from the Trustee until the end of the required Holding Period. Notwithstanding the above, if any such sale or transfer occurs before the end of the required Holding Period, the sanctions under Section 102 shall apply to and shall be borne by the Participant.

Tax Treatment
The following language supplements Section 6 of the Agreement:

The RSUs are intended to be taxed in accordance with Section 102, subject to full and complete compliance with the terms of Section 102. Participants with dual residency for tax purposes may be subject to taxation in several jurisdictions.

Any Tax imposed in respect of the RSUs and/or Shares, including, but not limited to, the grant of RSUs, and/or the vesting, transfer, waiver, or expiration of RSUs and/or Shares, and/or the sale of Shares, shall be borne solely by the Participant, and in the event of death, by the Participant's heirs. The Company, any Subsidiary, the Trustee or anyone on their behalf shall not be required to bear the aforementioned Taxes, directly or indirectly, nor shall they be required to gross up such Tax in the Participant's salaries or remuneration. The applicable Tax shall be withheld from the proceeds of sale of Shares or shall be paid to the Company or a Subsidiary or the Trustee by the Participant. Without derogating from the aforementioned, the Company or a Subsidiary or the Trustee shall be entitled to withhold Taxes as it deems complying with applicable law and to deduct any Taxes from payments otherwise due to the Participant from the Company or a Subsidiary or the Trustee. The ramifications of any future modification of applicable law regarding the taxation of the RSUs granted to the Participant shall apply to the Participant accordingly and the Participant shall bear the full cost thereof, unless such modified laws expressly provide otherwise.

The issuance of the Shares upon the vesting of RSUs or in respect thereto, shall be subject to the full payments of any Tax (if applicable).

Securities Law
If required under applicable law, the Company shall use reasonable efforts to receive a securities exemption from the Israeli Securities Authority to avoid the requirement to file an Israeli securities prospectus in relation to the Plan. Copies of the Plan and the Form S-8 registration statement for the Plan filed with the U.S. Securities and Exchange Commission will be made available by request from peeps@fb.com .

Italy

Data Privacy Consent
Pursuant to Legislative Decree no. 196/2003, the Controller of personal data processing is Facebook, with registered offices at 6ô Piano (6 th Floor), Piazza Giuseppe Missori 2, Milan 20122, Italy, and its Representative in Italy for privacy purposes is: Luca Colombo.

I understand that Data processing related to the purposes specified above shall take place under automated or non-automated conditions, anonymously when possible, that comply with the purposes for which Data are collected and with confidentiality and security provisions as set forth by applicable laws and regulations, with specific reference to Legislative Decree no. 196/200.

The processing activity, including the communication and transfer of my Data abroad, including outside of the European Union, as herein specified and pursuant to applicable laws and regulations, does not require my consent thereto as the processing is necessary for the performance of contractual obligations related to the implementation, administration and management of the Plan. I understand that the use of my Data will be minimized where it is not necessary for the implementation, administration and management of the Plan. I further understand that, pursuant to Section 7 of the Legislative Decree no. 196/2003, I have the right to, including but not limited to, access, delete, update, ask for rectification of my Data and stop, for legitimate reason, the Data processing. Furthermore, I am aware that my Data will not be used for direct marketing purposes.

Japan

Exit Tax
Please note that you may be subject to tax on your RSUs, even prior to vesting, if you relocate from Japan if you (1) hold financial assets with an aggregate value of ¥100,000,000 or more upon departure from Japan and (2) maintained a principle place of residence (*jusho*) or temporary place of abode (*kyosho*) in Japan for 5 years or more during the 10-year period immediately prior to departing Japan. You should discuss your tax treatment with your personal tax advisor.

Securities Acquisition Report
If you acquire Shares valued at more than ¥100,000,000 total, you must file a Securities Acquisition Report with the Ministry of Finance ("MOF") through the Bank of Japan within 20 days of the acquisition of the Shares.

Korea

Repatriation Requirement
Please note that proceeds received from the sale of stock overseas must be repatriated to Korea within eighteen (18) months if such proceeds exceed US $500,000 per sale. Separate sales may be deemed a single sale if the sole purpose of separate sales was to avoid a sale exceeding the US $500,000 per sale threshold.

Malaysia

Securities Law Notice
The grant of Facebook equity awards in Malaysia constitutes or relates to an 'excluded offer,' 'excluded invitation,' or 'excluded issue' pursuant to Section 229 and Section 230 of the CMSA, and as a consequence no prospectus is required to be registered with the Securities Commission of Malaysia. The award documents do not constitute and may not be used for the purpose of a public offering or an issue, offer for subscription or purchase, invitation to subscribe for or purchase any securities requiring the registration of a prospectus with the Securities Commission in Malaysia under the CMSA.

Mexico

Labor Law Acknowledgment
The invitation Facebook is making under the Plan is unilateral and discretionary and is not related to the salary and other contractual benefits granted to you by your employer; therefore, benefits derived from the Plan will not under any circumstance be considered as an integral part of your salary . Facebook reserves the absolute right to amend the Plan and discontinue it at any time without incurring any liability whatsoever. This invitation and, in your case, the acquisition of shares does not, in any way, establish a labor relationship between you and Facebook, nor does it establish any rights between you and your employer.

La invitación que Facebook hace en relación con el Plan es unilateral, discrecional y no se relaciona con el salario y otros beneficios que recibe actualmente de su actual empleador, por lo que cualquier beneficio derivado del Plan no será considerado bajo ninguna circunstancia como parte integral de su salario. Por lo anterior, Facebook se reserva el derecho absoluto para modificar o terminar el mismo, sin incurrir en responsabilidad alguna. Esta invitación y, en su caso, la adquisición de acciones, de ninguna manera establecen relación laboral alguna entre usted y Facebook y tampoco genera derecho alguno entre usted y su empleador.

New Zealand

Securities Law Notice
This is an offer of Restricted Stock Units over *ordinary shares* in Facebook, Inc. ("Facebook"). Facebook shares give you a stake in the ownership of Facebook. You may receive a return if dividends or dividend equivalents are paid. If Facebook runs into financial difficulties and is wound up, shareholders will only be paid after all creditors have been paid. You may lose some or all of your investment.

New Zealand law normally requires people who offer financial products to give information to investors before they invest. This information is designed to help investors to make an informed decision. The usual rules do not apply to this offer because it is made under an employee share purchase scheme. As a result, you may not be given all the information usually required. You will also have fewer other legal protections for this investment. Ask questions, read all documents carefully, and seek independent financial advice before committing yourself.

RSUs may not be transferred other than by will or by the laws of descent or distribution, subject to the terms of the RSU Agreement. If you receive shares upon vesting of RSUs, you may sell such shares, subject to any applicable insider trading laws or other regulations and any other trading restrictions imposed by Facebook. Facebook shares are quoted on NASDAQ. This means you may be able to sell them on the NASDAQ if there are interested buyers. You may get less than you invested. The price will depend on the demand for the Facebook shares.

In addition, you are directed to Facebook's most recent annual report and published financial statements. In compliance with New Zealand securities law, you are hereby notified that the documents listed below are available for your review on Facebook' external and internal sites at the web addresses listed below:

Facebook's most recent Annual Report (Form 10-K) - www.facebook.com (see "Investor Relations");
Facebook's most recent published financial statements - www.facebook.com (see "Investor Relations");
The Plan - http://www.schwab.com/facebook ;
The Plan Prospectus - http://www.schwab.com/facebook ; and
The RSU Agreement (of which this Appendix is a Part) - http://www.schwab.com/facebook .

A copy of the above documents will be sent to you free of charge upon request to peeps@fb.com . You should read the materials provided carefully before making a decision whether to participate in the Plan. When reading these materials, please note all references to the exercise price are listed in US dollars. In addition, please consult your tax advisor for specific information concerning your personal tax situation with regard to Plan participation.

Philippines

Securities Law Notice. This offering is subject to exemption from the requirements of registration with the Philippines Securities and Exchange Commission under Section 10.1 (k) of the Philippines Securities Regulation Code. **THE SECURITIES BEING OFFERED OR SOLD HAVE NOT BEEN REGISTERED WITH THE PHILIPPINES SECURITIES AND EXCHANGE COMMISSION UNDER THE SECURITIES REGULATION CODE. ANY FUTURE OFFER OR SALE THEREOF IS SUBJECT TO REGISTRATION REQUIREMENTS UNDER THE CODE UNLESS SUCH OFFER OR SALE QUALIFIES AS AN EXEMPT TRANSACTION.**

Poland	**Foreign Ownership Reporting** If you hold more than PLN 7,000,000 in foreign securities (including Shares) at year-end, you are required to report quarterly to the National Bank of Poland regarding the number and value of such securities. Such reports are filed on special forms available on the website of the National Bank of Poland. Additional forms are required if you hold 10% or more of the voting rights in a foreign entity.
Singapore	**Securities Law Notice** This grant of the RSU and the Common Stock to be issued upon vesting of the RSU shall be made available only to an employee of the Company or its Subsidiary, in reliance of the prospectus exemption set out in Section 173(1)(f) of the Securities and Futures Act (Chapter 289) of Singapore. In addition, you agree, by your acceptance of this grant, not to sell any Common Stock within six months of the date of grant. Please note that neither this Agreement nor any other document or material in connection with this offer of the RSU and the Common Stock thereunder has been or will be lodged, registered or reviewed by any regulatory authority in Singapore. **Director Reporting** If you are a director or shadow director of the Company or an affiliate, you may be subject to special reporting requirements with regard to the acquisition of shares or rights over shares. Please contact your personal legal advisor for further details if you are a director or shadow director. **Exit Tax / Deemed Exercise Rule** If you have received RSUs in relation to your employment in Singapore, please note that if, prior to the vesting of your RSUs, you are 1) a permanent resident of Singapore and leave Singapore permanently or are transferred out of Singapore; or 2) neither a Singapore citizen nor permanent resident and either cease employment in Singapore or leave Singapore for any period exceeding 3 months, you will likely be taxed on your unvested RSUs on a "deemed exercise" basis, even though your RSUs have not yet vested. You should discuss your tax treatment with your personal tax advisor.
South Africa	**Securities Law Notice** This is an offer of Restricted Stock Units over ordinary shares in Facebook, Inc. ("Facebook"). You have been provided full particulars of the nature of the Restricted Stock Units with this Offer, but the relevant documents may also be accessed here: The Plan - http://www.schwab.com/facebook ; The Plan Prospectus - http://www.schwab.com/facebook ; and The RSU Agreement (of which this Appendix is a Part) - http://www.schwab.com/facebook . Participation in the Plan and acquiring Shares in Facebook, Inc. carries inherent risks. You should carefully consider these risks in light of your investment objectives and personal circumstances. Any advice given to you in connection with the RSUs is general advice only. It does not take into account the objectives, financial situation and needs of any particular person. No financial product advice is provided in the documentation relating to the Plan and nothing in the documentation should be taken to constitute a recommendation or statement of opinion that is intended to influence you in making a decision to participate in the Plan. Facebook shares give you a stake in the ownership of Facebook. You may receive a return if dividends or dividend equivalents are paid. If Facebook runs into financial difficulties and is wound up, shareholders will only be paid after all creditors have been paid. You may lose some or all of your Share value. You are directed to Facebook's most recent annual report and published financial statements. In particular, Facebook's most recent Annual Report (Form 10-K) is available to you on https://investor.fb.com/home/default.aspx ("Investor Relations") and includes information about Facebook's business and its profit history over the last 3 years. Any material changes to this information are disclosed on quarterly Form 10-Q filings and Form 8-K filings, which will also be available to you on the Investor Relations site.

Spain	**Foreign Share Ownership Reporting** If you are a Spanish resident, your acquisition, purchase, ownership, and/or sale of foreign-listed stock may be subject to ongoing reporting obligations with the Dirección General de Politica Comercial e Inversiones Exteriores ("DGPCIE") of the Ministerio de Economia, the Bank of Spain, and/or the tax authorities. These requirements change periodically, so you should consult your personal advisor to determine the specific reporting obligations. Currently, you must declare the acquisition of Shares to DGPCIE for statistical purposes. You must also declare the ownership of any Shares with the DGPCIE each January while the shares are owned. The relevant forms are Form D6 and, depending on the amount of assets, Form D8. In addition, if you perform transactions with non-Spanish residents or hold a balance of assets and liabilities with foreign parties higher than EUR 1,000,000, you may be required to report such transactions and accounts to the Bank of Spain. The frequency (monthly, quarterly or annually) of the notification will vary depending on the total value of the transactions or the balance of assets and liabilities. If you hold assets or rights outside of Spain (including Shares acquired under the Plan), you may also have to file Form 720 with the tax authorities, generally if the value of your foreign investments exceeds €50,000. Please note that reporting requirements are based on what you have previously disclosed and the increase in value and the total value of certain groups of foreign assets.
Taiwan	**Exchange Control Information** You may acquire and remit foreign currency (including proceeds from the sale of Shares) into and out of Taiwan up to US $5,000,000 per year. If the transaction amount is TWD 500,000 or more in a single transaction, you must submit a foreign exchange transaction form and also provide supporting documentation to the satisfaction of the remitting bank. If the transaction amount is US $500,000 or more, you may be required to provide additional supporting documentation to the satisfaction of the remitting bank. Please consult your personal advisor to ensure compliance with applicable exchange control laws in Taiwan.
Thailand	**Exchange Control Information** When you sell Shares issued to you at vesting, you must repatriate all cash proceeds to Thailand and convert such proceeds to Thai Baht within 360 days of receipt of such proceeds. In certain cases the inward remittance may then need to be reported to the Bank of Thailand, but this is typically handled by the receiving bank.
United Arab Emirates	**Securities Law Notice** This Plan has not been approved or licensed by the UAE Central Bank or any other relevant licensing authorities or governmental agencies in the United Arab Emirates. This Plan is strictly private and confidential and has not been reviewed by, deposited or registered with the UAE Central Bank or any other licensing authority or governmental agencies in the United Arab Emirates. This Plan is being issued from outside the United Arab Emirates to a limited number of employees of Facebook, Inc. and affiliated companies and must not be provided to any person other than the original recipient and may not be reproduced or used for any other purpose. Further, the information contained in this report is not intended to lead to the issue of any securities or the conclusion of any other contract of whatsoever nature within the territory of the United Arab Emirates.

United Kingdom

Withholding of Tax

This provision supplements Section 6 of the Agreement:

If payment or withholding of the Tax-Related Items (including the Employer NICs, as defined below) is not made within ninety (90) days of the event giving rise to the Tax-Related Items (the " ***Due Date*** ") or such other period specified in Section 222(1)(c) of the U.K. Income Tax (Earnings and Pensions) Act 2003, the amount of any uncollected Tax-Related Items will constitute a loan owed by Participant to the Employer, effective on the Due Date. Participant agrees that the loan will bear interest at the then-current Official Rate of Her Majesty's Revenue and Customs (" ***HMRC*** "), it will be immediately due and repayable, and the Company or the employer may recover it at any time thereafter by any of the means referred to in Section 6 of the Agreement. Notwithstanding the foregoing, if Participant is a director or executive officer of the Company (within the meaning of Section 13(k) of the U.S. Securities and Exchange Act of 1934, as amended), Participant will not be eligible for such a loan to cover the Tax-Related Items. In the event that Participant is a director or executive officer and the Tax-Related Items are not collected from or paid by Participant by the Due Date, the amount of any uncollected Tax-Related Items will constitute a benefit to Participant on which additional income tax and national insurance contributions will be payable. Participant will be responsible for reporting and paying any income tax due on this additional benefit directly to HMRC under the self-assessment regime.

Settlement

Notwithstanding any discretion in the Plan, the Notice or the Agreement to the contrary, settlement of the RSUs shall be in Shares and not, in whole or in part, in the form of cash.

NICs Joint Election

As a condition of, and in consideration for, participation in the Plan and vesting of the RSUs and issuance of Shares, Participant agrees to accept any liability for secondary Class 1 national insurance contributions which may be payable by the Company and/or the employer in connection with the RSUs and any event giving rise to Tax-Related Items (" ***Employer NICs*** "). By accepting this Award (whether in writing, electronically or otherwise) including the receipt of Shares or any other benefit relating to the RSUs, Participant explicitly accepts the terms of and enters into the Form of Election to Transfer the Employer's Secondary Class 1 National Insurance Liability to the Employee, the form of such joint election being formally approved by HMRC (the " ***NICs Joint Election*** "), as provided for in Annex 1 to this Addendum to the Agreement. Participant further agrees to accept any other required consent, elections or other joint elections as may be required by the Company between Participant and the Company and/or the employer or any successor to the Company and/or the Employer.

If Participant does not enter into a NICs Joint Election prior to the vesting of his/her RSUs, or if the NICs Joint Election is revoked at any time by HMRC, then unless the Company determines otherwise as provided below, the RSUs shall cease vesting and shall become null and void and no Shares will be issued under the Plan, without any liability to the Company and/or the employer.

Participant shall indemnify the Company and/or the employer against any Employer NICs and, if the Company so determines, the Company shall allow vesting of the RSUs notwithstanding the absence of a valid NICs Joint Election, and Participant agrees that, in such circumstances, the Company and/or the employer may recover the amount of any Employer NICs by way of withholding in accordance with Section 6 of the Agreement.

Participant further agrees that the Company and/or the employer may collect the Employer NICs from Participant by any of the means set forth in Section 6 of the Agreement.

ANNEX 1

FACEBOOK INC.
2012 EQUITY INCENTIVE PLAN

Restricted Stock Unit Awards
for Employees in the United Kingdom

FORM OF ELECTION TO TRANSFER THE EMPLOYER'S SECONDARY

CLASS 1 NATIONAL INSURANCE LIABILITY TO THE EMPLOYEE

1. **Parties**

This Election is between:

(A) The named Participant (the ***"Employee"***), who is employed by the employing company set out in the attached schedule (the ***"Employer"***), and who is eligible to receive Restricted Stock Units (***"RSUs"***) pursuant to the terms and conditions of the Facebook, Inc. 2012 Equity Incentive Plan (the ***"Plan"***), and

(B) **Facebook, Inc.** of 1601 Willow Road, Menlo Park, California 94025, U.S.A. (the ***"Company"***) which may grant RSUs under the Plan and is authorized to enter this Election on behalf of the Employer.

2. **Purpose of Election**

2.1 This Election relates to the Employer's secondary Class 1 national insurance contributions (the ***"Employer's Liability"***) which may arise on the occurrence of a ***"Taxable Event"*** pursuant to section 4(4)(a) of the Social Security Contributions and Benefits Act 1992, including:

(i) the acquisition of securities pursuant to the RSUs including any dividend equivalents paid out in securities of the Company (pursuant to section 477(3)(a) ITEPA); and/or

(ii) the assignment or release of the RSUs in return for consideration (pursuant to section 477(3)(b) ITEPA); and/or

(iii) the receipt of a benefit in connection with the RSUs other than a benefit within (i) or (ii) above (pursuant to section 477(3)(c) ITEPA).

In this Election, ITEPA means the Income Tax (Earnings and Pensions) Act 2003.

2.2 This Election applies to all RSUs granted to the Employee under the Plan, including any dividend equivalents paid out in securities of the Company with respect to the RSUs, on or after 23 April 2012 up to the termination date of the Plan.

2.3 This joint election will not apply to the extent that it relates to relevant employment income which is employment income of the earner by virtue of Chapter 3A of Part 7 of ITEPA 2003 (employment income: securities with artificially depressed market value).

2.4 This Election does not apply in relation to any liability, or any part of any liability, arising as a result of regulations being given retrospective effect by virtue of section 4B(2) of either the Social Security Contributions and Benefits Act 1992, or the Social Security Contributions and Benefits (Northern Ireland) Act 1992.

3. **The Election**

The Employee and the Company jointly elect that the entire liability of the Employer to pay the Employer's Liability on the Taxable Event is hereby transferred to the Employee. The Employee understands that by accepting (whether in writing, electronically or otherwise) this Election he or she will become personally liable for the Employer's Liability covered by this Election.

4. **Payment of the Employer's Liability**

4.1 The Employee hereby authorizes the Company and/or the Employer to collect the Employer's Liability from the Employee at any time after the Taxable Event:

(i) by deduction from salary or any other payment payable to the Employee at any time on or after the date of the Taxable Event; and/or

(ii) directly from the Employee by payment in cash or cleared funds; and/or

(iii) by arranging, on behalf of the Employee, for the sale of some of the securities which the Employee is entitled to receive in respect of the RSUs; and/or

(iv) through any other method as set forth in the award agreement entered into between the Employee and the Company.

4.2 The Company hereby reserves for itself and the Employer the right to withhold the transfer of any securities to the Employee until full payment of the Employer's Liability is received.

4.3 The Company agrees to remit the Employer's Liability to Her Majesty's Revenue and Customs (***"HMRC"***) on behalf of the Employee within fourteen (14) days after the end of the U.K. tax month during which the Taxable Event occurs.

5. **Duration of Election**

5.1 The Employee and the Company agree to be bound by the terms of this Election regardless of whether the Employee is transferred abroad or is not employed by the Employer on the date on which the Employer's Liability becomes due.

5.2 This Election will continue in effect until the earliest of the following:

(i) such time as both the Employee and the Company agree that it should cease to have effect;

(ii) on the date the Company serves notice on the Employee terminating its effect;

(iii) on the date the HMRC withdraws approval of this Form of Election; or

(iv) on the date the Election ceases to have effect in accordance with its terms in respect of any outstanding RSUs granted under the Plan.

Agreed to by the Employee by electronically accepting this award of RSUs.

Agreed to by Facebook, Inc.

Schedule to Form of Election - Employing Companies

The employing companies to which this Form of Election relates are:

Facebook UK Limited

Registered Office:	Gladstone House, 77-79 High Street Egham, Surrey, TW20 9HY
Corporation Tax District:	Central London Area
Corporation Tax Reference:	623/29534 12978
PAYE District:	Lothians Area
PAYE Reference:	846/BA09294

EXHIBIT 31.1

CERTIFICATION OF PERIODIC REPORT UNDER SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Mark Zuckerberg, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Facebook, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: July 27, 2017

/s/ MARK ZUCKERBERG

Mark Zuckerberg

Chairman and Chief Executive Officer

(Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATION OF PERIODIC REPORT UNDER SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, David M. Wehner, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Facebook, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: July 27, 2017

/s/ DAVID M. WEHNER

David M. Wehner

Chief Financial Officer

(Principal Financial Officer)

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002

I, Mark Zuckerberg, Chairman and Chief Executive Officer of Facebook, Inc. (Company), do hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

- the Quarterly Report on Form 10-Q of the Company for the quarter ended June 30, 2017 (Report) fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company for the periods presented therein.

Date: July 27, 2017

/s/ MARK ZUCKERBERG
Mark Zuckerberg
Chairman and Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002

I, David M. Wehner, Chief Financial Officer of Facebook, Inc. (Company), do hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

- the Quarterly Report on Form 10-Q of the Company for the quarter ended June 30, 2017 (Report) fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company for the periods presented therein.

Date: July 27, 2017

/s/ DAVID M. WEHNER
David M. Wehner
Chief Financial Officer
(Principal Financial Officer)

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by EDGAR Online

TWITTER, INC.

FORM 10-Q
(Quarterly Report)

Filed 08/03/17 for the Period Ending 06/30/17

Address	1355 MARKET STREET, SUITE 900
	San Francisco, CA 94103
Telephone	(415) 222-9670
CIK	0001418091
Symbol	TWTR
SIC Code	7370 - Computer Programming, Data Processing, And
Industry	Internet Services
Sector	Technology
Fiscal Year	12/31

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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-Q

(Mark One)

☒ QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the quarterly period ended June 30, 2017

OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

FOR THE TRANSITION PERIOD FROM TO

Commission File Number 001-36164

Twitter, Inc.

(Exact name of registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation or organization)	20-8913779 (I.R.S. Employer Identification No.)

1355 Market Street, Suite 900
San Francisco, California 94103
(Address of principal executive offices and Zip Code)

(415) 222-9670
(Registrant's telephone number, including area code)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. YES ☒ NO ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). YES ☒ NO ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐ (Do not check if a smaller reporting company)	Smaller reporting company	☐
Emerging growth company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). YES ☐ NO ☒

The number of shares of the registrant's common stock outstanding as of July 27, 2017 was 737,693,225.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which statements involve substantial risks and uncertainties. Forward-looking statements generally relate to future events or our future financial or operating performence. In some cases, you can identify forward-looking statements because they contain words such as "may," "will," "should," "expects," "plans," "anticipates," "could," "intends," "target," "projects," "contemplates," "believes," "estimates," "predicts," "potential" or "continue" or the negative of these words or other similar terms or expressions that concern our expectations, strategy, plans or intentions. Forward-looking statements contained in this Quarterly Report on Form 10-Q include, but are not limited to, statements about:

- our ability to attract and retain users and increase the level of engagement, including ad engagement, of our users;
- our beliefs regarding MAUs, DAUs, cost per ad engagement and changes in ad engagements;
- our ability to develop or acquire new products, product features and services, improve our existing products and services, including with respect to Promoted Tweet product features and video and performance advertising, and increase the value of our products and services;
- our business strategies, plans and priorities, including our plans for growth, investment in and refinement of our products and services, including our decisions to de-emphasize, discontinue or not launch certain products and product features;
- our ability to provide new content from third parties, including our ability to secure live streaming video content on economic and other terms that are acceptable to us;
- our ability to attract advertisers to our platforms, products and services and increase the amount that advertisers spend with us;
- our expectations regarding our user growth and growth rates and the continued usage of our mobile applications;
- our ability to increase our revenue and our revenue growth rate, including by differentiating and scaling revenue products and our expectations regarding revenue mix;
- our expectations regarding revenue growth vis-à-vis audience growth, competition and the effects of advertiser sales cycle;
- our ability to improve user monetization, including of our logged out and syndicated audiences;
- our future financial performance, including trends in cost per ad engagement, revenue, cost of revenue, operating expenses, including stock-based compensation and income taxes; our expectations regarding our tax expense and cash taxes;
- our expectations regarding outstanding litigation;
- the effects of seasonal trends on our results of operations;
- the sufficiency of our cash and cash equivalents and cash generated from operations to meet our working capital and capital expenditure requirements;
- our ability to timely and effectively scale and adapt our existing technology and network infrastructure;
- our ability to successfully acquire and integrate companies and assets; and
- our expectations regarding international operations.

We caution you that the foregoing list may not contain all of the forward-looking statements made in this Quarterly Report on Form 10-Q.

You should not rely upon forward-looking statements as predictions of future events. We have based the forward-looking statements contained in this Quarterly Report on Form 10-Q primarily on our current expectations and projections about future events and trends that we believe may affect our business, financial condition, operating results, cash flows or prospects. The outcome of the events described in these forward-looking statements is subject to risks, uncertainties and other factors described in the s ection titled "Risk Factors" and elsewhere in this Quarterly Report on Form 10-Q. Moreover, we operate in a very competitive and rapidly changing environment. New risks and uncertainties emerge from time to time and it is not possible for us to predict all risks and uncertainties that could have an impact on the forward-looking statements contained in this Quarterly Report on Form 10-Q. We cannot assure you that the results, events and circumstances reflected in the forward-looking statements will be achiev ed or occur, and actual results, events or circumstances could differ materially from those described in the forward-looking statements.

The forward-looking statements made in this Quarterly Report on Form 10-Q relate only to events as of the date on which the statements are made. We undertake no obligation to update any forward-looking statements made in this Quarterly Report on Form 10-Q to reflect events or circumstances after the date of this Quarterly Report on Form 10-Q or to reflect new information or the occurrence of unanticipated events, except as required by law. We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements and you should not place undue reliance on our forward-looking statements. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make.

NOTE REGARDING KEY METRICS

We review a number of metrics, including monthly active users, or MAUs, changes in daily active users or daily active usage, or DAUs, changes in ad engagements and changes in cost per ad engagement, to evaluate our business, measure our performance, identify trends affecting our business, formulate business plans and make strategic decisions. See the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Metrics" for a discussion of how we calculate MAUs, changes in DAUs, changes in ad engagements and changes in cost per ad engagement.

The numbers of active users presented in this Quarterly Report on Form 10-Q are based on internal company data. While these numbers are based on what we believe to be reasonable estimates for the applicable period of measurement, there are inherent challenges in measuring usage and user engagement across our large user base around the world. For example, there are a number of false or spam accounts in existence on our platform. We have performed an internal review of a sample of accounts and estimate that false or spam accounts represented less than 5% of our MAUs as of December 31, 2016. In making this determination, we applied significant judgment, so our estimation of false or spam accounts may not accurately represent the actual number of such accounts, and the actual number of false or spam accounts could be higher than we have estimated. We are continually seeking to improve our ability to estimate the total number of spam accounts and eliminate them from the calculation of our active users, and in the past have made improvements in our spam detection capabilities that have resulted in the suspension of a large number of accounts. Spam accounts that we have identified are not included in the active user numbers presented in this Quarterly Report on Form 10-Q. We treat multiple accounts held by a single person or organization as multiple users for purposes of calculating our active users because we permit people and organizations to have more than one account. Additionally, some accounts used by organizations are used by many people within the organization. As such, the calculations of our active users may not accurately reflect the actual number of people or organizations using our platform.

Our metrics are also affected by applications that automatically contact our servers for regular updates with no discernible user-initiated action involved, and this activity can cause our system to count the users associated with such applications as active users on the day or days such contact occurs. As of December 31, 2016, approximately 8.5% of users used third party applications that may have automatically contacted our servers for regular updates without any discernible additional user-initiated action. As such, the calculations of our active users presented in this Quarterly Report on Form 10-Q may be affected as a result of this activity.

In addition, our data regarding user geographic location for purposes of reporting the geographic location of our MAUs is based on the IP address or phone number associated with the account when a user initially registered the account on Twitter. The IP address or phone number may not always accurately reflect a user's actual location at the time such user engaged with our platform. For example, a mobile user may appear to be accessing Twitter from the location of the proxy server that the user connects to rather than from a user's actual location.

We regularly review and may adjust our processes for calculating our internal metrics to improve their accuracy. Our measures of user growth and user engagement may differ from estimates published by third parties or from similarly-titled metrics of our competitors due to differences in methodology.

We present and discuss our total audience based on both internal metrics and relying on data from Google Analytics, which measures logged-out visitors to our properties.

PART I — FINANCIAL INFORMATION

Item 1. Financial Statements

TWITTER, INC.

CONSOLIDATED BALANCE SHEETS
(In thousands, except par value)
(Unaudited)

	June 30, 2017	December 31, 2016
Assets		
Current assets:		
Cash and cash equivalents	$ 1,288,323	$ 988,598
Short-term investments	2,791,589	2,785,981
Accounts receivable, net of allowance for doubtful accounts of $7,596 and $7,216 as of June 30, 2017 and December 31, 2016, respectively	524,064	650,650
Prepaid expenses and other current assets	236,126	226,967
Total current assets	4,840,102	4,652,196
Property and equipment, net	781,272	783,901
Intangible assets, net	65,291	95,334
Goodwill	1,186,189	1,185,315
Other assets	90,244	153,619
Total assets	$ 6,963,098	$ 6,870,365
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 107,398	$ 122,236
Accrued and other current liabilities	307,047	380,937
Capital leases, short-term	80,133	80,848
Total current liabilities	494,578	584,021
Convertible notes	1,582,468	1,538,967
Capital leases, long-term	83,410	66,837
Deferred and other long-term tax liabilities, net	9,247	7,556
Other long-term liabilities	64,499	68,049
Total liabilities	2,234,202	2,265,430
Commitments and contingencies (Note 12)		
Stockholders' equity:		
Preferred stock, $0.000005 par value-- 200,000 shares authorized; none issued and outstanding	—	—
Common stock, $0.000005 par value-- 5,000,000 shares authorized; 736,470 and 721,572 shares issued and outstanding as of June 30, 2017 and December 31, 2016, respectively	4	4
Additional paid-in capital	7,517,433	7,224,534
Accumulated other comprehensive loss	(46,828)	(69,253)
Accumulated deficit	(2,741,713)	(2,550,350)
Total stockholders' equity	4,728,896	4,604,935
Total liabilities and stockholders' equity	$ 6,963,098	$ 6,870,365

The accompanying notes are an integral part of these consolidated financial statements.

TWITTER, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share data)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue	$ 573,855	$ 601,958	$ 1,122,106	$ 1,196,479
Costs and expenses				
Cost of revenue	212,908	202,966	433,247	401,371
Research and development	143,171	178,511	271,899	334,305
Sales and marketing	185,296	236,619	354,890	472,790
General and administrative	70,839	70,238	140,707	133,505
Total costs and expenses	612,214	688,334	1,200,743	1,341,971
Loss from operations	(38,359)	(86,376)	(78,637)	(145,492)
Interest expense	(26,396)	(24,934)	(51,805)	(49,827)
Other income (expense), net	(48,320)	6,734	(40,998)	13,040
Loss before income taxes	(113,075)	(104,576)	(171,440)	(182,279)
Provision for income taxes	3,413	2,641	6,607	4,669
Net loss	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)
Net loss per share attributable to common stockholders:				
Basic	$ (0.16)	$ (0.15)	$ (0.25)	$ (0.27)
Diluted	$ (0.16)	$ (0.15)	$ (0.25)	$ (0.27)
Weighted-average shares used to compute net loss per share attributable to common stockholders:				
Basic	730,069	698,326	726,083	694,959
Diluted	730,069	698,326	726,083	694,959

The accompanying notes are an integral part of these consolidated financial statements.

TWITTER, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Net loss	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)
Other comprehensive income (loss), net of tax:				
Change in unrealized gain (loss) on investments in available-for-sale securities	69	(961)	(160)	3,481
Change in foreign currency translation adjustment	14,462	(13,052)	22,585	(2,418)
Net change in accumulated other comprehensive loss	14,531	(14,013)	22,425	1,063
Comprehensive loss	$ (101,957)	$ (121,230)	$ (155,622)	$ (185,885)

The accompanying notes are an integral part of these consolidated financial statements.

TWITTER, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)
(Unaudited)

	Six Months Ended June 30,	
	2017	2016
Cash flows from operating activities		
Net loss	$ (178,047)	$ (186,948)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Depreciation and amortization expense	205,855	181,904
Stock-based compensation expense	230,393	318,611
Amortization of discount on convertible notes	39,289	36,940
Changes in bad debt provision	1,355	2,573
Deferred income taxes	(768)	45
Impairment of investments in privately-held companies	55,000	—
Other adjustments	(4,854)	5,268
Changes in assets and liabilities, net of assets acquired and liabilities assumed from acquisitions:		
Accounts receivable	133,026	86,213
Prepaid expenses and other assets	(1,656)	(16,985)
Accounts payable	(13,616)	(37,085)
Accrued and other liabilities	(72,822)	(13,216)
Net cash provided by operating activities	393,155	377,320
Cash flows from investing activities		
Purchases of property and equipment	(83,217)	(98,235)
Purchases of marketable securities	(1,578,045)	(1,330,946)
Proceeds from maturities of marketable securities	1,461,687	1,232,249
Proceeds from sales of marketable securities	108,817	42,416
Proceeds from sales of long-lived assets	35,000	—
Changes in restricted cash	3,221	(590)
Purchases of investments in privately-held companies	(525)	(78,002)
Business combinations, net of cash acquired	—	(80,142)
Other investing activities	(10,006)	(81)
Net cash used in investing activities	(63,068)	(313,331)
Cash flows from financing activities		
Taxes paid related to net share settlement of equity awards	(5,023)	(6,994)
Payments of capital lease obligations	(55,150)	(48,740)
Proceeds from exercise of stock options	7,331	6,208
Proceeds from issuances of common stock under employee stock purchase plan	14,019	15,821
Other financing activities	—	22
Net cash used in financing activities	(38,823)	(33,683)
Net increase in cash and cash equivalents	291,264	30,306
Foreign exchange effect on cash and cash equivalents	8,461	5,933
Cash and cash equivalents at beginning of period	988,598	911,471
Cash and cash equivalents at end of period	$ 1,288,323	$ 947,710
Supplemental disclosures of non-cash investing and financing activities		
Common stock issued in connection with acquisitions	$ —	$ 644
Equipment purchases under capital leases	$ 70,928	$ 25,922
Changes in accrued property and equipment purchases	$ (1,847)	$ 10,938

The accompanying notes are an integral part of these consolidated financial statements.

TWITTER, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

Note 1. Description of Business and Summary of Significant Accounting Policies

Twitter, Inc. ("Twitter" or the "Company") was incorporated in Delaware in April 2007, and is headquartered in San Francisco, California. Twitter offers products and services for users, advertisers, developers and platform and data partners.

Basis of Presentation

The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation.

The accompanying unaudited consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States of America ("GAAP"). The unaudited interim consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements and reflect, in management's opinion, all adjustments of a normal, recurring nature that are necessary for the fair statement of the Company's financial position, results of operations and cash flows for the interim periods, but are not necessarily indicative of the results expected for the full fiscal year or any other period.

The accompanying interim consolidated financial statements and these related notes should be read in conjunction with the consolidated financial statements and related notes included in the Company's Annual Report on Form 10-K for the year ended December 31, 2016.

Use of Estimates

The preparation of the Company's consolidated financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue and expenses, as well as related disclosure of contingent assets and liabilities. Actual results could differ materially from the Company's estimates. To the extent that there are material differences between these estimates and actual results, the Company's financial condition or operating results will be affected. The Company bases its estimates on past experience and other assumptions that the Company believes are reasonable under the circumstances, and the Company evaluates these estimates on an ongoing basis.

Recent Accounting Pronouncements

Recently adopted accounting pronouncements

In March 2016, the Financial Accounting Standards Board ("FASB") issued a new accounting standard update on simplifying the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. The new guidance also allows an entity to account for forfeitures when they occur. This guidance became effective for reporting periods beginning after December 15, 2016. The Company adopted this new guidance on January 1, 2017. Upon adoption, tax benefits in excess of stock-based compensation costs, and tax deficiencies, are recorded in the consolidated statements of operations as a component of the provision for income taxes, whereas they previously were recorded in equity. The previously unrecognized excess tax benefits as of December 31, 2016 were recorded as an increase to deferred tax assets. However, given the valuation allowance placed on substantially all of the Company's deferred tax assets, the recognition upon adoption did not have an impact on the Company's accumulated deficit. As a result of adopting the new standard utilizing the modified retrospective approach, the Company's deferred tax assets increased by approximately $0.93 billion with a corresponding increase in its valuation allowance. The Company also elected to account for forfeitures as they occur, rather than estimate expected forfeitures. The adoption of this new guidance resulted in a net cumulative-effect adjustment of $13.3 million increase to accumulated deficit as of January 1, 2017, related to the accounting of forfeitures using the modified retrospective method. Additionally, the Company adopted the aspects of the guidance affecting the cash flow presentation retrospectively, which resulted in an immaterial reclassification of excess tax benefits from financing activities to operating activities in the Company's consolidated statements of cash flows.

In January 2017, the FASB issued a new accounting standard update on simplifying the accounting for goodwill impairment. The new guidance eliminates the requirement to calculate the implied fair value of goodwill (i.e., Step 2 of the goodwill impairment test) to measure a goodwill impairment charge. Instead, entities will record an impairment charge based on the excess of a reporting unit's carrying amount over its fair value. The Company adopted this guidance prospectively during the three mon ths ended March 31, 2017 and the adoption had no impact on the Company's financial statements.

In May 2017, the FASB issued a new accounting standard update on clarifying when changes to share-based payment awards must be accounted for as modifications. According to the new guidance, entities will apply the modification accounting guidance if the value, vesting conditions or classification of the award changes. The Company adopted this guidance prospectively during the three months ended June 30, 2017 and the adoption had no impact on the Company's financial statements.

Recently issued accounting pronouncements not yet adopted

In May 2014, the FASB issued a new accounting standard update on revenue recognition from contracts with customers. The new guidance will replace all current GAAP guidance on this topic and eliminate industry-specific guidance. According to the new guidance, revenue is recognized when promised goods or services are transferred to customers in an amount that reflects the consideration for which the Company expects to be entitled in exchange for those goods or services. The guidance will be effective for fiscal years, and interim periods with those fiscal years, beginning after December 15, 2017 and can be applied either retrospectively to each period presented or as a cumulative-effect adjustment as of the date of adoption. In March 2016, April 2016, May 2016 and December 2016, the FASB further amended the guidance to clarify the implementation on principal versus agent considerations, the identification of performance obligation and the licensing implementation guidance to provide narrow-scope improvements and practical expedients, and technical corrections and improvements. The Company will adopt this standard effective January 1, 2018 and currently anticipates adopting the standard using the modified retrospective method. The Company is still in the process of completing its analysis of the impact this standard will have on the consolidated financial statements including its disclosure. Specifically, while the Company has not yet finalized its analysis of the recognition impact this standard will have on advertising revenue, the Company does not expect the impact to be material; the Company is still assessing the recognition impact of adopting this standard on data licensing and other revenue; and the Company has not completed its assessment of the presentetion impact of adoption of the new principal versus agent guidance on its arrangements. As part of the Company's assessment and implementation plan, the Company is evaluating and implementing changes to its policies, procedures and controls.

In March 2017, the FASB issued a new accounting standard update on shortening the premium amortization period for purchased non-contingently callable debt securities. The new guidance shortens the amortization period for the premium on purchased non-contingently callable debt securities to tha earliest call date. Currently, entities generally amortize the premium as a yield adjustment over the contractual life of the security. This guidance will be effective for fiscal years, and interim periods within those years, beginning after December 15, 2018. Early adoption is permitted. The Company is evaluating the impact of adopting this new accounting standard update on the financial statements and related disclosures.

With the exception of the standards discussed above, there have been no other recent accounting pronouncements or changes in accounting pronouncements during the six months ended June 30, 2017, as compared to the recent accounting pronouncements described in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2016, that are of significance or potential significance to the Company.

Note 2. Cash, Cash Equivalents and Short-term Investments

Cash, cash equivalents and short-term investments consist of the following (in thousands):

	June 30, 2017	December 31, 2016
Cash and cash equivalents:		
Cash	$ 251,554	$ 253,808
Money market funds	642,605	422,515
U.S. government and agency securities including treasury bills	27,899	12,639
Corporate notes, commercial paper and certificates of deposit	366,265	299,636
Total cash and cash equivalents	$ 1,288,323	$ 988,598
Short-term investments:		
U.S. government and agency securities including treasury bills	$ 1,146,379	$ 1,183,768
Corporate notes, commercial paper and certificates of deposit	1,645,210	1,602,213
Total short-term investments	$ 2,791,589	$ 2,785,981

The contractual maturities of securities classified as available-for-sale as of June 30, 2017 were as follows (in thousands):

	June 30, 2017
Due within one year	$ 1,969,093
Due after one year through two years	822,496
Total	$ 2,791,589

The following tables summarize unrealized gains and losses related to available-for-sale securities classified as short-term investments on the Company's consolidated balance sheets (in thousands):

	June 30, 2017			
	Gross Amortized Costs	Gross Unrealized Gains	Gross Unrealized Losses	Aggregated Estimated Fair Value
U.S. government and agency securities including treasury bills	$ 1,148,568	$ 157	$ (2,346)	$ 1,146,379
Corporate notes, commercial paper and certificates of deposit	1,645,451	275	(516)	1,645,210
Total available-for-sale securities classified as short-term investments	$ 2,794,019	$ 432	$ (2,862)	$ 2,791,589

	December 31, 2016			
	Gross Amortized Costs	Gross Unrealized Gains	Gross Unrealized Losses	Aggregated Estimated Fair Value
U.S. government and agency securities including treasury bills	$ 1,185,274	$ 136	$ (1,642)	$ 1,183,768
Corporate notes, commercial paper and certificates of deposit	1,603,048	114	(949)	1,602,213
Total available-for-sale securities classified as short-term investments	$ 2,788,322	$ 250	$ (2,591)	$ 2,785,981

There were no securities in a continuous loss position for 12 months or longer as of June 30, 2017. The gross unrealized loss on securities in a continuous loss position for 12 months or longer was not material as of December 31, 2016.

Investments are reviewed periodically to identify possible other-than-temporary impairments. No impairment loss has been recorded on the securities included in the tables above as the Company believes that the decrease in fair value of these securities is temporary and expects to recover up to (or beyond) the initial cost of investment for these securities .

Note 3. Fair Value Measurements

The Company measures its cash equivalents, short-term investments and derivative financial instruments at fair value. The Company classifies its cash equivalents, short-term investments and derivative financial instruments within Level 1 or Level 2 because the Company values these investments using quoted market prices or alternative pricing sources and models utilizing market observable inputs. The fair value of the Company's Level 1 financial assets is based on quoted market prices of the identical underlying security. The fair value of the Company's Level 2 financial assets is based on inputs that are directly or indirectly observable in the market, including the readily-available pricing sources for the identical underlying security that may not be actively traded.

The following tables set forth the fair value of the Company's financial assets and liabilities measured at fair value on a recurring basis as of June 30, 2017 and December 31, 2016 based on the three-tier fair value hierarchy (in thousands):

	June 30, 2017			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents:				
Money market funds	$ 642,605	$ —	$ —	$ 642,605
Treasury bills	27,899	—	—	27,899
Corporate notes	—	768	—	768
Commercial paper	—	362,485	—	362,485
Certificates of deposit	—	3,012	—	3,012
Short-term investments:				
U.S. government securities	—	733,924	—	733,924
Agency securities	—	412,455	—	412,455
Corporate notes	—	752,793	—	752,793
Commercial paper	—	263,409	—	263,409
Certificates of deposit	—	629,008	—	629,008
Other current assets:				
Foreign currency contracts	—	2,966	—	2,966
Total	$ 670,504	$ 3,160,820	$ —	$ 3,831,324
Liabilities				
Other current liabilities:				
Foreign currency contracts	—	1,472	—	1,472
Total	$ —	$ 1,472	$ —	$ 1,472

	December 31, 2016			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents:				
Money market funds	$ 422,515	$ —	$ —	$ 422,515
Treasury bills	12,639	—	—	12,639
Corporate notes	—	7,387	—	7,387
Commercial paper	—	292,249	—	292,249
Short-term investments:				
U.S. government securities	—	657,502	—	657,502
Agency securities	—	526,266	—	526,266
Corporate notes	—	689,986	—	689,986
Commercial paper	—	311,238	—	311,238
Certificates of deposit	—	600,989	—	600,989
Other current assets:				
Foreign currency contracts	—	1,955	—	1,955
Total	$ 435,154	$ 3,087,572	$ —	$ 3,522,726
Liabilities				
Other current liabilities:				
Foreign currency contracts	—	500	—	500
Total	$ —	$ 500	$ —	$ 500

In 2014, the Company issued $935.0 million principal amount of 0.25% convertible senior notes due in 2019 (the "2019 Notes") and $954.0 million principal amount of 1.00% convertible senior notes due in 2021 (the "2021 Notes" and together with the 2019 Notes, the "Notes") in a private placement to qualified institutional buyers pursuant to Rule 144A under the Securities Act of 1933, as amended. Refer to Note 8 – Convertible Senior Notes for further details on the Notes. The estimated fair value of the 2019 Notes and 2021 Notes based on a market approach as of June 30, 2017 was approximately $882.6 million and $872.1 million respectively, which represents a Level 2 valuation. The estimated fair value was determined based on the estimated or actual bids and offers of the Notes in an over-the-counter market on the last business day of the period.

Derivative Financial Instruments

The Company enters into foreign currency forward contracts with financial institutions to reduce the risk that its earnings may be adversely affected by the impact of exchange rate fluctuations on monetary assets or liabilities denominated in currencies other than the functional currency of a subsidiary. These contracts do not subject the Company to material balance sheet risk due to exchange rate movements because gains and losses on these derivatives are intended to offset gains and losses on the hedged foreign currency denominated assets and liabilities. These foreign currency forward contracts are not designated as hedging instruments.

The Company recognizes these derivative instruments as either assets or liabilities in the consolidated balance sheets at fair value based on a Level 2 valuation. The Company records changes in the fair value (i.e., gains or losses) of the derivatives as other income (expense), net in the consolidated statements of operations. The notional principal of foreign currency contracts outstanding was equivalent to $553.6 million and $536.9 million at June 30, 2017 and December 31, 2016, respectively.

The fair values of outstanding derivative instruments for the periods presented on a gross basis are as follows (in thousands):

	Balance Sheet Location	June 30, 2017	December 31, 2016
Assets			
Foreign currency contracts not designated as hedging instruments	Other current assets	$ 2,966	$ 1,955
Liabilities			
Foreign currency contracts not designated as hedging instruments	Other current liabilities	$ 1,472	$ 500

The Company recognized $5.6 million and $2.4 million of net gains on the foreign currency contracts in the three and six months ended June 30, 2017, respectively. The Company recognized $6.5 million and $4.7 million of net losses on the foreign currency contracts in the three and six months ended June 30, 2016, respectively.

Note 4. Property and Equipment, Net

The following table presents the detail of property and equipment, net for the periods presented (in thousands):

	June 30, 2017	December 31, 2016
Property and equipment, net		
Equipment	$ 990,795	$ 909,797
Furniture and leasehold improvements	319,414	304,613
Capitalized software	398,983	353,163
Construction in progress	71,694	74,255
Total	1,780,886	1,641,828
Less: Accumulated depreciation and amortization	(999,614)	(857,927)
Property and equipment, net	$ 781,272	$ 783,901

Note 5. Goodwill and Intangible Assets

The following table presents the goodwill activities for the periods presented (in thousands):

Goodwill	
Balance as of December 31, 2016	$ 1,185,315
Foreign currency translation adjustment and other	874
Balance as of June 30, 2017	$ 1,186,189

For each of the periods presented, gross goodwill balance equaled the net balance since no impairment charges have been recorded.

The following table presents the detail of intangible assets for the periods presented (in thousands):

	Gross Carrying Value	Accumulated Amortization	Net Carrying Value
June 30, 2017:			
Patents and developed technologies	$ 123,324	$ (63,434)	$ 59,890
Publisher and advertiser relationships	53,100	(47,699)	5,401
Total	$ 176,424	$ (111,133)	$ 65,291
December 31, 2016:			
Patents and developed technologies	$ 122,611	$ (47,160)	$ 75,451
Publisher and advertiser relationships	53,100	(33,217)	19,883
Total	$ 175,711	$ (80,377)	$ 95,334

Amortization expense associated with intangible assets for the three months ended June 30, 2017 and 2016 was $14.3 million and $12.8 million, respectively, and for the six months ended June 30, 2017 and 2016 was $30.5 million and $25.5 million, respectively.

Estimated future amortization expense as of June 30, 2017 is as follows (in thousands):

Remainder of 2017	$ 15,830
2018	16,023
2019	8,496
2020	6,222
2021	5,826
Thereafter	12,894
Total	$ 65,291

Note 6. Accrued and Other Current Liabilities

The following table presents the detail of accrued and other current liabilities for the periods presented (in thousands):

	June 30, 2017	December 31, 2016
Accrued compensation	$ 73,833	$ 82,354
Accrued restructuring	43,937	55,942
Accrued publisher, content and ad network costs	21,816	44,362
Deferred revenue	22,700	33,659
Accrued tax liabilities	30,945	29,558
Accrued fixed assets and maintenance	25,214	25,265
Accrued other	88,602	109,797
Total	$ 307,047	$ 380,937

Note 7. Investments in Privately-Held Companies

The Company makes strategic investments in privately-held companies and assesses the accounting for these investments under the equity or cost method. The Company also evaluates each investee to determine if the investee is a variable interest entity and, if so, whether the Company is the primary beneficiary of the variable interest entity. The Company has determined, as of June 30, 2017, there were no variable interest entities required to be consolidated in the Company's consolidated financial statements. The Company's investments in privately-held companies are primarily accounted for using the cost method which had a carrying value of $35.2 million and $90.2 million as of June 30, 2017 and December 31, 2016, respectively. The maximum loss the Company can incur for its investments is their carrying value. These investments in privately-held companies are included within Other Assets on the consolidated balance sheets.

The Company periodically evaluates the carrying value of the cost-method investments, when events and circumstances indicate that the carrying amount of the investment may not be recovered. The Company estimates the fair value of the cost-method investments to assess whether impairment losses shall be recorded using Level 3 inputs. These investments include the Company's holdings in privately-held companies that are not exchange traded and therefore not supported with observable market prices hence the Company may determine the fair value by reviewing equity valuation reports, current financial results, long-term plans of the private company, the amount of cash that the private company has on-hand, the ability to obtain additional financing and overall market conditions in which the private company operates.

In the three months ended June 30, 2017, the Company determined that the estimated fair value of a cost- method investment , valued using Level 3 inputs, was below its carrying value and that the carrying value of this investment was not expected to be recoverable within a reasonable period of time. The Company calculated the expected value of the cost- m ethod investment based on third- party offers received by the investee and the Company's expectation of its negotiated investment value based on the amount of cash that the investee has on-hand, the investee's ability to obtain additional financing and overall market conditions in which the investee operates. Based on this analysis , the Company recorded a $55.0 million other-than-temporary impairment charge during the three months ended June 30, 2017 , which was recorded within other income (expense), net in the consolidated statements of operations. No impairment charges have been recorded in the three months ended March 31, 2017, and three and six months ended June 30, 2016.

Note 8. Convertible Senior Notes

In 2014, the Company issued $935.0 million principal amount of 2019 Notes and $954.0 million principal amount of 2021 Notes. The total net proceeds from this offering were approximately $1.86 billion, after deducting $28.3 million of initial purchasers' discount and $0.5 million debt issuance costs in connection with the 2019 Notes and the 2021 Notes.

The interest rates are fixed at 0.25% and 1.00% per annum for the 2019 Notes and the 2021 Notes, respectively, and are payable semi-annually in arrears on March 15 and September 15 of each year, commencing on March 15, 2015. For the three months ended June 30, 2017 and 2016, the Company recognized $22.1 million and $20.9 million, respectively, of interest expense related to the amortization of initial purchasers' discount and debt discount prior to capitalization of interest, and $3.0 million and $3.0 million, respectively, of coupon interest expense. For the six months ended June 30, 2017 and 2016, the Company recognized $43.5 million and $41.3 million, respectively, of interest expense related to the amortization of initial purchasers' discount and debt discount prior to capitalization of interest, and $5.9 million and $6.0 million, respectively, of coupon interest expense.

The Notes consisted of the following (in thousands):

	June 30, 2017		December 31, 2016	
	2019 Notes	2021 Notes	2019 Notes	2021 Notes
Principal amounts:				
Principal	$ 935,000	$ 954,000	$ 935,000	$ 954,000
Unamortized initial purchasers' discount and debt discount (1)	(112,758)	(193,774)	(136,376)	(213,657)
Net carrying amount	$ 822,242	$ 760,226	$ 798,624	$ 740,343
Carrying amount of the equity component (2)	$ 222,826	$ 283,283	$ 222,826	$ 283,283

(1) Included in the consolidated balance sheets within convertible notes and amortized over the remaining livas of the Notes.
(2) Included in the consolidated balance sheets within additional paid-in capital.

As of June 30, 2017, the remaining life of the 2019 Notes and 2021 Notes is approximately 26 months and 50 months, respectively.

Note 9. Net Loss per Share

Basic net loss per share is computed by dividing total net loss attributable to common stockholders by the weighted-average common shares outstanding during the period. The weighted-average common shares outstanding is adjusted for shares subject to repurchase such as unvested restricted stock granted to employees in connection with acquisitions, contingently returnable shares and escrowed shares supporting indemnification obligations that are issued in connection with acquisitions and unvested stock options exercised.

Diluted net loss per share is computed by dividing the net loss attributable to common stockholders by the weighted-average number of common shares outstanding, during the period, including potential dilutive common stock instruments. In the three and six months ended June 30, 2017 and 2016, the Company's potential common stock instruments such as stock options, restricted stock units ("RSUs"), shares to be purchased under the 2013 Employee Stock Purchase Plan ("ESPP"), shares subject to repurchases, conversion feature of the Notes and the warrants were not included in the computation of diluted loss per share as the effect of including these shares in the calculation would have been anti-dilutive.

The following table presents the calculation of basic and diluted net loss per share for periods presented (in thousands, except per share data).

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Net loss	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)
Basic shares:				
Weighted-average common shares outstanding	734,178	704,174	730,348	700,920
Weighted-average restricted stock subject to repurchase	(4,109)	(5,848)	(4,265)	(5,961)
Weighted-average shares used to compute basic net loss per share	730,069	698,326	726,083	694,959
Diluted shares:				
Weighted-average shares used to compute diluted net loss per share	730,069	698,326	726,083	694,959
Net loss per share attributable to common stockholders:				
Basic	$ (0.16)	$ (0.15)	$ (0.25)	$ (0.27)
Diluted	$ (0.16)	$ (0.15)	$ (0.25)	$ (0.27)

The following number of potential common shares at the end of each period were excluded from the calculation of diluted net loss per share attributable to common stockholders because their effect would have been anti-dilutive for the periods presented (in thousands):

	Three and Six Months Ended June 30,	
	2017	2016
RSUs	37,979	58,806
Warrants	24,329	24,329
Stock options	5,301	9,340
Shares subject to repurchase and others	6,410	10,457

Since the Company expects to settle the principal amount of the outstanding Notes in cash, the Company uses the treasury stock method for calculating any potential dilutive effect of the conversion spread on diluted net income per share, if applicable. The conversion spread of 24.3 million shares will have a dilutive impact on diluted net income per share of common stock when the average market price of the Company's common stock for a given period exceeds the conversion price of $77.64 per share for the Notes.

If the average market price of the common stock exceeds the exercise price of the warrants, $105.28, the warrants will have a dilutive effect on the earnings per share assuming that the Company is profitable. Since the average market price of the common stock is below $105.28, the warrants are anti-dilutive.

Note 10. Stockholders' Equity

Equity Incentive Plans

The Company's 2013 Equity Incentive Plan became effective upon the completion of the Company's initial public offering and serves as the successor to the 2007 Equity Incentive Plan. Initially, 68.3 million shares were reserved under the 2013 Equity Incentive Plan and any shares subject to options or other similar awards granted under the 2007 Equity Incentive Plan that expire, are forfeited, are repurchased by the Company or otherwise terminate unexercised will become available under the 2013 Equity Incentive Plan. The number of shares of the Company's common stock available for issuance under the 2013 Equity Incentive Plan were and will be increased on the first day of each fiscal year beginning with the 2014 fiscal year, in an amount equal to the least of (i) 60,000,000 shares, (ii) 5% of the outstanding shares on the last day of the immediately preceding fiscal year or (iii) such number of shares determined by the Company's Board of Directors. No additional shares have been issued under the 2007 Equity Incentive Plan since 2013.

Employee Stock Purchase Plan

The number of shares available for sale under the ESPP were and will be increased on the first day of each fiscal year beginning with the 2014 fiscal year, in an amount equal to the least of i) 11.3 million shares; ii) 1% of the outstanding shares of the Company's common stock as of the last day of the immediately preceding fiscal year; or iii) such other amount as determined by the Company's Board of Directors.

During the six months ended June 30, 2017, employees purchased an aggregate of 1.1 million shares under the ESPP at a weighted-average price of $12.43 per share. During the six months ended June 30, 2016, employees purchased an aggregate of 1.3 million shares under the ESPP at a price of $11.99 per share. During the three months ended June 30, 2017 and 2016, the Company recorded $1.8 million and $5.7 million, respectively, and recorded $4.4 million and $11.4 million during the six months ended June 30, 2017 and 2016, respectively, of stock-based compensation expense related to the ESPP.

Restricted Common Stock

The Company has granted restricted common stock to certain continuing employees in connection with the acquisitions. Vesting of this stock is dependent on the respective employee's continued employment at the Company during the requisite service period, which is generally up to four years from the issuance date, and the Company has the right to repurchase the unvested shares upon termination of employment. The fair value of the restricted common stock issued to employees is recorded as compensation expense on a straight-line basis over the requisite service period.

The activities for the restricted common stock issued to employees for the six months ended June 30, 2017 are summarized as follows (in thousands, except per share data):

	Number of Shares	Weighted-Average Grant-Date Fair Value Per Share
Unvested restricted common stock at December 31, 2016	5,097	$ 23.04
Vested	(1,166)	$ 23.76
Canceled	(441)	$ 38.03
Unvested restricted common stock at June 30, 2017	3,490	$ 20.90

Stock Option Activity

A summary of stock option activity for the six months ended June 30, 2017 is as follows (in thousands, except years and per share data):

	Options Outstanding			
	Number of Shares	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Life (in years)	Aggregate Intrinsic Value
Outstanding at December 31, 2016	8,723	$ 7.71	$ 4.25	$ 98,240
Options exercised	(3,239)	$ 2.26		
Options canceled	(183)	$ 2.72		
Outstanding at June 30, 2017	5,301	$ 11.20	5.17	$ 56,414
Exercisable at June 30, 2017	4,192	$ 8.73	4.42	$ 49,988

The total intrinsic values of stock options exercised during the three months ended June 30, 2017 and 2016 were $6.7 million and $12.4 million, respectively, and $44.1 million and $32.2 million during the six months ended June 30, 2017 and 2016, respectively.

Performance Restricted Stock Units Activity

The Company grants restricted stock units to certain of its executive officers periodically that vest based on the Company's attainment of the annual financial performance goals and the executives' continued employment through the vesting date, approximately one year ("PRSUs"). These PRSUs are granted when the annual performance targets are set by the Compensation Committee of the Board of Directors, generally in the first quarter of each financial year.

During the six months ended June 30, 2017, the Company granted 318,400 PRSUs, at the 100% target level, for the 2017 performance goals with a weighted-average grant date fair value of $15.28 per share. During the year ended December 31, 2016, the Company granted 165,833 PRSUs, at the 100% target level, of which 117,808 vested in 2017.

The Company also grants restricted stock units to certain of its executive officers that vest based on Twitter stock price performance relative to a broad-market index over a two year period from the grant date and the executives continued employment through the vesting date ("TSR RSUs"). During the six months ended June 30, 2017, the Company granted 134,400 TSR RSUs with a weighted-average grant date fair value of $13.02 per share.

In addition, there ere 1,408,533 additional PRSUs and TSR RSUs that will vest based on performance goals and Total Shareholder Return ("TSR") targets in 2018 to 2020, if achieved, at target levels. Since the performance and TSR targets for those additional awards have not been established, they are not considered granted nor are they presented as outstanding.

RSU Activity

The following table summarizes the activity related to the Company's RSUs, excluding PRSUs, for the six months ended June 30, 2017. For purposes of this table, vested RSUs represent the shares for which the service condition had been fulfilled as of each respective date (in thousands, except per share data):

	RSUs Outstanding	
	Shares	Weighted-Average Grant-Date Fair Value Per Share
Unvested and outstanding at December 31, 2016	48,069	$ 22.64
Granted	9,111	$ 15.23
Vested	(11,138)	$ 22.29
Canceled	(8,063)	$ 22.61
Unvested and outstanding at June 30, 2017	37,979	$ 20.97

The total fair value of RSUs vested during the three months ended June 30, 2017 and 2016 was $86.1 million and $119.8 million, respectively, and $187.0 million and $212.4 million during the six months ended June 30, 2017 and 2016, respectively.

Stock-Based Compensation Expense

Stock-based compensation expense is allocated based on the cost center to which the award holder belongs. Total stock-based compensation expense by function is as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Cost of revenue	$ 6,253	$ 7,858	$ 12,205	$ 15,826
Research and development	63,625	90,916	128,011	166,495
Sales and marketing	20,694	45,856	45,783	91,957
General and administrative	22,824	23,065	44,394	44,333
Total stock-based compensation expense	$ 113,396	$ 167,695	$ 230,393	$ 318,611

The Company capitalized $14.2 million and $17.9 million of stock-based compensation expense associated with the cost for developing software for internal use in the three months ended June 30, 2017 and 2016, respectively, and $30.3 million and $40.5 million in the six months ended June 30, 2017 and 2016, respectively.

As of June 30, 2017, there was $738.2 million of gross unamortized stock-based compensation expense related to unvested awards which will be recognized, net of actual forfeiture in the future, over a weighted-average period of 2.3 years. Upon adoption of the stock-based compensation expense simplification rule as of January 1, 2017, the Company no longer applies a forfeiture rate to determine the unamortized stock-based compensation expense; instead, the Company accounts for forfeitures as they occur.

Note 11. Income Taxes

The Company is subject to taxation in the United States and various state and foreign jurisdictions. Earnings from non-US activities are subject to local country income tax. The material jurisdictions in which the Company is subject to potential examination by taxing authorities include the United States, California and Ireland. The Company is currently under a Federal income tax examination by the Internal Revenue Service (IRS) for tax years 2011, 2012 and 2013. The Company believes that adequate amounts have been reserved in these jurisdictions. The Company does not provide for federal income taxes on the undistributed earnings of its foreign subsidiaries as such earnings are to be reinvested indefinitely outside the U.S. The Company computes its quarterly income tax provision by using a forecasted annual effective tax rate and adjusts for any discrete items arising during the quarter.

The Company recorded an income tax provision of $ 3.4 million and $ 2.6 million for the three months ended June 30 , 201 7 and 2016 , respectively , and an income tax provision of $6.6 million and $4.7 m illion for the six months ended June 30, 2017 and 2016, respectively . As of June 30 , 2017 , based on the available objective evidence, management believes it is more likely than not that the tax benefits of the U.S. losses incurred during the six months end ed June 30 , 2017 will not be realized by the end of the 201 7 fiscal year. Accordingly, the Company did not record the tax benefits of the U.S. losses incurred during the six months ended June 30 , 2017 . The primary difference between the effective tax rate and the federal statutory tax rate relates to the valuation allowances on the Company's net operating losses and foreign tax rate differences.

During the three and six months ended June 30, 2017, the amount of gross unrecognized tax benefits increased by $12.8 million and $23.5 million, respectively. As of June 30, 2017, the Company has $293.0 million of unrecognized tax benefits, including $286.0 million of unrecognized tax benefits which, if recognized, will not affect the annual effective tax rate as these unrecognized tax benefits would increase deferred tax assets which would be subject to a full valuation allowance, while the remaining $7.0 million of unrecognized tax benefits which, if recognized, would affect the annual effective tax rate.

Note 12. Commitments and Contingencies

Credit Facility

The Company has a revolving credit agreement with certain lenders, which provides for a $1.0 billion revolving unsecured credit facility maturing on October 22, 2018. The Company is obligated to pay interest on loans under the credit facility and other customary fees for a credit facility of this size and type, including an upfront fee and an unused commitment fee. Obligations under the credit facility are guaranteed by one of the Company's wholly-owned subsidiaries. In addition, the credit facility contains restrictions on payments including cash payments of dividends.

As of June 30, 2017, no amounts had been drawn under the credit facility.

Leases

The Company has entered into various non-cancelable operating lease agreements for certain offices and data center facilities with contractual lease periods expiring through 2028. Under the terms of certain leases, the Company is committed to pay for certain taxes, insurance, maintenance and management expenses. Certain of these arrangements have free rent periods or escalating rent payment provisions, and the Company recognizes rent expense under such arrangements on a straight-line basis.

There were no material changes in the Company's leases compared to the disclosure in its Annual Report on Form 10-K for the fiscal year ended December 31, 2016.

Legal Proceedings

The Company is currently involved in, and will likely in the future be involved in, legal proceedings, claims and government investigations in the normal course of business. These proceedings, in the form of both individual and class action litigation, have included, but are not limited to matters involving intellectual property, defamation, privacy, securities, employment and contractual rights. Legal fees and other costs associated with such actions are expensed as incurred. The Company assesses, in conjunction with its legal counsel, the need to record a liability for litigation and contingencies. Litigation accruals are recorded when and if it is determined that a loss related matter is both probable and reasonably estimable. Material loss contingencies that are reasonably possible of occurrence, if any, are subject to disclosure. As of June 30, 2017 and December 31, 2016, there was no litigation or contingency with at least a reasonable possibility of a material loss. No material losses have been recorded during the three and six months ended June 30, 2017 and 2016 with respect to litigation or loss contingencies.

Indemnification

In the ordinary course of business, the Company often includes standard indemnification provisions in its arrangements with its customers, partners, suppliers and vendors. Pursuant to these provisions, the Company may be obligated to indemnify such parties for losses or claims suffered or incurred in connection with its service, breach of representations or covenants, intellectual property infringement or other claims made against such parties. These provisions may limit the time within which an indemnification claim can be made. It is not possible to determine the maximum potential amount under these indemnification obligations due to the limited history of prior indemnification claims and the unique facts and circumstances involved in each particular agreement. The Company has never incurred significant expense defending its licensees against third party claims, nor has it ever incurred significant expense under its standard service warranties or arrangements with its customers, partners, suppliers and vendors. Accordingly, the Company had no liabilities recorded for these provisions as of June 30, 2017 and December 31, 2016.

Note 13. Operations by Geographic Area

Revenue

Revenue by geography is based on the billing addresses of the customers. The following table sets forth revenue by services and revenue by geographic area (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue by services:				
Advertising services	$ 489,148	$ 534,524	$ 962,928	$ 1,065,265
Data licensing and other	84,707	67,434	159,178	131,214
Total revenue	$ 573,855	$ 601,958	$ 1,122,106	$ 1,196,479

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue by geographic area:				
United States	$ 334,675	$ 360,676	$ 675,259	$ 750,943
International	239,180	241,282	446,847	445,536
Total revenue	$ 573,855	$ 601,958	$ 1,122,106	$ 1,196,479

Japan accounted for $74.2 million and $61.2 million, or 13% and 10% of total revenue for the three months ended June 30, 2017 and 2016, respectively, and also for $146.8 million, or 13% of total revenue for the six months ended June 30, 2017. No individual country from the international markets contributed in excess of 10% of the total revenue for the six months ended June 30, 2016.

Property and Equipment, net

The following table sets forth property and equipment, net by geographic area (in thousands):

	June 30, 2017	December 31, 2016
Property and equipment, net:		
United States	$ 730,269	$ 728,429
International	51,003	55,472
Total property and equipment, net	$ 781,272	$ 783,901

Note 14. Related Party Transactions

The Company has a partnership agreement for no consideration with Square, Inc., for which Jack Dorsey (the Company's Chief Executive Officer) serves as Chief Executive Officer, to enable U.S. political donations through Tweets. Neither Square, Inc. nor the Company will pay each other any amounts in connection with the agreement. The agreement has no impact on the Company's financial statements.

Note 15. Restructuring Charges

On October 25, 2016, the Board of Directors of the Company approved a reduction in force plan ("2016 Plan") of up to approximately 9% of the Company's positions globally. The reduction in force was undertaken to eliminate investment in noncore areas and drive toward greater efficiency, while allowing the Company to continue to invest in its highest priorities. The Company expects the reduction in force to be completed in 2017.

On December 17, 2016, the Board of Directors of the Company approved a lease abandonment plan ("2016 Lease Plan") to abandon excess office space with lease terms expiring through 2028.

The following table summarizes the activities related to restructuring charges, as discussed above (in thousands):

	2016 Employee Termination Plan	2016 Lease Plan
Charges	$ 21,611	$ 79,685
Cash payment	(11,629)	(3,562)
Non-cash and other adjustments	(6,357)	(19,577)
Accrued as of December 31, 2016	$ 3,625	$ 56,546
Charges (1)	$ 788	$ 1,539
Cash payment	(4,240)	(11,319)
Non-cash and other adjustments	108	14
Accrued as of June 30, 2017	$ 281	$ 46,780
Reflected in consolidated balance sheets as of June 30, 2017:		
Accrued and other current liabilities	$ 281	$ 43,656
Other long-term liabilities	$ —	$ 3,124

(1) For the three months ended June 30, 2017, the Company recorded a reduction to restructuring charges of $0.2 million within sales and marketing in the consolidated statements of operations. For the six months ended June 30, 2017, the Company recorded restructuring charges of $1.3 million within sales and marketing, $0.6 million within research and development, $0.3 million within general and administrative and $0.1 million within cost of revenue in the consolidated statements of operations.

I tem 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the consolidated financial statements and related notes thereto included in Item 1 "Financial Statements" in this Quarterly Report on Form 10-Q. This discussion contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those discussed below. Factors that could cause or contribute to such differences include, but are not limited to, those identified below and those discussed in the section titled "Risk Factors" included elsewhere in this Quarterly Report on Form 10-Q.

Overview and Highlights of Quarterly Results

Revenue in the second quarter of 2017 totaled $573.9 million, a decrease of 5% compared to $602.0 million in the second quarter of 2016.

- Advertising revenue totaled $ 489.1 million, a decrease of 8% year-over-year.
- Data licensing and other revenue totaled $ 84.7 million, an increase of 26% year-over-year.
- U.S. revenue totaled $334.7 million, a decrease of 7% year-over-year.
- International revenue totaled $ 239.2 million, a decrease of 1% year-over-year.
- Total ad engagements increased 95% year-over-year.
- Cost per ad engagement decreased 53% year-over-year.

Net loss was $116.5 million, an increase of 9% year-over-year.

Non-GAAP net income was $56.4 million, a decrease of 5% year-over-year.

Adjusted EBITDA was $177.9 million, an increase of 2% year-over-year.
Cash, cash equivalents and short-term investments in marketable securities totaled $4.08 billion as of June 30, 2017.

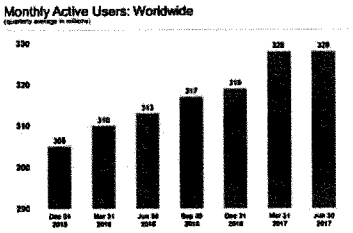
Average monthly active users were 328 million for the three months ended June 30, 2017, an increase of 5% year-over-year and compared to 313 million for the three months ended June 30, 2016.

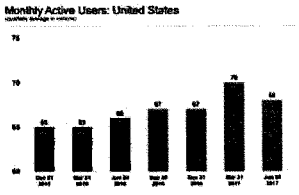
Average daily active usage for the three months ended June 30, 2017 grew 12% year-over-year.

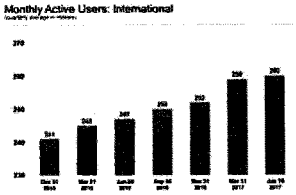
Key Metrics

We review a number of metrics, including the following key metrics, to evaluate our business, measure our performance, identify trends affecting our business, formulate business plans and make strategic decisions.

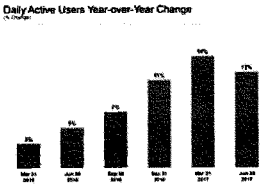
Monthly Active Users (MAUs) . We define MAUs as Twitter users who logged in or were otherwise authenticated and accessed Twitter through our website, mobile website, desktop or mobile applications, SMS or registered third-party applications or websites in the 30-day period ending on the date of measurement. Average MAUs for a period represent the average of the MAUs at the end of each month during the period. MAUs are a measure of the size of our logged in or otherwise authenticated active user base. In the three months ended June 30, 2017, we had 328 million average MAUs, which represents an increase of 5% from the three months ended June 30, 2016. The growth in average MAUs was driven primarily by better relevance in email, push notifications, and the timeline, along with ongoing efforts in marketing. In the three months ended June 30, 2017, we had 68 million average MAUs in the United States and 260 million average MAUs in the rest of the world, which represent increases of 4% and 5%, respectively, from the three months ended June 30, 2016. For additional information on how we calculate MAUs and factors that can affect this metric, see the section titled "Note Regarding Key Metrics."







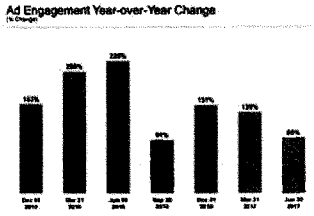
Changes in Daily Active Users/Daily Active Usage (DAU) . We define d aily active users or daily active usage as Twitter users who logged in or were otherwise authenticated and accessed Twitter through our website, mobile website or mobile applications on any given day. Average DAU for a period represent s the number of DAU s on each day of such period divided by the number of days for such period . Changes in DAU are a measure of changes in the size of our daily logged in or otherwise authenticated active user base. To calculate the year-over-year change in DAUs, we subtract the average DAU for the three months ended i n the previous year from the average DAU for the same three months ended in the current year and divide the result by the average DAU for the three months ended in the previous year. Prior to reporting results for the third quarter of 2016 , we had discussed DAUs and the ratio of MAUs to DAUs. In those instances, for comparability and consistency with MAUs, DAUs also included users who accessed Twitter through our desktop applications and third-party properties. For additional information on how we c alculate changes in DAUs and factors that can affect this metric, see the section titled "Note Regarding Key Metrics."

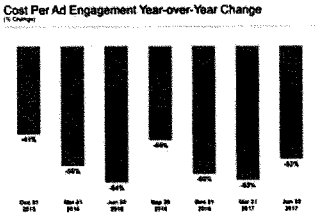


DAU grew faster than MAU in the second quarter of 2017 as we continued to improve our product experience for our existing user base including better relevance in email, push notifications and the timeline.

Changes in Ad Engagements and Cost Per Ad Engagement . We define an ad engagement as a user interaction with one of our pay-for-performance advertising products. Ad engagements with our advertising products are based on a user completing an objective set out by an advertiser such as expanding, Retweeting, liking or replying to a Promoted Tweet, viewing an embedded video, downloading or engaging with a promoted mobile application, clicking on a website link, signing up for marketing emails from advertisers, following the account that tweets a Promoted Tweet, or completing a transaction on an external website. We believe changes in ad engagements is one way to measure user engagement with our advertising products. We believe changes in cost per ad engagement is one way to measure demand.

In the three months ended June 30, 2017, ad engagements increased 95% from the three months ended June 30, 2016. The increase was driven by a continuing mix shift toward video ad impressions as well as higher click-through rates, as a result of better targeting and ad relevance, across nearly all ad formats on a like-for-like basis. In the three months ended June 30, 2017, average cost per ad engagement decreased 53% from the three months ended June 30, 2016. The decrease in cost per ad engagement reflects a higher mix of video ad engagements, and lower cost per ad engagement across the majority of ad formats compared to the second quarter of 2016.





Non-GAAP Financial Measures

To supplement our consolidated financial statements presented in accordance with generally accepted accounting principles in the United States, or GAAP, we consider certain financial measures that are not prepared in accordance with GAAP, including Adjusted EBITDA, non-GAAP income before income taxes, non-GAAP provision for income taxes as it relates to the calculation of non-GAAP net income, and non-GAAP net income. These non-GAAP financial measures are not based on any standardized methodology prescribed by GAAP and are not necessarily comparable to similarly-titled measures presented by other companies.

Adjusted EBITDA

We define Adjusted EBITDA as net loss adjusted to exclude stock-based compensation expense, depreciation and amortization expense, interest and other expenses, provision (benefit) for income taxes, restructuring charges and one-time nonrecurring gain, if any.

The following table presents a reconciliation of net loss to Adjusted EBITDA for each of the periods indicated (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Reconciliation of Net Loss to Adjusted EBITDA				
Net loss	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)
Stock-based compensation expense	113,396	187,695	230,393	318,611
Depreciation and amortization expense	103,063	93,283	205,855	181,904
Interest and other expense, net	74,716	18,200	92,803	38,787
Provision for income taxes	3,413	2,641	6,607	4,669
Restructuring charges and one-time nonrecurring gain	(226)	—	(9,798)	47
Adjusted EBITDA	$ 177,874	$ 174,602	$ 347,813	$ 355,070

Non-GAAP Net Income

We define non-GAAP net income as net loss adjusted to exclude stock-based compensation expense, amortization of acquired intangible assets, non-cash interest expense related to convertible notes, non-cash expense related to acquisitions, impairment of investments in privately-held companies, restructuring charges and one-time nonrecurring gain, and adjustment to income tax expense based on the non-GAAP measure of profitability using our blended U.S. statutory tax rate (which was 37%).

Non-GAAP Income before Income Taxes . We define non-GAAP income before income taxes as loss before income taxes adjusted to exclude stock-based compensation expense, amortization of acquired intangible assets, non-cash interest expense related to convertible notes, non-cash expense related to acquisitions, impairment of investments in privately-held companies, and restructuring charges and one-time nonrecurring gain.

Non-GAAP Provision for Income Taxes . We define non-GAAP provision for income taxes as the current and deferred income tax expense commensurate with the non-GAAP measure of profitability using our blended U.S. statutory tax rate.

The following table presents a reconciliation of net loss to non-GAAP net income for each of the periods indicated (in thousands) :

	(NEW METHOD)				(PRIOR METHOD)			
	Three Months Ended June 30,		Six Months Ended June 30,		Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016	2017	2016	2017	2016
Reconciliation of Net Loss to Non-GAAP Net Income								
Net loss	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)
Exclude: Provision for income taxes	3,413	2,641	6,607	4,669	3,413	2,641	6,607	4,669
Loss before income taxes	(113,075)	(104,576)	(171,440)	(182,279)	(113,075)	(104,576)	(171,440)	(182,279)
Stock-based compensation expense	113,395	167,695	230,393	318,611	113,395	167,695	230,393	318,611
Amortization of acquired intangible assets	14,340	12,816	30,531	25,546	14,340	12,816	30,531	25,546
Non-cash interest expense related to convertible notes	20,041	18,570	39,289	36,940	20,041	18,570	39,289	36,940
Impairment of investments in privately-held companies	55,000	—	55,000	—	55,000	—	55,000	—
Restructuring charges and one-time nonrecurring gain	(226)	—	(9,798)	47	(226)	—	(9,798)	47
Non-GAAP income before income taxes	89,476	94,505	173,975	198,865	89,476	94,505	173,975	198,865
Non-GAAP provision for income taxes (1)	33,106	34,967	64,371	73,580	2,723	1,577	4,818	3,214
Non-GAAP net income	$ 56,370	$ 59,538	$ 109,604	$ 125,285	$ 86,753	$ 92,928	$ 169,157	$ 195,651

(1) Beginning Q2 2017, we are changing our method of calculating our non-GAAP provision for income taxes in accordance with the SEC's Non-GAAP Financial Measures Compliance and Disclosure Interpretation. For this Quarterly Report on Form 10-Q only, we are providing the calculations under our prior method and the new method. The "New Method" consists of current and deferred income tax expense commensurate with the non-GAAP measure of profitability using our blended U.S. statutory tax rate of 37%. The "Prior Method" consists of current and deferred income tax expense on a GAAP basis excluding the income tax effects related to acquisitions. We do not, however, expect to pay significant GAAP taxes for the foreseeable future in the U.S. and certain other foreign jurisdictions and believe that our long-term effective GAAP tax rate will be lower than the U.S. statutory tax rate based upon our established tax structure.

We use non-GAAP financial measures of Adjusted EBITDA, non-GAAP income before income taxes, non-GAAP provision for income taxes, and non-GAAP net income in evaluating our operating results and for financial and operational decision-making purposes. We believe that Adjusted EBITDA, non-GAAP income before income taxes and non-GAAP net income help identify underlying trends in our business that could otherwise be masked by the effect of the expenses that we exclude in Adjusted EBITDA, non-GAAP income before income taxes and non-GAAP net income. We believe that Adjusted EBITDA, non-GAAP income before income taxes and non-GAAP net income provide useful information about our operating results, enhance the overall understanding of our past performance and future prospects and allow for greater transparency with respect to key metrics used by our management in its financial and operational decision-making. We also use these measures to establish budgets and operational goals for managing our business and evaluating our performance.

These non-GAAP financial measures should not be considered in isolation from, or as a substitute for, financial information prepared in accordance with GAAP. There are a number of limitations related to the use of these non-GAAP financial measures rather than net loss, which is the nearest GAAP equivalent of these financial measures. Some of these limitations are:

- These non-GAAP financial measures exclude restructuring charges, one-time nonrecurring gain and certain recurring, non-cash charges such as stock-based compensation expense, amortization of acquired intangible assets, non-cash interest expense related to convertible notes and impairment of investments in privately-held companies;
- Stock-based compensation expense has been, and will continue to be for the foreseeable future, a significant recurring expense in our business and an important part of our compensation strategy;
- Adjusted EBITDA and non-GAAP income before income taxes do not reflect tax payments that reduce cash available to us;
- Adjusted EBITDA excludes depreciation and amortization expense and although these are non-cash charges, the property and equipment being depreciated and amortized may have to be replaced in the future; and

- The expenses that we exclude in our calculation of these non-GAAP financial measures may differ from the expenses , if any, that our peer companies may exclude from similarly-titled non-GAAP measures when they report their results of operations.

Results of Operations

The following tables set forth our consolidated statement of operations data for each of the periods presented (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue				
Advertising services	$ 489,148	$ 534,524	$ 962,928	$ 1,065,265
Data licensing and other	84,707	67,434	159,178	131,214
Total Revenue	573,855	601,958	1,122,106	1,196,479
Costs and expenses (1)				
Cost of revenue	212,908	202,966	433,247	401,371
Research and development	143,171	178,511	271,899	334,305
Sales and marketing	185,296	236,619	354,890	472,790
General and administrative	70,839	70,238	140,707	133,505
Total costs and expenses	612,214	688,334	1,200,743	1,341,971
Loss from operations	(38,359)	(86,376)	(78,637)	(145,492)
Interest expense	(26,396)	(24,934)	(51,805)	(49,827)
Other income (expense), net	(48,320)	6,734	(40,998)	13,040
Loss before income taxes	(113,075)	(104,576)	(171,440)	(182,279)
Provision for income taxes	3,413	2,641	6,607	4,669
Net loss	$ (116,488)	$ (107,217)	$ (178,047)	$ (186,948)

(1) Costs and expenses include stock-based compensation expense as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Cost of revenue	$ 6,253	$ 7,858	$ 12,205	$ 15,826
Research and development	63,625	90,916	128,011	166,495
Sales and marketing	20,694	45,856	45,783	91,957
General and administrative	22,824	23,065	44,394	44,333
Total stock-based compensation expense	$ 113,396	$ 167,695	$ 230,393	$ 318,611

The following table sets forth our consolidated statement of operations data for each of the periods presented as a percentage of revenue:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Revenue				
Advertising services	85%	89%	86%	89%
Data licensing and other	15	11	14	11
Total Revenue	100	100	100	100
Costs and expenses				
Cost of revenue	37	34	39	34
Research and development	25	30	24	28
Sales and marketing	32	39	32	40
General and administrative	12	12	13	11
Total costs and expenses	107	114	107	112
Loss from operations	(7)	(14)	(7)	(12)
Interest expense	(5)	(4)	(5)	(4)
Other income (expense), net	(8)	1	(4)	1
Loss before income taxes	(20)	(17)	(15)	(15)
Provision for income taxes	1	0	1	0
Net loss	(20)%	(18)%	(16)%	(16)%

Revenue

We generate the substantial majority of our revenue from the sale of advertising services. We also generate revenue by licensing our data to third parties and providing mobile advertising exchange services.

Advertising Services

We generate most of our advertising revenue by selling our Promoted Products. Currently, our Promoted Products consist of the following:

- *Promoted Tweets* . Promoted Tweets, which are labeled as "promoted," appear within a user's timeline, search results or profile pages just like an ordinary Tweet regardless of device, whether it be desktop or mobile. Using our proprietary algorithms and understanding of the interests of each user, we can deliver Promoted Tweets that are intended to be relevant to a particular user. We enable our advertisers to target an audience based on our users' Interest Graphs. Our Promoted Tweets are pay-for-performance advertising that is priced through en auction. Our Promoted Tweets include objective-based features that allow advertisers to pay only for the types of engagement selected by the advertisers, such as Tweet engagements (e.g., Retweets, replies and likes), website clicks or conversions, mobile application installs or engagements, obtaining new followers, or video views.
- *Promoted Accounts* . Promoted Accounts, which are labeled as "promoted," provide a way for our advertisers to grow a community of users who are interested in their business, products or services. Our Promoted Accounts are pay-for-performance advertising that is priced through an auction.
- *Promoted Trends* . Promoted Trends, which are labeled as "promoted," appear at the top of the list of trending topics for an entire day in a particular country or on a global basis. We sell our Promoted Trends on a fixed-fee-per-day basis.

While the majority of the Promoted Products we sell to our advertisers are placed on Twitter, we also generate advertising revenue by placing advertising products that we sell to advertisers on third-party publishers' websites, applications or other offerings.

Data Licensing and Other

We generate data licensing and other revenue by (i) offering data products and data licenses that allow our data partners to access, search and analyze historical and real-time data on our platform, which data consists of public Tweets and their content, and (ii) providing mobile advertising exchange services through our MoPub exchange. Our data partners generally purchase licenses to access all or a portion of our data for a fixed period. We recognize data licensing revenue as the licensed data is made available to our data partners. In addition, we operate a mobile ad exchange and receive service fees from transactions completed on the exchange. Our mobile ad exchange enables buyers and sellers to purchase and sell advertising inventory and matches buyers and sellers. We have determined we are not the principal in the purchase and sale of advertising inventory in transactions between third party buyers and sellers on the exchange. Therefore we report revenue related to our ad exchange services on a net basis.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
Advertising services	$ 489,148	$ 534,524	(8)%	$ 962,928	$ 1,065,265	(10)%
Data licensing and other	84,707	67,434	26%	159,178	131,214	21%
Total revenue	$ 573,855	$ 601,958	(5)%	$ 1,122,106	$ 1,196,479	(6)%

Revenue in the three and six months ended June 30, 2017 decreased by $28.1 million and $74.4 million, respectively, compared to the three and six months ended June 30, 2016.

In the three and six months ended June 30, 2017, advertising revenue decreased by 8% and 10%, respectively, compared to the three and six months ended June 30, 2016. The substantial majority of our advertising revenue was generated from our owned and operated platform. Advertising revenue generated from the sale of our advertising products on our owned and operated platform in the three and six months ended June 30, 2017 was $435.9 million and $851.2 million, respectively, as compared to $480.7 million and $948.0 million in the three and six months ended June 30, 2016, respectively. Advertising revenue generated from the sale of our advertising products placed on third party publishers' websites, applications and other offerings in the three and six months ended June 30, 2017 was $53.2 million and $111.7 million, respectively, as compared to $53.8 million and $117.2 million in the three and six months ended June 30, 2016, respectively. The slight decrease was driven by significantly lower contribution from TellApart (which we have been de-emphasizing and from which we expect lower revenue contribution), offset by strong performance from Twitter Audience Platform. The overall decrease in advertising revenue was primarily attributable to 53% and 58% decreases in average cost per ad engagement offset by 95% and 114% increases in the number of ad engagements in the three and six months ended June 30, 2017, respectively, compared to the same periods in 2016. The increase in ad engagements was driven by a continuing mix shift toward video ad impressions as well as higher click-through rates, as a result of better targeting and ad relevance, across nearly all ad formats on a like-for-like basis. The decrease in average cost per ad engagement reflects a higher mix of video ad engagements, and lower cost per ad engagement across the majority of ad formats compared to the second quarter of 2016. Advertising revenue continued to be driven by strong growth in our video ad formats and offset by declines in traditional Promoted Tweet and direct response ad formats. Although we believe the potential to increase our revenue grows with growth in our user base and the level of engagement of our users, we expect revenue growth to continue to lag behind audience growth on a year-over-year basis in, and possibly beyond, 2017 due to lead time for sales cycles, ongoing competition and the impact from revenue products and features that we have de-emphasized (including TellApart), discontinued or not launched or may decide to de-emphasize, discontinue or not launch. As a result of these factors, we continue to face challenges that affect our ability to attract demand from advertisers.

In the three and six months ended June 30, 2017, data licensing and other revenue increased by 26% and 21%, respectively, compared to the three and six months ended June 30, 2016. A majority of the increase was attributable to growth in data licensing fees from the offering of data products. We expect to continue to grow our data revenue with a new product and channel segmented go-to-market approach.

Cost of Revenue

Cost of revenue includes infrastructure costs, other direct costs including content costs, amortization of acquired intangible assets and capitalized labor costs, allocated facilities costs, as well as traffic acquisition costs, or TAC. Infrastructure costs consist primarily of data center costs related to our co-located facilities, which include lease and hosting costs, related support and maintenance costs and energy and bandwidth costs; as well as depreciation of our internally developed software, servers and networking equipment; and personnel-related costs, including salaries, benefits and stock-based compensation, for our operations teams. TAC consists of costs we incur with third parties in connection with the sale to advertisers of our advertising products that we place on third-party publishers' websites, applications or other offerings collectively resulting from acquisitions, and from our organically-built advertising network, Twitter Audience Platform. Many of the elements of our cost of revenue are fixed, and cannot be reduced in the near term to offset any decline in our revenue.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
Cost of revenue	$ 212,908	$ 202,966	5%	$ 433,247	$ 401,371	8%
Cost of revenue as a percentage of revenue	37%	34%		39%	34%	

In the three months ended June 30, 2017, cost of revenue, which included TAC of $26.1 million, increased by $9.9 million compared to the three months ended June 30, 2016. The increase was attributable to a $10.8 million increase in depreciation and amortization expense primarily related to additional internally developed software, server and networking equipment and a $10.1 million increase in other direct costs that is primarily driven by an increase in content costs . The increases were offset by an $8.3 million decrease in infrastructure costs, a $2.1 million decrease in TAC due to the decrease in advertising revenue generated from the sale of our advertising products placed on third party publishers' websites, applications and other offerings as well as the mix of those advertising products , and a $0.6 million decrease in personnel-related costs.

In the six months ended June 30, 2017, cost of revenue, which included TAC of $55.9 million, increased by $31.9 million compared to the six months ended June 30, 2016. The increase was attributable to a $27.7 million increase in other direct costs that is primarily driven by an increase in content costs, and a $21.2 million increase in depreciation and amortization expense primarily related to additional internally developed software, server and networking equipment. The increases were offset by an $8.4 million decrease in TAC due to the decrease in advertising revenue generated from the sale of our advertising products placed on third party publishers' websites, applications and other offerings as well as the mix of those advertising products , a $6.9 million decrease in infrastructure costs, and a $1.7 million decrease in personnel-related costs.

We plan to continue to scale the capacity and enhance the capability and reliability of our infrastructure to support user growth and activity on our platform. Although we expect TAC to decrease in the near term, cost of revenue will otherwise vary in the near term from period to period as a percentage of revenue based on a number of factors, including the relative revenue growth rates, the growth rates of infrastructure costs to support user growth and activity on our platform, and the growth rates of expenses associated with our content acquisition costs as well as our hardware inventory and related costs.

Research and Development

Research and development expenses consist primarily of personnel-related costs, including salaries, benefits and stock-based compensation, for our engineers and other employees engaged in the research and development of our products and services. In addition, research and development expenses include amortization of acquired intangible assets, allocated facilities and other supporting overhead costs.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
Research and development	$ 143,171	$ 178,511	(20)%	$ 271,899	$ 334,305	(19)%
Research and development as a percentage of revenue	25%	30%		24%	28%	

In the three months ended June 30 , 2017 , research and development expenses de creased by $ 35.3 million compared to th e three months ended June 30 , 2016 . The decrease was attributable to a $ 34.3 million decrease in personnel-related costs, mainly driven by a decrease in recognition of stock-based compensation expense from a decrease in average employee headcount , a $ 4.3 m illion decrease in allocated facilities and other supporting overhead expenses , and a $ 0.6 million decrease in depreciation and amortization expense , offset by a $ 3.9 million decrease in the capitalization of costs associated with developing software for internal use .

In the six months ended June 30, 2017, research and development expenses decreased by $62.4 million compared to the six months ended June 30, 2016. The decrease was attributable to a $51.2 million decrease in personnel-related costs, mainly driven by a decrease in recognition of stock-based compensation expense from a decrease in average employee headcount, an $11.5 million one-time nonrecurring gain net of restructuring charges in the quarter ended March 31, 2017, an $8.4 million decrease in allocated facilities and other supporting overhead expenses, and a $1.0 million decrease in depreciation and amortization expense, offset by a $9.7 million decrease in the capitalization of costs associated with developing software for internal use.

We plan to continue to invest in key areas of our business and ensure that we have the right level of engineering, product management and design teams to support our research and development efforts. We expect that research and development costs will vary in the near term from period to period as a percentage of revenue.

Sales and Marketing

Sales and marketing expenses consist primarily of personnel-related costs, including salaries, commissions, benefits and stock-based compensation for our employees engaged in sales, sales support, business development and media, marketing, corporate communications and customer service functions. In addition, marketing and sales-related expenses also include advertising costs, market research, tradeshows, branding, marketing, public relations costs, amortization of acquired intangible assets, as well as allocated facilities and other supporting overhead costs.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
Sales and marketing	$ 185,296	$ 236,619	(22)%	$ 354,890	$ 472,790	(25)%
Sales and marketing as a percentage of revenue	32%	39%		32%	40%	

In the three months ended June 30, 2017, sales and marketing expenses decreased by $51.3 million compared to the six months ended June 30, 2016. The decrease was attributable to a $38.1 million decrease in personnel-related costs, driven by a decrease in average employee headcount mainly as a result of our 2016 restructuring plan, an $8.4 million decrease in allocated facilities and other supporting overhead expenses, a $5.3 million decrease in marketing and sales-related expenses, and a $0.2 million decrease in restructuring expenses, offset by a $0.7 million increase in amortization of acquired intangible assets.

In the six months ended June 30, 2017, sales and marketing expenses decreased by $117.9 million compared to the three months ended June 30, 2016. The decrease was attributable to a $76.2 million decrease in personnel-related costs, driven by a decrease in average employee headcount mainly as a result of our 2016 restructuring plan, a $31.3 million decrease in marketing and sales-related expenses, and a $16.9 million decrease in allocated facilities and other supporting overhead expenses. The decreases were offset by a $5.3 million increase in amortization of acquired intangible assets and a $1.2 million increase in restructuring expenses.

We continue to evaluate key areas in our business to ensure we have the right level of sales and marketing to execute on our key priorities and objectives. We expect that sales and marketing expenses will vary in the near term from period to period as a percentage of revenue.

General and Administrative

General and administrative expenses consist primarily of personnel-related costs, including salaries, benefits and stock-based compensation, for our executive, finance, legal, information technology, human resources and other administrative employees. In addition, general and administrative expenses include fees and costs for professional services, including consulting, third-party legal and accounting services and facilities and other supporting overhead costs that are not allocated to other departments.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
General and administrative	$ 70,839	$ 70,238	1%	$ 140,707	$ 133,505	5%
General and administrative as a percentage of revenue	12%	12%		13%	11%	

In the three months ended June 30, 2017, general and administrative expense increased by $0.6 million compared to the three months ended June 30, 2016. The increase was attributable to a $3.7 million increase in personnel-related costs, driven by an increase in average employee headcount, and a $1.0 million increase in fees and costs for professional services. These increases were offset by a $3.9 million decrease in facilities and supporting costs not allocated to other functions and a $0.2 million increase in the capitalization of costs associated with developing software for internal use.

In the six months ended June 30, 2017, general and administrative expense increased by $7.2 million compared to the six months ended June 30, 2016. The increase was attributable to a $7.4 million increase in personnel-related costs, driven by an increase in average employee headcount, a $3.2 million increase in fees and costs for professional services, a $1.1 million decrease in the capitalization of costs associated with developing software for internal use, and a $0.3 million increase in restructuring expenses, offset by a $4.8 million decrease in facilities and supporting costs not allocated to other functions.

We plan to continue to invest in key areas of our business and ensure that we have the right level of general and administrative support on our key priorities and objectives. We expect that general and administrative expenses will vary in the near term from period to period as a percentage of revenue.

Interest Expense

Interest expense consists primarily of interest expense incurred in connection with the $935.0 million principal amount of 0.25% convertible senior notes due 2019, or the 2019 Notes, and $954.0 million principal amount of 1.00% convertible senior notes due 2021, or the 2021 Notes and together with the 2019 Notes, the Notes, and interest expense related to capital leases and other financing facilities.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
Interest expense	$ 26,396	$ 24,934	6%	$ 51,805	$ 49,827	4%

In the three and six months ended June 30, 2017, interest expense increased by $1.5 million and $2.0 million, respectively, compared to the three and six months ended June 30, 2016. Interest expense in the three and six months ended June 30, 2017 was comprised of $25.0 million and $49.1 million, respectively, of total interest expense related to the Notes as well as the credit facility and $1.4 million and $2.7 million, respectively, related to capital leases of equipment.

Other Income (Expense), Net

Other income (expense), net, consists primarily of interest income resulting from our short-term investments net of the related amortization of premium paid on such investments, and unrealized foreign exchange gains and losses due to re-measurement of monetary assets and liabilities denominated in non-functional currencies as well as realized foreign exchange gains and losses on foreign exchange transactions. We expect our foreign exchange gains and losses will vary depending upon movements in the underlying exchange rates.

	Three Months Ended June 30,			Six Months Ended June 30,		
	2017	2016	% Change	2017	2016	% Change
	(in thousands)			(in thousands)		
Other income (expense), net	$ (48,320)	$ 6,734	(818)%	$ (40,998)	$ 13,040	(414)%

Other expense, net, was $48.3 million in the three months ended June 30, 2017 compared to other income, net of $6.7 million in the three months ended June 30, 2016. Other expense, net, was $41.0 million in the six months ended June 30, 2017 compared to other income, net of $13.0 million in the six months ended June 30, 2016. The changes were primarily attributable to the recording of an other-than-temporary impairment on a cost-method investment of $55.0 million during the second quarter of 2017 and less favorable foreign currency exchange impacts from foreign currency-denominated assets and liabilities as well as derivative financial instruments, offset by an increase in interest income on our short term investments. Other expense, net in the three months ended June 30, 2017 was comprised of $55.0 million of other-than-temporary impairment on a cost-method investment, $3.1 million of foreign currency exchange net loss and $0.3 million of other expense, offset by $10.1 million of interest and other income. Other expense, net in the six months ended June 30, 2017 was comprised of $55.0 million of other-than-temporary impairment on a cost-method investment, $4.1 million of foreign currency exchange net loss and $0.4 million of other expense, offset by $18.5 million of interest and other income.

Provision (Benefit) for Income Taxes

Provision (benefit) for income taxes consists of federal and state income taxes in the United States and income taxes in certain foreign jurisdictions which are expected to fluctuate based on the pre-tax results within and outside of the United States and will also be impacted by our allocation of centrally incurred costs to foreign jurisdictions. Our future effective tax rate will also be affected by the changes in tax rates and tax regulations, the impact of tax examinations, the impact of business combinations, and changes in valuation allowance. In addition, the provision is impacted by deferred income taxes and changes in the related valuation allowance reflecting the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes.

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
	(in thousands)		(in thousands)	
Provision for income taxes	$ 3,413	$ 2,641	$ 6,607	$ 4,669

Our provision for income taxes in the three and six months ended June 30, 2017 increased by $0.8 million and $1.9 million, respectively, compared to the three and six months ended June 30, 2016, primarily due to increased foreign income taxes partially offset by reduced U.S. income taxes.

Liquidity and Capital Resources

	Six Months Ended June 30,	
	2017	2016
	(in thousands)	
Consolidated Statements of Cash Flows Data:		
Net loss	$ (178,047)	$ (186,948)
Net cash provided by operating activities	393,155	377,320
Net cash used in investing activities	(63,068)	(313,331)
Net cash used in financing activities	(38,823)	(33,683)

Our principal sources of liquidity are our cash, cash equivalents, and short-term investments in marketable securities. Our cash equivalents and marketable securities are invested primarily in short-term fixed income securities, including government and in vestment-grade debt securities and money market funds .

As of June 30, 2017, we had $4.08 billion of cash, cash equivalents and short-term investments in marketable securities, of which $180.6 million was held by our foreign subsidiaries. Under the current tax laws, if these funds are needed for our operations in the U.S., we would be required to accrue and pay U.S. taxes to repatriate certain of these funds. However, our intent is to indefinitely reinvest these funds outside of the U.S. and our current plans do not demonstrate a need to repatriate them to fund our U.S. operations. In addition, we have a revolving unsecured credit facility (described below) available to borrow up to $1.0 billion. We believe that our existing cash, cash equivalents and short-term investment balance, and our credit facility, together with cash generated from operations will be sufficient to meet our working capital and capital expenditure requirements for at least the next 12 months.

Credit Facility

In October 2013, we entered into a revolving credit agreement with certain lenders which provides for a $1.0 billion revolving unsecured credit facility maturing on October 22, 2018. We are obligated to pay interest on loans under the credit facility and other customary fees for a credit facility of this size and type, including an upfront fee and an unused commitment fee. Our obligations under the credit facility are guaranteed by one of our wholly-owned subsidiaries. In addition, the credit facility contains restrictions on payments including cash payment of dividends. As of June 30, 2017, no amounts had been drawn under the credit facility.

Operating Activities

Cash provided by operating activities consists of net loss adjusted for certain non-cash items including depreciation and amortization, stock-based compensation, amortization of discount on our Notes, deferred income taxes, impairment of investments in privately-held companies, non-cash restructuring charges, as well as the effect of changes in working capital and other activities. We expect that cash provided by operating activities will fluctuate in future periods as a result of a number of factors, including fluctuations in our revenue, increases in operating expenses and costs related to acquisitions. For additional discussion, see "Part II—Other Information, Item 1A. Risk Factors."

Cash provided by operating activities in the six months ended June 30, 2017 was $393.2 million, an increase in cash inflow of $15.8 million compared to the six months ended June 30, 2016. Cash provided by operating activities was driven by a net loss of $178.0 million, as adjusted for the exclusion of non-cash expenses totaling $526.3 million, of which $230.4 million was related to stock-based compensation expense and $55.0 million was related to other-than-temporary impairment on a cost-method investment, and the effect of changes in working capital and other carrying balances that resulted in cash inflows of $44.9 million.

Cash provided by operating activities in the six months ended June 30, 2016 was $377.3 million. Cash provided by operating activities was driven by a net loss of $186.9 million, as adjusted for the exclusion of non-cash expenses totaling $545.3 million, of which $318.6 million was related to stock-based compensation expense, and the effect of changes in working capital and other carrying balances that resulted in cash inflows of $18.9 million.

Investing Activities

Our primary investing activities consist of purchases of property and equipment, particularly purchases of servers and networking equipment, leasehold improvements for our facilities, purchases and disposal of marketable securities, strategic investments in privately-held companies, acquisitions of businesses and other activities.

Cash used in investing activities in the six months ended June 30, 2017 was $63.1 million, a decrease in cash outflow of $250.3 million compared to the six months ended June 30, 2016. The decrease in cash outflow was primarily due to a $295.8 million increase in proceeds from sales and maturities of marketable securities, a net $80.1 million decrease in cash used in business combinations, a $77.5 million decrease in purchases of investments in privately-held companies, a $35.0 million increase in proceeds from sale of long-lived assets, and a $15.0 million decrease in purchases of property and equipment, offset by a $247.1 million increase in the purchases of marketable securities and a $6.0 million increase in expenditures on other investing activities.

We anticipate making capital expenditures in 2017 of approximately $300 million to $400 million, a portion of which we may finance through capital leases, as we continue to expand our co-located data centers.

Financing Activities

Our primary financing activities consist of issuances of securities, capital lease financing and stock option exercises by employees.

Cash used in financing activities in the six months ended June 30, 2017 was $38.8 million, an increase in cash outflow of $5.1 million compared to the six months ended June 30, 2016. The increase in cash outflow was due to a $6.4 million increase in payments of capital lease obligations and a $1.8 million decrease in proceeds from the issuance of shares of stock from the ESPP, offset by a net $2.0 million decrease in tax payments related to net share settlements of equity awards and other activities and a net $1.1 million increase in proceeds from option exercises.

Off Balance Sheet Arrangements

We do not have any off-balance sheet arrangements and did not have any such arrangements as of June 30, 2017.

Contractual Obligations

There were no material changes in our commitments under contractual obligations except for scheduled payments from the ongoing business, as disclosed in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in accordance with GAAP. In doing so, we make estimates and assumptions that affect our reported amounts of assets, liabilities, revenue and expenses, as well as related disclosure of contingent assets and liabilities. To the extent that there are material differences between these estimates and actual results, our financial condition or operating results would be affected. We base our estimates on past experience and other assumptions that we believe are reasonable under the circumstances, and we evaluate these estimates on an ongoing basis. We refer to accounting estimates of this type as critical accounting policies and estimates. Please refer to "Management's Discussion and Analysis of Financial Condition and Results of Operations" contained in Part II, Item 7 of our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 for a more complete discussion of our critical accounting policies and estimates.

There have been no material changes to our critical accounting policies and estimates as compared to the critical accounting policies and estimates described in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016.

Recent Accounting Pronouncements

For information with respect to recent accounting pronouncements and the impact of these pronouncements on our consolidated financial statements, see Note 1 – "Description of Business and Summary of Significant Accounting Policies" in the notes to the consolidated financial statements included in Part I of this Quarterly Report on Form 10-Q.

Item 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We have operations both within the United States and internationally, and we are exposed to market risks in the ordinary course of our business. These risks include primarily interest rate and foreign exchange risks.

Interest Rate Fluctuation Risk

Our investment portfolio mainly consists of short-term fixed income securities, including government and investment-grade debt securities and money market funds. These securities are classified as available-for-sale and, consequently, are recorded in the consolidated balance sheets at fair value with unrealized gains or losses, net of tax reported as a separate component of accumulated other comprehensive loss. Our investment policy and strategy is focused on the preservation of capital and supporting our liquidity requirements. We do not enter into investments for trading or speculative purposes.

A rise in interest rates could have a material adverse impact on the fair value of our investment portfolio. Based on our investment portfolio balance as of June 30, 2017, a hypothetical increase in interest rates of 100 basis points would result in a decrease of approximately $16.5 million in the fair value of our available-for-sale securities. We currently do not hedge these interest rate exposures.

In 2014, we issued Notes with an aggregate principal amount of $1.89 billion. We carry the Notes at face value less amortized discount on the consolidated balance sheet. Since the Notes bear interest at fixed rates, we have no financial statement risk associated with changes in interest rates. However, the fair value of the Notes changes when the market price of our stock fluctuates or interest rates change.

Foreign Currency Exchange Risk

Transaction Exposure

We transact business in various foreign currencies and have international revenue, as well as costs denominated in foreign currencies, primarily the Euro, British Pound, Singapore Dollar and Japanese Yen. This exposes us to the risk of fluctuations in foreign currency exchange rates. Accordingly, changes in exchange rates, and in particular a continuing strengthening of the U.S. dollar, would negatively affect our revenue and other operating results as expressed in U.S. dollars.

We have experienced and will continue to experience fluctuations in our net loss as a result of transaction gains or losses related to revaluing and ultimately settling certain asset and liability balances that are denominated in currencies other than the functional currency of the entities in which they are recorded. Net realized and unrealized foreign currency gains were immaterial for the three and six months ended June 30, 2017 and 2016. We currently utilize foreign currency forward contracts with financial institutions to reduce the risk that our earnings may be adversely affected by the impact of exchange rate fluctuations on monetary assets or liabilities denominated in currencies other than the local currency of a subsidiary. These contracts are not designated as hedging instruments. We may in the future enter into other derivative financial instruments if it is determined that such hedging activities are appropriate to further reduce our foreign currency exchange risk. Based on our foreign currency exposures from monetary assets and liabilities net of our open hedge position, we estimated that a 5% change in exchange rates against the U.S. dollars would have resulted in a gain or loss of approximately $3.0 million as of June 30, 2017.

Translation Exposure

We are also exposed to foreign exchange rate fluctuations as we translate the financial statements of our foreign subsidiaries into U.S. dollars in consolidation. If there is a change in foreign currency exchange rates, the translating adjustments resulting from the conversion of our foreign subsidiaries' financial statements into U.S. dollars would result in a gain or loss recorded as a component of accumulated other comprehensive loss which is part of stockholders' equity.

I tem 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, has evaluated the effectiveness of our disclosure controls and procedures as of the end of the period covered by this Quarterly Report on Form 10-Q. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commissions' rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. The design of disclosure controls and procedures and internal control over financial reporting must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs. Based on such evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that, as of June 30, 2017, our disclosure controls and procedures were designed at a reasonable assurance level and were effective to provide reasonable assurance.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this Quarterly Report on Form 10-Q that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

P ART II – OTHER INFORMATION

Item 1. LEGAL PROCEEDINGS

We are currently involved in, and may in the future be involved in, legal proceedings, claims, investigations, and government inquiries arising in the ordinary course of business. These proceedings, in the form of both individual and class action litigation, have included, but are not limited to matters involving intellectual property, defamation, privacy, securities, employment and contractual rights. For example, we currently have pending shareholder class action lawsuits alleging violations of securities laws filed in the U.S. District Court for the Northern District of California and the Superior Court for San Mateo County in California, naming current and former officers as defendants. Legal risk is enhanced in certain jurisdictions outside the United States where our protection from liability for content published on our platform by third parties may be unclear and where we may be less protected under local laws than we are in the United States. Future litigation may be necessary, among other things, to defend ourselves, and our users, by determining the scope, enforceability, and validity of third-party rights or to establish our rights.

Although the results of the legal proceedings, claims, investigations, and government inquiries in which we are involved cannot be predicted with certainty, we do not believe that there is a reasonable possibility that the final outcome of these matters will have a material adverse effect on our business, financial condition, operating results, or prospects. However, the final results of any current or future proceeding cannot be predicted with certainty, and until there is final resolution on any such matter that we may be required to accrue for, we may be exposed to loss in excess of the amount accrued. Regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources, and other factors.

Item 1A. RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the risks and uncertainties described below, together with all of the other information in this Quarterly Report on Form 10-Q, including the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our consolidated financial statements and related notes, before making a decision to invest in our common stock. The risks and uncertainties described below may not be the only ones we face. If any of the risks actually occurs, our business, financial condition, opereting results, cash flows and prospects could be materially and adversely affected. In that event, the market price of our common stock could decline, and you could lose part or all of your investment.

Risks Related to Our Business and Our Industry

If we fail to grow our user base, or if user engagement or ad engagement on our platform decline, our revenue, business and operating results may be harmed.

The size of our user base and our users' level of engagement are critical to our success. We had 328 million average MAUs in the three months ended June 30, 2017, representing a 5% increase from 313 million average MAUs in the three months ended June 30, 2016. DAUs for the three months ended June 30, 2017 increased 12% year over year. Our financial performance has been and will continue to be significantly determined by our success in growing the number of users and increasing their overall level of engagement on our platform as well as the number of ad engagements. We anticipate that our user growth rate will continue to slow over time as the size of our user base increases. For example, in general, a higher proportion of Internet users in the United States uses Twitter than Internet users in other countries and, in the future, we expect our user growth rate in certain international markets, such as Germany, India, Japan, the Philippines, Saudi Arabia, South Korea and Thailand, to continue to be higher than our user growth rate in the United States. To the extent our logged-in user growth rate slows, our success will become increasingly dependent on our ability to increase levels of ad engagement on Twitter and monetizing our total audience on logged-out usage and syndicated properties as well as increasing revenue growth from the sale to advertisers of our advertising products which we place on Twitter properties and third party publishers' websites, applications and other offerings. We generate a substantial majority of our revenue based upon engagement by our users with the ads that we display. If people do not perceive our products and services to be useful, reliable and trustworthy, we may not be able to attract users or increase the frequency of their engagement with our platform and the ads that we display. A number of consumer-oriented websites that achieved early popularity have seen their user bases or levels of engagement decline, in some cases precipitously. There is no guarantee that we will not experience a similar erosion of our user base or engagement levels. A number of factors could potentially negatively affect user growth and engagement, including if:

- users, including influential users, such as world leaders, government officials, celebrities, athletes, journalists, sports teams, media outlets and brands or certain age demographics, engage with other products, services or activities as an alternative to ours;

- we are unable to convince potential or new users of the value and usefulness of our products and services;
- there is a decrease in the perceived quantity, quality, usefulness or relevance of the content generated by our users or content partners;
- our content partners terminate their relationships with us or do not renew their agreements on economic or other terms that are favorable to us;
- there are user concerns related to privacy and communication, safety, security, spam or other hostile or inappropriate usage or other factors;
- we fail to introduce new and improved products or services or if we introduce new or improved products or services that are not favorably received or that negatively affect user engagement;
- technical or other problems prevent us from delivering our products or services in a rapid and reliable manner or otherwise affect the user experience, including issues with connecting to the Internet;
- users have difficulty installing, updating, or otherwise accessing our products or services on mobile devices as a result of actions by us or third parties that we rely on to distribute our products and deliver our services;
- we are unable to manage and prioritize information to ensure users are presented with content that is interesting, useful and relevant to them;
- users believe that their experience is diminished as a result of the decisions we make with respect to the frequency, format, relevance and prominence of ads that we display;
- there are adverse changes in our products or services that are mandated by, or that we elect to make to address, legislation, regulatory authorities or litigation, including settlements or consent decrees;
- we fail to provide adequate customer service to users; or
- we do not maintain our brand image or our reputation is damaged.

We believe that returning to meaningful MAU growth is dependent on improving our product and feature offerings to demonstrate our value proposition to a larger audience. If we are unable to increase our user base, user growth rate or user engagement, or if these metrics decline, our products and services could be less attractive to potential or new users, as well as to advertisers, content partners and platform partners, which would have a material and adverse impact on our business, financial condition and operating results.

If our users or content partners do not continue to contribute content or such content is not viewed as unique or engaging by other users, we may experience a decline in the number of users accessing our products and services and user engagement, which could result in the loss of content partners, advertisers, platform partners and revenue.

Our success depends on our ability to provide users of our products and services with unique and engaging content, which in turn depends on the content contributed by our users. We believe that one of our competitive advantages is the quality, quantity and real-time nature of the content on Twitter, and that access to unique or real-time content is one of the main reasons users visit Twitter. We seek to foster a broad and engaged user community, and we encourage world leaders, government officials, celebrities, athletes, journalists, sports teams, media outlets and brands to use our products and services to express their views to broad audiences. We also encourage media outlets to use our products and services to distribute their content. In addition, we license our premium live streaming video content from a variety of content providers. If these content providers are no longer willing or able to license us content upon economic and other terms that are acceptable to us, our ability to stream such content will be adversely affected and/or our costs could increase. If users, including influential users, do not continue to contribute content or content providers do not license content to Twitter, and we are unable to provide users with unique, engaging and timely content, our user base and user engagement may decline. Additionally, if we are not able to address user concerns regarding the safety and security of our products and services or if we are unable to successfully prevent abusive or other hostile behavior on our platform, the size of our user base and user engagement may decline. We rely on the sale of advertising services for the substantial majority of our revenue and a decline in the number of users, user growth rate, or user engagement, including as a result of the loss of world leaders, government officials, celebrities, athletes, journalists, sports teams, media outlets and brands who generate content on Twitter, advertisers may deter new advertisers from using our products or services or cause current advertisers to reduce their spending with us or cease doing business with us, which would harm our business and operating results.

We generate the substantial majority of our revenue from advertising. The loss of advertising revenue could harm our business.

The substantial majority of our revenue is currently generated from third parties advertising on Twitter. We generated approximately 89% and 86% of our revenue from advertising in the fiscal year ended December 31, 2016 and the six months ended June 30, 2017, respectively. We generate substantially all of our advertising revenue through the sale of our three Promoted Products: Promoted Tweets, Promoted Accounts and Promoted Trends. As is common in our industry, our advertisers do not have long-term advertising commitments with us. In addition, many of our advertisers purchase our advertising services through one of several large advertising agency holding companies. To sustain or increase our revenue, we must add new advertisers and encourage existing advertisers to maintain or increase the amount of advertising inventory purchased through our platform and adopt new features and functionalities that we add to our platform. However, advertising agencies and potential new advertisers may view our Promoted Products or any new products or services we offer as experimental and unproven, and we may need to devote additional time and resources to educate them about our products and services. Advertisers also may choose to reach users through our free products and services, instead of our Promoted Products. Advertisers will not continue to do business with us, or they will reduce the prices they are willing to pay to advertise with us, if we do not deliver ads in an effective manner, or if they do not believe that their investment in advertising with us will generate a competitive return on investment relative to alternatives, including online, mobile and traditional advertising platforms. In addition, competition for advertising is becoming increasingly more intense and our advertising revenue could be further impacted by escalating competition for digital ad spending as well as the re-evaluation of our revenue product feature portfolio, which could result in the de-emphasis of certain product features. Since our initial public offering, our revenue growth has been primarily driven by increases in the number of our users and increases in our ad load driven by strong advertiser demand as well as other factors. To date, our available advertising inventory has been greater than demand. Our future revenue growth, however, may be limited by available advertising inventory for specific ad types on certain days if we do not increase the number of our users, their engagement or monetize our larger global audience. Our advertising revenue could be adversely affected by a number of other factors, including:

- decreases in user engagement with the ads on our platform and those that we serve off of our platform;
- decreases in the size of our user base or user growth rate;
- if we are unable to demonstrate the value of our Promoted Products to advertisers and advertising agencies or if we are unable to measure the value of our Promoted Products in a manner which advertisers and advertising agencies find useful;
- if we are unable to demonstrate the value of, or attract video and video advertisements on, our platform;
- decreases in the perceived quantity, quality, usefulness or relevance of the content generated by our users or content partners;
- if our Promoted Products are not cost effective or not valued by certain types of advertisers or if we are unable to develop cost effective or valuable advertising services for different types of advertisers;
- if we are unable to convince advertisers and brands to invest resources in learning to use our products and services and maintaining a brand presence on Twitter;
- our advertisers' ability to optimize their campaigns or measure the results of their campaigns;
- product or service changes we may make that change the frequency or relative prominence of ads displayed on Twitter or that detrimentally impact revenue in the near term with the goal of achieving long term benefits;
- our inability to increase advertiser demand and spend from new and existing advertisers as well as advertising inventory;
- our inability to increase the relevance of ads shown to users;
- our inability to help advertisers effectively target ads, including as a result of the fact that we do not collect extensive personal information from our users and that we do not have real-time geographic information for all of our users particularly for ads served through our app mobile-focused advertising exchange;
- decreases in the cost per ad engagement;
- failure to effectively monetize our growing international user base, our logged-out audience or our syndicated audience;
- loss of advertising market share to our competitors;
- the degree to which users access Twitter content through applications that do not contain our ads;

- any arrangements or other partnerships with third parties to shar e our revenue;
- our new advertising strategies do not gain traction;
- the impact of new technologies that could block or obscure the display of our ads;
- adverse legal developments relating to advertising or measurement tools related to the effectiveness of advertising, including legislative and regulatory developments, and developments in litigation;
- our inability to create new products, product featuras and services that sustain or increase the value of our advertising services to both our advertisers and our users;
- changes to our products or development of new products or product features that decrease users' ad engagements or limit the types of user interactions that we count as ad engagements;
- the impact of fraudulent clicks or spam on our Promoted Products and our users;
- changes in the way our advertising is priced; and
- the impact of macroeconomic conditions and conditions in the advertising industry in general.

The occurrence of any of these or other factors could result in a reduction in demand for our ads, which may reduce the prices we receive for our ads, either of which would negatively affect our revenue and operating results.

If we are unable to compete effectively for users and advertiser spend, our business and operating results could be harmed.

Competition for users of our products and services is intense. Although we have developed a global platform that we believe is the best and fastest place to see what's happening and what people are talking about all around the world, we face strong competition in our business. We compete against many companies to attract and engage users, including companies which have greater financial resources and substantially larger user bases, such as Facebook (including Instagram and WhatsApp), Google (including YouTube), Microsoft (including LinkedIn), Snap and Yahoo, which offer a variety of Internet and mobile device-based products, services and content. For example, Facebook operates a social networking site with significantly more users than Twitter and has been introducing features similar to those of Twitter. In addition, Google may use its strong position in one or more markets to gain a competitive advantage over us in areas in which we operate, including by integrating competing features into products or services they control. As a result, our competitors may draw users towards their products or services and away from ours. This could decrease the growth or engagement of our user base, which, in turn, would negatively affect our business. We also compete against largely regional social media and messaging companies that have strong positions in particular countries such as Kakao and Line.

We believe that our ability to compete effectively for users depends upon many factors both within and beyond our control, including:

- the popularity, usefulness, ease of use, performance and reliability of our products and services compared to those of our competitors;
- the amount, quality and timeliness of content generated by our users and content partners;
- the timing and market acceptance of our products and services;
- our ability, in and of itself and in comparison to the ability of our competitors, to develop new products and services and enhancements to existing products and services;
- the frequency and relative prominence of the ads displayed by us or our competitors;
- our ability to establish and maintain relationships with content partners;
- our ability to develop a reliable, scalable, secure, high-performance technology infrastructure that can efficiently handle increased usage globally;
- changes mandated by, or that we elect to make to address, legislation, regulatory authorities or litigation, including settlements and consent decrees, some of which may have a disproportionate effect on us;
- the application of antitrust laws both in the United States and internationally;
- the continued adoption of our products and services internationally;
- our ability to establish and maintain relationships with platform partners that integrate with our platform;

- acquisitions or consolidation within our industry, which may result in more formidable competitors; and
- our reputation and brand strength relative to our competitors.

We also face significant competition for advertiser spend. The substantial majority of our revenue is currently generated through third parties advertising on Twitter, and we compete against online and mobile businesses, including those referenced above, and traditional media outlets, such as television, radio and print, for advertising budgets. In addition, many advertisers, particularly branded advertisers, use marketing mix analyses to determine how to allocate their advertising budgets on an annual or bi-annual basis. Accordingly, if we fail to demonstrate to such advertisers during the appropriate time period that we provide a better return on investment than our competitors do, we may lose the opportunity to secure, increase or sustain our share of the advertising budget allocated for a significant portion of the year until the next budget cycle.

We also compete with advertising networks, exchanges, demand side platforms and other platforms, such as Google AdSense, DoubleClick Ad Exchange, Yahoo Ad Exchange, AOL's Ad.com and Microsoft Media Network, for marketing budgets and in the development of the tools and systems for managing and optimizing advertising campaigns. In order to grow our revenue and improve our operating results, we must increase our share of spending on advertising relative to our competitors, many of which are larger companies that offer more traditional and widely accepted advertising products. In addition, some of our larger competitors have substantially broader product or service offerings and leverage their relationships based on other products or services to gain additional share of advertising budgets.

We believe that our ability to compete effectively for advertiser spend depends upon many factors both within and beyond our control, including:

- the size and composition of our user base relative to those of our competitors;
- our ad targeting and measurement capabilities, and those of our competitors;
- the timing and market acceptance of our advertising services, and those of our competitors;
- our marketing and selling efforts, and those of our competitors;
- the pricing of our Promoted Products relative to the advertising products and services of our competitors;
- the actual or perceived return our advertisers receive from our advertising services, and those of our competitors; and
- our reputation and the strength of our brand relative to our competitors.

In recent years, there have been significant acquisitions and consolidation by and among our actual and potential competitors. We anticipate this trend of consolidation will continue, which will present heightened competitive challenges for our business. Acquisitions by our competitors may result in reduced functionality of our products and services. For example, following Facebook's acquisition of Instagram, Facebook disabled Instagram's photo integration with Twitter such that Instagram photos were no longer viewable within Tweets and users are instead re-directed to Instagram to view Instagram photos through a link within a Tweet. As a result, our users may be less likely to click on links to Instagram photos in Tweets, and Instagram users may be less likely to Tweet or remain active users of Twitter. Any similar elimination of integration with Twitter in the future, whether by Facebook or others, may adversely impact our business and operating results.

Consolidation may also enable our larger competitors to offer bundled or integrated products that feature alternatives to our platform. Reduced functionality of our products and services, or our competitors' ability to offer bundled or integrated products that compete directly with us, may cause our user growth, user engagement and ad engagement to decline and advertisers to reduce their spend with us.

If we are not able to compete effectively for users and advertiser spend our business and operating results would be materially and adversely affected.

Our operating results may fluctuate from quarter to quarter, which makes them difficult to predict.

Our quarterly operating results have fluctuated in the past and will fluctuate in the future. As a result, our past quarterly operating results are not necessarily indicators of future performance. Our operating results in any given quarter can be influenced by numerous factors, many of which we are unable to predict or are outside of our control, including:

- our ability to grow our user base and user engagement;
- our ability to attract and retain advertisers, content partners and platform partners;
- the occurrence of planned significant events, such as the World Cup, Super Bowl, Champions League Final, Wortd Series, Olympics and the Oscars, or unplanned significant events, such as natural disasters and political revolutions;
- the pricing of our products and services;
- the development and introduction of new products or services, changes in features of existing products or services or de-emphasis or termination of existing products, product features or services;
- the impact of competitors or competitive products and services;
- our ability to maintain or increase revenue;
- our ability to maintain or improve gross margins and operating margins;
- increases in research and development, marketing and sales and other operating expenses that we may incur to grow and expand our operations and to remain competitive;
- stock-based compensation expense;
- costs related to the acquisition of businesses, talent, technologies or intellectual property, including potentially significant amortization costs;
- system failures resulting in the inaccessibility of our products and services;
- breaches of security or privacy, and the costs associated with remediating any such breaches;
- adverse litigation judgments, settlements or other litigation-related costs, and the fees associated with investigating and defending claims;
- changes in the legislative or regulatory environment, including with respect to security, privacy or enforcement by government regulators, including fines, orders or consent decrees;
- fluctuations in currency exchange rates and changes in the proportion of our revenue and expenses denominated in foreign currencies;
- changes in U.S. generally accepted accounting principles; and
- changes in global business or macroeconomic conditions.

Given our limited operating history and the rapidly evolving markets in which we compete, our historical operating results may not be useful to you in predicting our future operating results. As our revenue growth rate slows, we expect that the seasonality in our business may become more pronounced and may in the future cause our operating results to fluctuate. For example, advertising spending is traditionally seasonally strong in the fourth quarter of each year and we believe that this seasonality affects our quarterly results, which generally reflect higher sequential advertising revenue growth from the third to fourth quarter compared to sequential advertising revenue growth from the fourth quarter to the subsequent first quarter. In addition, global economic concerns continue to create uncertainty and unpredictability and add risk to our future outlook. An economic downturn in any particular region in which we do business or globally could result in reductions in advertising revenue, as our advertisers reduce their advertising budgets, and other adverse effects that could harm our operating results.

We depend on highly skilled personnel to grow and operate our business, and have seen high levels of attrition. If we are unable to hire, retain and motivat e our personnel, we may not be able to grow effectively.

Our future success and strategy will depend upon our continued ability to identify, hire, develop, motivate and retain highly skilled personnel, including senior management, engineers, designers and product managers. We depend on contributions from our employees, and in particular our senior management team, to execute efficiently and effectively. We do not have employment agreements other than offer letters with any member of our senior management or other key employee, and we do not maintain key person life insurance for any employee. We also face significant competition for employees, particularly in the San Francisco Bay Area (where our headquarters is located), for engineers, designers and product managers from other Internet and high-growth companies, which include both publicly-traded and privately-held companies. As a result, we may not be able to retain our existing employees or hire new employees quickly enough to meet our needs. At the same time, we are also experiencing high voluntary attrition, and the resulting influx of new leaders and other employees requires that we expend the time and resources necessary to recruit and retain talent, restructure our organizations, and train new employees. In addition, to attract highly and retain skilled personnel, we have had to offer, and believe we will need to continue to offer, highly competitive compensation packages. Identifying, recruiting, training and integrating qualified individuals will require significant time, expense and attention. We may need to invest significant amounts of cash and equity to attract and retain new employees and we may never realize returns on these investments. In addition, changes to U.S. immigration and work authorization laws and regulations can be significantly affected by political forces and levels of economic activity. Our business may be materially adversely affected if legislativa or administrative changes to immigration or visa laws and regulations impair our hiring processes or projects involving personnel who are not citizens of the country where the work is to be performed. If we are not able to effectively attract and retain employees, we may not be able to innovate or execute quickly on our strategy and our ability to achieve our strategic objectives will be adversely impacted, and our business will be harmed.

We also believe that our culture and core values have been and will continue to be a key contributor to our success and our ability to foster the innovation, creativity and teamwork we believe we need to support our operations. As we continue to evolve, however, we are subject to the risks of over-hiring and over-compensating our employees, and to the challenges of integrating, developing and motivating an employee base that is located in various countries around the world. If we fail to effectively manage our hiring needs and successfully integrate our new hires, our efficiency and ability to meet our forecasts and our culture, employee morale, productivity and retention could suffer, and our business and operating results could be adversely affected.

If we fail to monetize effectively in international markets, our revenue and our business will be harmed.

We may not be able to monetize our products and services internationally as effectively as in the United States as a result of competition, advertiser demand, differences in the digital advertising market and digital advertising conventions, as well as differences in the way that users in different countries access or utilize our products and services. For example, a significant portion of users in emerging markets like India and Pakistan use faature phones and communicate via SMS messaging, both of which have limited functionality and neither of which may be able to take full advantage of our products and services offered on smartphone or our website or desktop applications. Users who access Twitter through SMS messaging may monetize at lower rates than other users. Differences in the competitive landscape in international markets may impact our ability to monetize our products and services. For example, in South Korea we face intense competition from a messaging service offered by Kakao, which offers some of the same communication features as Twitter. The existence of a well-established competitor in an international market may adversely affect our ability to increase our user base, attract content partners, advertisers and platform partners and monetize our products in such market. We may also experience differences in advertiser demand in international markets. For example, during times of political upheaval, advertisers may choose not to advertise on Twitter. Certain international markets are also not as familiar with digital advertising in general, or in new forms of digital advertising such as our Promoted Products. Further, we face challenges in providing certain advertising products, features or analytics in certain international markets, such as the European Union, due to government regulation. Our products and services may also be used differently abroad than in the United States. In particular, in certain international markets where Internet access is not as rapid or reliable as in the United States, users tend not to take advantage of certain features of our products and services, such as rich media included in Tweets, video or live streaming video. The limitation of mobile devices of users in emerging and other markets limits our ability to deliver certain features to those users and may limit the ability of advertisers to deliver compelling advertisements to users in these markets which may result in reduced ad engagements which would adversely affect our business and operating results.

If our revenue from our international operations, and particularly from our operations in the countries and regions where we have focused our spending, does not exceed the expense of establishing and maintaining these operations, our business and operating results will suffer. In addition, our user base may expand more rapidly in international regions where we are less successful in monetizing our products end services. As our user base continues to expand internationally, we will need to increase revenue from the activity generated by our international users in order to grow our business. For example, users outside the United States constituted 79 % of our average MAUs in the three months ended June 30 , 2017, but our international revenue, as determined based on the billing location of our advertisers, was only 42 % of our consolidated revenue in the three months ended June 30 , 2017. Our inability to successfully expand our business internationally could adversely affect our business, financial condition and operating results.

User growth and engagement depend upon effective interoperation with operating systems, networks, devices, web browsers and standards that we do not control.

We make our products and services available across a variety of operating systems and through websites. We are dependent on the interoperability of our products and services with popular devices, desktop and mobile operating systems and web browsers that we do not control, such as Mac OS, Windows, Android, iOS, Chrome and Firefox. Any changes, bugs or technical issues in such systems, devices or web browsers that degrade the functionality of our products and services, make it difficult for our users to access our content, limit our ability to target or measure the effectiveness of ads, impose fees related to our products or services or give preferential treatment to competitive products or services could adversely affect usage of our products and services. Further, if the number of platforms for which we develop our product expands, it will result in an increase in our operating expenses. In order to deliver high quality products and services, it is important that our products and services work well with a range of operating systems, networks, devices, web browsers and standards that we do not control. In addition, because a majority of our users access our products and services through mobile devices, we are particularly dependent on the interoperability of our products and services with mobile devices and operating systems. We may not be successful in developing relationships with key participants in the mobile industry or in developing products or services that operate effectively with these operating systems, networks, devices, web browsers and standards. In the event that it is difficult for our users to access and use our products and services, particularly on their mobile devices, our user growth and engagement could be harmed, and our business and operating results could be adversely affected.

Our ability to convince potential and new users of the value of our products and services is critical to increasing our user base and to the success of our business.

We have developed a global platform that we believe is the best and fastest place to see what's happening and what people are talking about all around the world, but the market for our products and services is relatively new and may not develop as expected, if at all. Despite our efforts to reduce barriers to consumption, people who are not our users may not understand the value of our products and services and new users may initially find our product confusing, which may make retention of such users more difficult. There may be a perception that our products and services are only useful to users who Tweet, or to influential users with large audiences. Convincing potential and new users of the value of our products and services is critical to increasing our user base and to the success of our business.

If we fail to educate potential users and potential advertisers about the value of our products and services, if the market for our platform does not develop as we expect or if we fail to address the needs of this market, our business will be harmed. We may not be able to successfully address these risks and challenges or others. Failure to adequately address these risks and challenges could harm our business and cause our operating results to suffer.

We have incurred significant operating losses in the past, and we may not be able to achieve or subsequently maintain profitability.

Since our inception, we have incurred significant operating losses, and, as of June 30, 2017, we had an accumulated deficit of $2.74 billion. Although our revenue has grown rapidly, increasing from $664.9 million in 2013 to $2.55 billion in 2016, our revenue growth rate has slowed as a result of a variety of factors. We believe that our future revenue growth will depend on, among other factors, our ability to attract new users, increase user engagement and ad engagement, increase our brand awareness, compete effectively, maximize our sales efforts, demonstrate a positive return on investment for advertisers, and successfully develop new products and services. Accordingly, you should not rely on the revenue growth of any prior quarterly or annual period as an indication of our future performance. Our costs may increase in future periods as we continue to expend substantial financial resources on:

- our technology infrastructure;
- research and development for our products and services;

- sales and marketing;
- attracting and retaining talented employees;
- strategic opportunities, including commercial relationships and acquisitions; and
- general administration, including personnel costs and legal and accounting expenses related to being a public company.

These investments may not result in increased revenue or growth in our business. Additionally, certain new revenue products or product features may carry higher costs relative to our other products, which may decrease our margins. If we are unable to generate adequate revenue growth and to manage our expenses, we may continue to incur significent losses in the future and may not be able to achieve or maintain profitability.

Our business depends on continued and unimpeded access to our products and services on the Internet by our users, content partners, advertisers, and platform partners. If we or our users experience disruptions in Internet service or if Internet service providers are able to block, degrade or charge for access to our products and services, we could incur additional expenses and the loss of users and advertisers.

We depend on the ability of our users, content partners, advertisers and platform partners to access the Internet. Currently, this access is provided by companies that have significant market power in the broadband and Internet access marketplace, including incumbent telephone companies, cable companies, mobile communications companies, government-owned service providers, device manufacturers and operating system providers, any of whom could take actions that degrade, disrupt or increase the cost of user access to our products or services, which would, in turn, negatively impact our business. The adoption of any laws or regulations that adversely affect the growth, popularity or use of the Internet, including laws or practices limiting Internet neutrality, could decrease the demand for, or the usage of, our products and services, increase our cost of doing business and adversely affect our operating results. For example, access to Twitter is blocked in China and has been intermittently blocked in Turkey in the last three years. We also rely on other companies to maintain reliable network systems that provide adequate speed, data capacity and security to us and our users. As the Internet continues to experience growth in the number of users, frequency of use and amount of data transmitted, the Internet infrastructure that we and our users rely on may be unable to support the demands placed upon it. The failure of the Internet infrastructure that we or our users rely on, even for a short period of time, could undermine our operations and harm our operating results.

Our new products, product features, services and initiatives and changes to existing products, services and initiatives could fail to attract users, content partners, advertisers and platform partners or generate revenue.

Our industry is subject to rapid and frequent changes in technology, evolving customer needs and the frequent introduction by our competitors of new and enhanced offerings. We must constantly assess the playing field and determine whether we need to improve or re-allocate resources amongst our existing products and services or create new ones (independently or in conjunction with third parties). Our ability to increase the size and engagement of our user base, attract content partners, advertisers and platform partners and generate revenue will depend on those decisions. We may introduce significant changes to our existing products and services or develop and introduce new and unproven products and services, including technologies with which we have little or no prior development or operating experience. For example, in 2015, we introduced Periscope, a mobile application that lets users share and experience live video from their mobile phones and in 2013, we introduced Vine, a mobile application that enables users to create and distribute videos that are up to six seconds in length, which we discontinued in January 2017 but transitioned certain product features to the Vine Camera app. Also, we introduced new features to Twitter such as "Moments", a curated collection of Tweets, photos, videos, and Periscope broadcasts about current news stories or events; "In Case You Missed It," which surfaces Tweets a logged-in user may have missed since last accessing Twitter; and Instant Timeline, which helps create a timeline for new users as well as new features to our Promoted Tweets like promoted video ads. If new or enhanced products, product features or services fail to engage users, content partners and advertisers, we may fail to attract or retain users or to generate sufficient revenue or operating profit to justify our investments, and our business and operating results could be adversely affected. In addition, we have launched and expect to continue to launch strategic initiatives that do not directly generate revenue but which we believe will enhance our attractiveness to users, content partners and advertisers. In the future, we may invest in new products, product features, services and initiatives to generate revenue, but there is no guarantee these approaches will be successful. We may not be successful in future efforts to generate revenue from our new products or services. If our strategic initiatives do not enhance our ability to monetize our existing products and services, enable us to develop new approaches to monetization or meet the expectations of our users or third-party business partners, we may not be able to maintain or grow our revenue or recover any associated development costs and our operating results could be adversely affected.

If we fail to effectively manage changes to our business and operations, our business and operating results could be harmed.

Providing our products and services to our users is costly and we expect certain of our expenses to continue to increase in the future as we broaden our user base and increase user engagement, as users increase the amount of content they contribute, and as we develop and implement new features, products and services that require more infrastructure, in particular our video product features. In addition, our operating expenses, such as our research and development expenses and sales and marketing expenses, have grown rapidly as we have expanded our business. Historically, our costs have increased each year due to these factors and we expect to continue to incur increasing costs to support our operations. We expect to continue to invest in our infrastructure so that we can provide our products and services rapidly and reliably to users around the world, including in countries where we do not expect significant near-term monetization.

We intend to fully invest in our highest priorities, while eliminating investment in noncore areas. Finding and maintaining the appropriate balance will require significant expenditures and allocation of valuable management resources. If we fail to achieve the necessary level of efficiency in our organization, our business, operating results and financial condition would be harmed.

We focus on product innovation and user engagement rather than short-term operating results.

We encourage employees to quickly develop and help us launch new and innovative features. We focus on improving the user experience for our products and services, which includes protecting user privacy, and on developing new and improved products and services for the advertisers on our platform. We prioritize innovation and the experience for users and advertisers on our platform over short-term operating results. We frequently make product, product feature and service decisions that may reduce our short-term operating results if we believe that the decisions are consistent with our goals to improve the user experience and performance for advertisers, which we believe will improve our operating results over the long term. For example, we are investing in our new live-streaming video experiences, and we may not successfully monetize such experiences. These decisions may not be consistent with the short-term expectations of investors and may not produce the long-term benefits that we expect, in which case our user growth and user engagement, our relationships with advertisers and our business and operating results could be harmed. In addition, our focus on the user experience may negatively impact our relationships with our existing or prospective advertisers. This could result in a loss of advertisers, which could harm our revenue and operating results.

Our business and operating results may be harmed by a disruption in our service, or by our failure to timely and effectively scale and adapt our existing technology and infrastructure.

One of the reasons people come to Twitter is for real-time information. We have experienced, and may in the future experience, service disruptions, outages and other performance problems due to a variety of factors, including infrastructure changes, human or software errors, hardware failure, capacity constraints due to an overwhelming number of people accessing our products and services simultaneously, computer viruses and denial of service or fraud or security attacks. For instance, in January 2016, we experienced a brief service outage during which Twitter.com and Twitter mobile clients were inaccessible as a result, in part, of a software misconfiguration in one of our infrastructure components. Additionally, although we are investing significantly to improve the capacity, capability and reliability of our infrastructure, we are not currently serving traffic equally through our co-located data centers that support our platform. Accordingly, in the event of a significant issue at the data center supporting most of our network traffic, some of our products and services may become inaccessible to the public or the public may experience difficulties accessing our products and services. Any disruption or failure in our infrastructure could hinder our ability to handle existing or increased traffic on our platform, which could significantly harm our business.

As the number of our users increases and our users generate more content, including photos and videos hosted by Twitter, we may be required to expand and adapt our technology and infrastructure to continue to reliably store, serve and analyze this content. It may become increasingly difficult to maintain and improve the performance of our products and services, especially during peak usage times, as our products and services become more complex and our user traffic increases. In addition, because we lease our data center facilities, we cannot be assured that we will be able to expand our data center infrastructure to meet user demand in a timely manner, or on favorable economic terms. If our user s are unable to access Twitter or we are not able to make information available rapidly on Twitter, users may seek other channels to obtain the information, and may not return to Twitter or use Twitter as often in the future, or at all. This would negative ly impact our ability to attract users , content partners and advertisers and increase engagement of our users. We expect to continue to make significant investments to maintain and improve the capacity, capability and reliability of our infrastructure. To the extent that we do not effectively address capacity constraints, upgrade our systems as needed and continually develop our technology and infrastructure to accommodate actual and anticipated changes in technology, our business and operating results may be harmed.

If we are unable to maintain and promote our brand, our business and operating results may be harmed.

We believe that maintaining and promoting our brand is critical to expanding our base of users, content partners and advertisers. Maintaining and promoting our brand will depend largely on our ability to continue to provide useful, reliable and innovative products and services with a focus on a positive user experience, which we may not do successfully. We may introduce new features, products, services or terms of service that users, content partners, advertisers or platform partners do not like, which may negatively affect our brand. Additionally, the actions of content partners may affect our brand if users do not have a positive experience using third-party applications or websites integrated with Twitter or that make use of Twitter content. Our brand may also be negatively affected by the actions of users that are hostile or inappropriate to other people, by users impersonating other people, by users identified as spam, by use of our products or services to disseminate information that may be viewed as misleading (or intended to manipulate the opinions of our users), by users introducing excessive amounts of spam on our platform or by third parties obtaining control over users' accounts. For example, in the past, attackers obtained the credentials to Twitter accounts through a "phishing" attack. Maintaining and enhancing our brand may require us to make substantial investments and these investments may not achieve the desired goals. If we fail to successfully promote and maintain our brand or if we incur excessive expenses in this effort, our business and operating results could be adversely affected.

Negative publicity could adversely affect our business and operating results.

We receive a high degree of media coverage around the world. Negative publicity about our company, including about our product quality and reliability, changes to our products and services, privacy and security practices, litigation, regulatory activity, the actions of our users (including the dissemination of information that may be viewed as misleading or as intended to manipulate the opinions of our users) or user experience with our products and services, even if inaccurate, could adversely affect our reputation and the confidence in and the use of our products and services. Such negative publicity could also have an adverse effect on the size, engagement and loyalty of our user base and result in decreased revenue, which could adversely affect our business and operating results.

Action by governments to restrict access to our products and services or censor Twitter content could harm our business and operating results.

Governments have sought, and may in the future seek, to censor content available through our products and services, restrict access to our products and services from their country entirely or impose other restrictions that may affect the accessibility of our products and services for an extended period of time or indefinitely. For example, domestic Internet service providers in China have blocked access to Twitter, and other countries, including Iran, Libya, Pakistan, Turkey and Syria, have intermittently restricted access to Twitter, and we believe that access to Twitter has been blocked in these countries primarily for political reasons. In addition, governments in these or other countries may seek to restrict access to our products and services based on our decisions around user content, providing user information in response to governmental requests, or other matters. In the event that access to our products and services is restricted, in whole or in part, in one or more countries or our competitors are able to successfully penetrate geographic markets that we cannot access, our ability to retain or increase our user base and user engagement may be adversely affected, and our operating results may be harmed.

Our future perfor mance depends in part on support from our content partners and data partners.

We believe user engagement with our products and services depends in part on the availability of applications and content generated by our content or platform partners. For instance, in July 2018, we partnered with the Major League Baseball Advanced Media to deliver a free live digital video stream of weekly MLB baseball games on Twitter. If our content or platform partners focus their efforts on other platforms, the availability and quality of applications and content for our products and services may suffer. There is no assurance that our content or platform partners will continue to develop and maintain applications and content for our products and services. If our content or platform partners cease to develop and maintain applications and content for our products and services, user engagement may decline. In addition, we generate revenue from licensing our historical and real-time data to third parties. If any of these relationships are terminated or not renewed on economic and other terms that are acceptable to us, or if we are unable to enter into similar relationships in the future, our operating results could be adversely affected.

Our international operations are subject to increased challenges and risks.

We have offices around the world and our products and services are available in multiple languages. However, our ability to manage our business and conduct our operations internationally requires considerable management attention and resources and is subject to tha particular challenges of supporting a rapidly growing business in an environment of multiple languages, cultures, customs, legal and regulatory systems, alternative dispute systems and commercial markets. Our international operations have required and will continue to require us to invest significant funds and other resources. Operating internationally subjects us to new risks and may increase risks that we currently face, including risks associated with:

- recruiting and retaining talented and capable employees in foreign countries and maintaining our company culture across all of our offices;
- providing our products and services and operating across a significant distance, in different languages and among different cultures, including the potential need to modify our products, services, content and features to ensure that they are culturally relevant in different countries;
- increased competition from largely regional websites, mobile applications and services that provide real-time communications and have strong positions in particular countries, which have expanded and may continue to expand their geographic footprint;
- differing and potentially lower levels of user growth, user engagement and ad engagement in new and emerging geographies;
- different levels of advertiser demand;
- greater difficulty in monetizing our products and services;
- compliance with applicable foreign laws and regulations, including laws and regulations with respect to privacy, data security, consumer protection, spam and content, and the risk of penalties to our users and individual members of management if our practices are deemed to be out of compliance;
- longer payment cycles in some countries;
- credit risk and higher levels of payment fraud;
- operating in jurisdictions that do not protect intellectual property rights to the same extent as the United States;
- compliance with anti-bribery laws including, without limitation, compliance with the Foreign Corrupt Practices Act and the U.K. Bribery Act, including by our business partners;
- currency exchange rate fluctuations;
- foreign exchange controls that might require significant lead time in setting up operations in certain geographic territories and might prevent us from repatriating cash earned outside the United States;
- political and economic instability in some countries;
- double taxation of our international earnings and potentially adverse tax consequences due to changes in the tax laws of the United States or the foreign jurisdictions in which we operate; and
- higher costs of doing business internationally, including increased accounting, travel, infrastructure and legal compliance costs.

If we are unable to manage the complexity of our global operations successfully, our business, financial condition and operating results could be adversely affected.

Our products and services may contain undetected software errors, which could harm our business and operating results.

Our products and services incorporate complex software and we encourage employees to quickly develop and help us launch new and innovative features. Our software, including any open source software that is incorporated into our code, has contained, and may now or in the future contain, errors, bugs or vulnerabilities. For example, in February 2016, we discovered, and corrected, a bug that affected our password recovery systems for about 24 hours. Although this issue did not expose passwords or information that could be used directly to access an account, it had the potential to expose the email address and phone number associated with a small number of accounts (less than 10,000 active accounts). Some errors in our software code may only be discovered after the product or service has been released. Errors, vulnerabilities, or other design defects within the software on which we rely may result in a negative experience for users and advertisers who use our products, delay product introductions or enhancements, result in targeting, measurement, or billing errors, compromise our ability to protect the data of our users and/or our intellectual property or lead to reductions in our ability to provide some or all of our services. For example, in December 2016, we discovered and corrected a technical error in our Android application that resulted in incorrect reporting of certain video advertisement metrics for approximately one month. Any errors, bugs or vulnerabilities discovered in our code after release could result in damage to our reputation, loss of users, loss of content or platform partners, loss of advertisers or advertising revenue or liability for damages or other relief sought in lawsuits, regulatory inquiries or other proceedings, any of which could adversely affect our business and operating results.

Our business is subject to complex and evolving U.S. and foreign laws and regulations. These laws and regulations are subject to change and uncertain interpretation, and could result in claims, changes to our business practices, monetary penalties, increased cost of operations or declines in user growth, user engagement or ad engagement, or otherwise harm our business.

We are subject to a variety of laws and regulations in the United States and abroad that involve matters central to our business, including privacy, rights of publicity, data protection, content regulation, intellectual property, competition, protection of minors, consumer protection, credit card processing and taxation. Many of these laws and regulations are still evolving and being tested in courts. As a result, it is possible that these laws and regulations may be interpreted and applied in a manner that is inconsistent from country to country and inconsistent with our current policies and practices and in ways that could harm our business, particularly in the new and rapidly evolving industry in which we operate. Additionally, the introduction of new products or services may subject us to additional laws and regulations.

From time to time, governments, regulators and others have expressed concerns about whether our products, services or practices compromise the privacy of users and others. While we strive to comply with applicable data protection laws and regulations, as well as our own postad privacy policies and other obligations we may have with respect to privacy and data protection, the failure or perceived failure to so comply may result, and in some cases has resulted, in inquiries and other proceedings or actions against us by governments, regulators or others. Moreover, foreign data protection, privacy, consumer protection, content regulation and other laws and regulations are often more restrictive than those in the United States. In particular, the European Union and its member states traditionally have taken broader views as to types of data that are subject to privacy and data protection, and have imposed greater legal obligations on companies in this regard. A number of proposals have recently been adopted or are currently pending before federal, state and foreign legislative and regulatory bodies that could significantly affect our business. For example, in April 2016, European legislative bodies adopted the General Data Protection Regulation to replace European Union and national data protection legislation effective May 2018, which includes more stringent operational requirements for entities processing personal information and significant penalties for non-compliance, including fines of up to €20 million or 4% of total worldwide revenue, whichever is higher. Additionally, we rely on a variety of legal bases to transfer certain personal information outside of the European Economic Area, including the EU-US Privacy Shield Framework, or Privacy Shield, and EU Standard Contractual Clauses, or SCCs. The Privacy Shield is currently under review by regulatory authorities and it and the SCCs are both subject of legal challenges in European courts, and the absence of successor legal bases for continued data transfer could require us to create duplicative, and potentially expensive, information technology infrastructure and business operations in Europe or limit our ability to collect and use personal information collected in Europe. Any of these changes to EU data protection law could disrupt our business.

Further, following a referendum in June 2016 in which voters in the United Kingdom approved an exit f rom the EU, it is expected that the United Kingdom government will initiate a process to leave the EU (often referred to as "Brexit"). Brexit has created uncertainty with regard to the regulation of data protection in the United Kingdom. In particular, it is unclear whether the United Kingdom will enact data protection laws or regulations designed to be consistent with the pending EU General Data Protection Regulation and how data transfers to and from the United Kingdom will be regulated.

Similarly, there have been a number of recent legislative proposals in the United States, at both the federal and state level, that could impose new obligations in areas such as privacy and liability for copyright infringement by third parties. The U.S. government, including the FTC and the Department of Commerce, has announced that it is reviewing the need for greater regulation for the collection of information concerning user behavior on the Internet, including regulation aimed at restricting certain online tracking and targeted advertising practices. Additionally, recent amendments to U.S. patent laws may affect the ability of companies, including us, to protect their innovations and defend against claims of patent infringement.

Additionally, we have relationships with third parties that perform a variety of functions such as payments processing, tokenization, vaulting, currency conversion, fraud prevention and data security audits. The laws and regulations related to online payments are complex, subject to change, and vary across different jurisdictions in the United States and globally. As a result, we may be required to spend significant time, effort and expense to comply with applicable laws and regulations. Any failure or claim of our failure to comply, or any failure or claim of failure by the above-mentioned third parties to comply, could increase our costs or could result in liabilities. Additionally, because Twitter accepts payment via credit cards and is certified as a PCI Level 1 service provider, we are subject to payment card association operating rules and certification requirements, including the Payment Card Industry Data Security Standard.

We currently allow use of our platform without the collection of extensive personal information, such as age. We may experience additional pressure to expand our collection of personal information in order to comply with new and additional regulatory demands or we may independently decide to do so. If we obtain such additional personal information, we may be subject to additional regulation.

Regulatory investigations and settlements could cause us to incur additional expenses or change our business practices in a manner materially adverse to our business.

We have been subject to regulatory investigations in the past, and expect to continue to be subject to regulatory scrutiny as our business grows and awareness of our brand increases. In March 2011, to resolve an investigation into various incidents, we entered into a settlement agreement with the FTC that, among other things, required us to establish an information security program designed to protect non-public consumer information and also requires that we obtain biennial independent security assessments. The obligations under the settlement agreement remain in effect until the later of March 2, 2031, or the date 20 years after the date, if any, on which the U.S. government or the FTC files a complaint in federal court alleging any violation of the order. We expect to continue to be the subject of regulatory inquiries, investigations and audits in the future by the FTC and other regulators around the world.

It is possible that a regulatory inquiry, investigation or audit might result in changes to our policies or practices, and may cause us to incur substantial costs or could result in reputational harm, prevent us from offering certain products, services, features or functionalities, cause us to incur substantial costs or require us to change our business practices in a manner materially adverse to our business. Violation of existing or future regulatory orders, settlements or consent decrees could subject us to substantial monetary fines and other penalties that could negatively affect our financial condition and operating results.

If our securi ty measures are breached, or if our products and services are subject to attacks that degrade or deny the ability of users to access our products and services, our products and services may be perceived as not being secure, users and advertisers may curtail or stop using our products and services and our business and operating results could be harmed.

Our products and services involve the storage and transmission of users' and advertisers' information, and security breaches expose us to a risk of loss of this information, litigation, increased security costs and potential liability. We also work with third-party vendors to process credit card payments by our customers and are subject to payment card association operating rules. We and our third-party service providers experience cyber-attacks of varying degrees on a regular basis. For example, in October 2016, we experienced a service outage as a result of several distributed denial of service attacks on our domain name service provider, Dyn. Third parties may also gain access to Twitter user names and passwords without attacking Twitter directly by combining credential information from other recent breaches, using malware on victim machines that are stealing passwords for all sites, or a combination of both. In addition, some of our developers or other partners, such as third party applications to which our users have given permission to Tweet on their behalf, may receive or store information provided by us or by our users through mobile or web applications integrated with us. If these third parties or developers fail to adopt or adhere to adequate data security practices, or in the event of a breach of their networks, our data or our users' data may be improperly accessed, used, or disclosed.

As a result, unauthorized parties have obtained, and may in the future obtain, access to our data or our users' or advertisers' data. For example, we have previously disclosed that sophisticated unknown third parties had attacked our systems and may have had access to limited information for small subset of our users. Any systems failure or actual or perceived compromise of our security that results in the unauthorized access to or release of our users' or advertisers' data, such as credit card data, could significantly limit the adoption of our products and services, as well as harm our reputation and brand and, therefore, our business.

Our security measures may also be breached due to employee error, malfeasance or otherwise. Additionally, outside parties may attempt to fraudulently induce employees, users or advertisers to disclose sensitive information in order to gain access to our data or our users' or advertisers' data or accounts, or may otherwise obtain access to such data or accounts. Since our users and advertisers may use their Twitter accounts to establish and maintain online identities, unauthorized communications from Twitter accounts that have been compromised may damage their reputations and brands as well as ours. Because the techniques used to obtain unauthorized access, disable or degrade service or sabotage systems change frequently and often are not recognized until launched against a target, we may be unable to anticipate these techniques or to implement adequate preventative measures. If an actual or perceived breach of our security occurs, the market perception of the effectiveness of our security measures could be harmed, our users and advertisers may be harmed, lose trust and confidence in us, decrease the use of our products and services or stop using our products and services in their entirety. We may also incur significant legal and financial exposure, including legal claims, higher transaction fees and regulatory fines and penalties. Any of these actions could have a material and adverse effect on our business, reputation and operating results.

We may face lawsuits or incur liability as a result of content published or made available through our products and services.

We have faced and will continue to face claims relating to content that is published or made available through our products and services or third party products or services. In particular, the nature of our business exposes us to claims related to defamation, intellectual property rights, rights of publicity and privacy, illegal content, misinformation, content regulation and personal injury torts. The laws relating to the liability of providers of online products or services for activities of their users remains somewhat unsettled, both within the United States and internationally. This risk may be enhanced in certain jurisdictions outside the United States where we may be less protected under local laws than we are in the United States. In addition, the public nature of communications on our network exposes us to risks arising from the creation of impersonation accounts intended to be attributed to our users or advertisers. We could incur significant costs investigating and defending these claims. If we incur material costs or liability as a result of these occurrences, our business, financial condition and operating results could be adversely affected.

Our intellectual property rights are valuable, and any inability to protect them could reduce the value of our products, services and brand.

Our trade secrets, trademarks, copyrights, patents and other intellectual property rights are important assets. We rely on, and expect to continue to rely on, a combination of confidentiality and license agreements with our employees, consultants and third parties with whom we have relationships, as well as trademark, trade dress, domain name, copyright, trade secret and patent laws, to protect our brand and other intellectual property rights. However, various events outside of our control pose a threat to our intellectual property rights, as well as to our products, services and technologies. For example, we may fail to obtain effective intellectual property protection, or effective intellectual property protection may not be available in every country in which our products and services are available. Also, the efforts we have taken to protect our intellectual property rights may not be sufficient or effective, and any of our intellectual property rights may be challenged, which could result in them being narrowed in scope or declared invalid or unenforceable. There can be no assurance our intellectual property rights will be sufficient to protect against others offering products or services that are substantially similar to ours and compete with our business.

We rely on non-patented proprietary information and technology, such as trade secrets, confidential information, know-how and technical information. While in certain cases we have agreements in place with employees and third parties that place restrictions on the use and disclosure of this intellectual property, these agreements may be breached, or this intellectual property may otherwise be disclosed or become known to our competitors, which could cause us to lose any competitive advantage resulting from this intellectual property.

We are pursuing registration of trademarks and domain names in the United States and in certain jurisdictions outside of the United States. Effective protection of trademarks and domain names is expensive and difficult to maintain, both in terms of application and registration costs as well as the costs of defending and enforcing those rights. We may be required to protect our rights in an increasing number of countries, a process that is expensive and may not be successful or which we may not pursue in every country in which our products and services are distributed or made available.

We are party to numerous agreements that grant licenses to third parties to use our intellectual property, including our trademarks. For example, many third parties distribute their content through Twitter, or embed Twitter content in their applications or on their websites, and make use of our trademarks in connection with their services. If the licensees of our trademarks are not using our trademarks properly, it may limit our ability to protect our trademarks and could ultimately result in our trademarks being declared invalid or unenforceable. We have a policy designed to assist third parties in the proper use of our brand, trademarks and other assets, and we have an internal team dedicated to enforcing our policy and protecting our brand. Our brand protection team routinely receives and reviews reports of improper and unauthorized use of the Twitter brand, trademarks or assets and issues takedown notices or initiates discussions with the third parties to correct the issues. However, there can be no assurance that we will be able to protect against the unauthorized use of our brand, trademarks or other assets. If we fail to maintain and enforce our trademark rights, the value of our brand could be diminished. There is also a risk that one or more of our trademarks could become generic, which could result in them being declared invalid or unenforceable. For example, there is a risk that the word "Tweet" could become so commonly used that it becomes synonymous with any short comment posted publicly on the Internet, and if this happens, we could lose protection of this trademark.

We also seek to obtain patent protection for some of our technology and as of June 30, 2017, we had 1,034 issued U.S. patents. We may be unable to obtain patent protection for our technologies, and our existing patents, and any patents that may be issued in the future, may not provide us with competitive advantages or distinguish our products and services from those of our competitors. In addition, any patents may be contested, circumvented, or found unenforceable or invalid, and we may not be able to prevent third parties from infringing or otherwise violating them. Effective protection of patent rights is expensive and difficult to maintain, both in terms of application and maintenance costs, as well as the costs of defending and enforcing those rights.

Our Innovator's Patent Agreement, or IPA, also limits our ability to prevent infringement of our patents. In May 2013, we implemented the IPA, which we enter into with our employees and consultants, including our founders. The IPA, which applies to our current and future patents, allows us to assert our patents defensively. The IPA also allows us to assert our patents offensively with th e permission of the inventors of the applicable patent. Under the IPA, an assertion of claims is considered for a defensive purpose if the claims are asserted: (i) against an entity that has filad, maintained, threatened or voluntarily participated in a pa tent infringement lawsuit against us or any of our users, affiliates, customers, suppliers or distributors; (ii) against an entity that has used its patents offensively against any other party in the past ten years, so long as the entity has not instituted the patent infringement lawsuit defensively in response to a patent litigation threat against the entity; or (iii) otherwise to deter a patent litigation threat against us or our users, affiliates, customers, suppliers or distributors. In addition, the IP A provides that the above limitations apply to any future owner or exclusive licensee of any of our patents, which could limit our ability to sell or license our patents to third parties. While we may be able to claim protection of our intellectual propert y under other rights, such as trade secrets or contractual obligations with our employees not to disclose or use confidential information, we may be unable to assert our patent rights against third parties that we believe are infringing our patents, even i f such third parties are developing products and services that compete with our products and services. For example, in the event that an inventor of one of our patents leaves us for another company and uses our patented technology to compete with us, we wo uld not be able to assert that patent against such other company unless the assertion of the patent right is for a defensive purpose. In such event, we may be limited in our ability to assert a patent right against another company, and instead would need t o rely on trade secret protection or the contractual obligation of the inventor to us not to disclose or use our confidential information. In addition, the terms of the IPA could affect our ability to monetize our intellectual property portfolio.

Significant impairments of our intellectual property rights, and limitations on our ability to assert our intellectual property rights against others, could harm our business and our ability to compete.

Also, obtaining, maintaining and enforcing our intellectual property rights is costly and time consuming. Any increase in the unauthorized use of our intellectual property could make it more expensive to do business and harm our operating results.

We are currently, and expect to be in the future, party to intellectual property rights claims that are expensive and time consuming to defend, and, if resolved adversely, could have a significant impact on our business, financial condition or operating results.

Companies in the internet, technology and media industries are subject to litigation based on allegations of infringement, misappropriation or other violations of intellectual property or other rights. Many companies in these industries, including many of our competitors, have substantially larger patent and intellectual property portfolios than we do, which could make us a target for litigation as we may not be able to assert counterclaims against parties that sue us for patent, or other intellectual property infringement. In addition, various "non-practicing entities" that own patents and other intellectual property rights often attempt to assert claims in order to extract value from technology companies. From time to time we receive claims from third parties which allege that we have infringed upon their intellectual property rights. Further, from time to time we may introduce new products, product features and services, including in areas where we currently do not have an offering, which could increase our exposure to patent and other intellectual property claims from competitors and non-practicing entities. In addition, although our standard terms and conditions for our Promoted Products and public APIs do not provide advertisers and platform partners with indemnification for intellectual property claims against them, some of our agreements with advertisers, content partners, platform partners and data partners require us to indemnify them for certain intellectual property claims against them, which could require us to incur considerable costs in defending such claims, and may require us to pay significant damages in the event of an adverse ruling. Such advertisers, content partners, platform partners and data partners may also discontinue use of our products, services and technologies as a result of injunctions or otherwise, which could result in loss of revenue and adversely impact our business.

We presently are involved in a number of intellectual property lawsuits, and as we face increasing competition and gain an increasingly high profile and develop new produ cts , we expect the number of patent and other intellectual property claims against us to grow. There may be intellectual property or other rights held by others, including issued or pending patents, that cover significant aspects of our products and servic es, and we cannot be sure that we are not infringing or violating, and have not infringed or violated, any third-party intellectual property rights or that we will not be held to have done so or be accused of doing so in the future. Any claim or litigation alleging that we have infringed or otherwise violated intellectual property or other rights of third parties, with or without merit, and whether or not settled out of court or determined in our favor, could be time-consuming and costly to address and reso lve, and could divert the time and attention of our management and technical personnel. Some of our competitors have substantially greater resources than we do and are able to sustain the costs of complex intellectual property litigation to a greater degre e and for longer periods of time than we could. The outcome of any litigation is inherently uncertain, and there can be no assurances that favorable final outcomes will be obtained in all cases. In addition, plaintiffs may seek, and we may become subject t o, preliminary or provisional rulings in the course of any such litigation, including potential preliminary injunctions requiring us to cease some or all of our operations. We may decide to settle such lawsuits and disputes on terms that are unfavorable to us. Similarly, if any litigation to which we are a party is resolved adversely, we may be subject to an unfavorable judgment that may not be reversed upon appeal. The terms of such a settlement or judgment may require us to cease some or all of our operat ions or pay substantial amounts to the other party. In addition, we may have to seek a license to continue practices found to be in violation of a third - party's rights. If we are required, or choose to enter into royalty or licensing arrangements, such arr angements may not be available on reasonable terms, or at all, and may significantly increase our operating costs and expenses. As a result, we may also be required to develop or procure alternative non-infringing technology , which could require significan t effort and expense or discontinue use of the technology . An unfavorable resolution of the disputes and litigation referred to above could adversely affect our business, financial condition and operating results.

Many of our products and services contain open source software, and we license some of our software through open source projects, which may pose particular risks to our proprietary software, products, and services in a manner that could have a negative effect on our business.

We use open source software in our products and services and will use open source software in the future. In addition, we regularly contribute software source code to open source projects under open source licenses or release internal software projects under open source licenses, and anticipate doing so in the future. The terms of many open source licenses to which we are subject have not been interpreted by U.S. or foreign courts, and there is a risk that open source software licenses could be construed in a manner that imposes unanticipated conditions or restrictions on our ability to provide or distribute our products or services. Additionally, we may from time to time face claims from third parties claiming ownership of, or demanding release of, the open source software or derivative works that we developed using such software, which could include our proprietary source code, or otherwise seeking to enforce the terms of the applicable open source license. These claims could result in litigation and could require us to make our software source code freely available, purchase a costly license or cease offering the implicated products or services unless and until we can re-engineer them to avoid infringement. This re-engineering process could require significant additional research and development resources, and we may not be able to complete it successfully. In addition to risks related to license requirements, use of certain open source software may pose greater risks than use of third-party commercial software, as open source licensors generally do not provide warranties or controls on the origin of software. Any of these risks could be difficult to eliminate or manage, and, if not addressed, could have a negative effect on our business, financial condition and operating results.

We may require additional capital to support our operations or the growth of our business, and we cannot be certain that this capital will be available on reasonable terms when required, or at all.

From time to time, we may need additional financing to operate or grow our business. Our ability to obtain additional financing, if and when required, will depend on investor and lender demand, our operating performance, the condition of the capital markets and other factors, and we cannot assure you that additional financing will be available to us on favorable terms when required, or at all. If we raise additional funds through the issuance of equity, equity-linked or debt securities, those securities may have rights, preferences or privileges senior to the rights of our common stock, and our existing stockholders may experience dilution. If we are unable to obtain adequate financing or financing on terms satisfactory to us when we require it, our ability to continue to support the operation or growth of our business could be significantly impaired and our operating results may be harmed.

We rely on assumptions and estimates to calculate certain of our key metrics, and real or perceiv ed inaccuracies in such metrics may harm our reputation and negatively affect our business.

The number of our active users is calculated using internal company data that has not been independently verified. While these numbers are based on what we believe to be reasonable calculations for the applicable period of measurement, there are inherent challenges in measuring usage and user engagement across our large user base around the world. For example, there are a number of false or spam accounts in existence on our platform. We estimate that false or spam accounts represent less than 5% of our MAUs as of December 31, 2016. However, this estimate is based on an internal review of a sample of accounts and we apply significant judgment in making this determination. As such, our estimation of false or spam accounts may not accurately represent the actual number of such accounts, and the actual number of false or spam accounts could be higher than we have currently estimated. We are continually seeking to improve our ability to estimate the total number of spam accounts and eliminate them from the calculation of our active users, but we otherwise treat multiple accounts held by a single person or organization as multiple users for purposes of calculating our active users because we permit people and organizations to have more than one account. Additionally, some accounts used by organizations are used by many people within the organization. As such, the calculations of our active users may not accurately reflect the actual number of people or organizations using our platform.

Our metrics are also affected by mobile applications that automatically contact our servers for regular updates with no discernable user-initiated action involved, and this activity can cause our system to count the user associated with such a device as an active user on the day such contact occurs. The calculations of MAUs and DAUs presented in this Quarterly Report on Form 10-Q may be affected by this activity. The impact of this automatic activity on our metrics varies by geography because mobile application usage varies in different regions of the world. In addition, our data regarding user geographic location is based on the IP address or phone number associated with the account when a user initially registered the account on Twitter. That IP address or phone number may not always accurately reflect a user's actual location at the time of such user's engagement on our platform.

We regularly review and may adjust our processes for calculating our internal metrics to improve their accuracy. We present and discuss our total audience based on both internal metrics and data from Google Analytics, which measures unique visitors to our properties. Our measures of user growth and user engagement may differ from estimates published by third parties or from similarly-titled metrics of our competitors due to differences in methodology. If advertisers, content or platform partners or investors do not perceive our user metrics to be accurate representations of our user base or user engagement, or if we discover material inaccuracies in our user metrics, our reputation may be harmed and content partners, advertisers and platform partners may be less willing to allocate their budgets or resources to our products and services, which could negatively affect our business and operating results. Further, as our business develops, we may revise or cease reporting metrics if we determine that such metrics are no longer accurate or appropriate measures of our performance. For example, we stopped disclosing timeline views as we no longer believed that metric was helpful in measuring engagement on our platform. If investors, analysts or customers do not believe our reported measures of user engagement are sufficient or accurately reflect our business, we may receive negative publicity and our operating results may be harmed.

Spam could diminish the user experience on our platform, which could damage our reputation and deter our current and potential users from using our products and services.

"Spam" on Twitter refers to a range of abusive activities that are prohibited by our terms of service and is generally defined as unsolicited, repeated actions that negatively impact other users with the general goal of drawing user attention to a given account, site, product or idea. This includes posting large numbers of unsolicited mentions of a user, duplicate Tweets, misleading links (e.g., to malware or "click-jacking" pages) or other false or misleading content, and aggressively following and un-following accounts, adding users to lists, sending invitations, Retweeting and liking Tweets to inappropriately attract attention. Our terms of service also prohibit the creation of serial or bulk accounts, both manually or using automation, for disruptive or abusive purposes, such as to tweet spam or to artificially inflate the popularity of users seeking to promote themselves on Twitter. Although we continue to invest resources to reduce spam on Twitter, we expect spammers will continue to seek ways to act inappropriately on our platform. In addition, we expect that increases in the number of users on our platform will result in increased efforts by spammers to misuse our platform. We continuously combat spam, including by suspending or terminating accounts we believe to be spammers and launching algorithmic changes focused on curbing abusive activities. Our actions to combat spam require the diversion of significant time and focus of our engineering team from improving our products and services. If spam increases on Twitter, this could hurt our reputation for delivering relevant content or reduce user growth and user engagement and result in continuing operational cost to us.

We rely in part on application marketplaces and Internet search engines to drive traffic to our products and services, and if we fail to appear high up in the searc h results or rankings, traffic to our platform could decline and our business and operating results could be adversely affected.

We rely on application marketplaces, such as Apple's App Store and Google's Play, to drive downloads of our mobile applications. In the future, Apple, Google or other operators of application marketplaces may make changes to their marketplaces which make access to our products and services more difficult or limit our use of data to provide targeted advertising. We also depend in part on Internet search engines, such as Google, Apple Spotlight, Bing and Yahoo, to drive traffic to our website. For example, when a user types an inquiry into a search engine, we rely on a high organic search result ranking of our webpages in these search results to refer the user to our website. However, our ability to maintain high organic search result rankings is not within our control. Our competitors' search engine optimization, or SEO, efforts may result in their websites receiving a higher search result page ranking than ours, or Internet search engines could revise their methodologies in a way that would adversely affect our search result rankings. If Internet search engines modify their search algorithms in ways that are detrimental to us, or if our competitors' SEO efforts are more successful than ours, the growth in our user base could slow. Our website has experienced fluctuations in search result rankings in the past, and we anticipate similar fluctuations in the future. Any reduction in the number of users directed to our mobile applications or website through application marketplaces and search engines could harm our business and operating results.

More people are using devices other than personal computers to access the Internet and new platforms to produce and consume content, and we need to continue to promote the adoption of our mobile applications, and our business and operating results may be harmed if we are unable to do so.

The number of people who access the Internet through devices other than personal computers, including mobile phones, tablets, video game consoles and television set-top devices, has increased dramatically in the past few years. In the six months ended June 30, 2017, 91% of our advertising revenue was generated from mobile devices. Since we generate a majority of our advertising revenue through users on mobile devices, we must continue to drive adoption of our mobile applications. However, in emerging markets like India and Pakistan, a significant portion of users use feature phones and communicate via SMS messaging, both of which have limited functionality and neither of which may be able to take full advantage of our products and services offered on smartphone or our website or desktop applications. In addition, mobile users frequently change or upgrade their mobile devices. Our business and operating results may be harmed if our users do not install our mobile application when they change or upgrade their mobile device. Although we generate the majority of our advertising revenue from ad engagements on mobile devices, certain of our products and services, including Promoted Trends and Promoted Accounts, receive less prominence on our mobile applications than they do on our desktop applications. This has in the past reduced, and may in the future continue to reduce, the amount of revenue we are able to generate from these products and services as users increasingly access our products and services through mobile and alternative devices. In addition, as new devices and platforms are continually being released, users may consume content in a manner that is more difficult to monetize. If we are unable to develop products and services that are compatible with new devices and platforms, or if we are unable to drive continued adoption of our mobile applications, our business and operating results may be harmed.

Acquisitions, divestitures and investments could disrupt our business and harm our financial condition and operating results.

Our success will depend, in part, on our ability to expand our products, product features and services, and grow our business in response to changing technologies, user and advertiser demands, and competitive pressures. In some circumstances, we may determine to do so through the acquisition of complementary businesses and technologies rather than through internal development, including, for example, our acquisitions of Periscope, a live-streaming video mobile application, MoPub, a mobile-focused advertising exchange; and TellApart, Inc., a marketing technology company providing retailers and e-commerce advertisers with unique retargeting capabilities. The identification of suitable acquisition candidates can be difficult, time-consuming and costly, and we may not be able to successfully complete identified acquisitions. The risks we face in connection with acquisitions include:

- diversion of management time and focus from operating our business to addressing acquisition integration challenges;
- retention of key employees from the acquired company;
- cultural challenges associated with integrating employees from the acquired company into our organization;
- integration of the acquired company's accounting, management information, human resources and other administrative systems and processes;

- the need to implement or improve controls, procedures, and policies at a business that prior to the acquisition may have lacked effective controls, procedures and policies;
- liability for activities of the acquired company before the acquisition, including intellectual property infringement claims, violations of laws, commercial disputes, tax liabilities and other known and unknown liabilities;
- unanticipated write-offs or charges; and
- litigation or other claims in connection with the acquired company, including claims from terminated employees, users, former stockholders or other third parties.

Our failure to address these risks or other problems encountered in connection with our past or future acquisitions and investments could cause us to fail to realize the anticipated benefits of these acquisitions or investments, cause us to incur unanticipated liabilities, and harm our business generally. Future acquisitions could also result in dilutive issuances of our equity securities, the incurrence of debt, contingent liabilities, amortization expenses, incremental operating expenses or the impairment of goodwill, any of which could harm our financial condition or operating results.

We also make investments in privately-held companies in furtherance of our strategic objectives. We may not realize a return and may recognize a loss on such investments. Many of the instruments in which we invest are non-marketable at the time of our initial investment. Companies in which we invest range from early-stage companies still defining their strategic direction to more mature companies with established revenue streams and business models. The success of our investment in any company is typically dependent on the availability to the company of additional funding on favorable terms, or a liquidity event, such as a public offering or acquisition. If any of the companies in which we invest decrease in value, we could lose all or part of our investment. For example, in June 2017, we recorded a $55.0 million cost-method investment impairment charge relating to an investment in a privately-held company.

In certain cases, we have also divested or stopped investing in certain products. For instance, in January 2017, we divested certain assets related to our Fabric platform. In 2017, we also de-emphasized certain of our revenue products, including TellApart. In these cases, we have needed to and may, in the future, need to restructure operations, terminate employees and/or incur other expenses. We may not realize the expected benefits and cost savings of these actions and our results may be harmed.

If we fail to maintain an effective system of disclosure controls and internal control over financial reporting, our ability to produce timely and accurate financial statements or comply with applicable regulations could be impaired.

As a public company, we are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, the Sarbanes-Oxley Act of 2002, as amended, or the Sarbanes-Oxley Act, and the listing standards of the New York Stock Exchange. The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal control over financial reporting. In order to maintain and improve the effectiveness of our disclosure controls and procedures and internal control over financial reporting, we have expended, and anticipate that we will continue to expend, significant resources, including accounting-related costs and significant management oversight.

Any failure to develop or maintain effective controls, or any difficulties encountered in their implementation or improvement, could cause us to be subject to one or more investigations or enforcement actions by state or federal regulatory agencies, stockholder lawsuits or other adverse actions requiring us to incur defense costs, pay fines, settlements or judgments. Any such failures could also cause investors to lose confidence in our reported financial and other information, which would likely have a negative effect on the trading price of our common stock. In addition, if we are unable to continue to meet these requirements, we may not be able to remain listed on the New York Stock Exchange.

If currency exchange rates fluctuate substantially in the future, our operating results, which are reported in U.S. dollars, could be adversely affected.

Our international operations expose us to the effects of fluctuations in currency exchange rates. We incur expenses for employee compensation and other operating expenses at our international locations in the local currency, and accept payment from advertisers or data partners in currencies other than the U.S. dollar. Since we conduct business in currencies other than U.S. dollars but report our operating results in U.S. dollars, we face exposure to fluctuations in currency exchange rates. While we enter into foreign currency forward contracts with financial institutions to reduce the risk that our earnings may be adversely affected by the impact of exchange rate fluctuations on monetary assets or liabilities denominated in currencies other than the functional currency of a subsidiary, exchange rate fluctuations between the U.S. dollar and other currencies could have a material impact on our operating results.

Servicing our convertible senior notes may require a significant amount of cash, and we may not have sufficient cash flow or the ability to raise the funds necessary to satisfy our obligations under such notes, and our future debt may contain limitations on our ability to pay cash upon conversion or repurchase of such n otes.

In 2014, we issued $935.0 million principal amount of 0.25% convertible senior notes due 2019, or the 2019 Notes, and $954.0 million principal amount of 1.00% convertible senior notes due 2021, or the 2021 Notes and together with the 2019 Notes, the Notes, in private placements to qualified institutional buyers. As of June 30, 2017, we had a total par value of $1.89 billion of outstanding Notes.

Holders of the Notes will have the right under the indenture for the Notes to require us to repurchase all or a portion of their notes upon the occurrence of a fundamental change before the relevant maturity date, in each case at a repurchase price equal to 100% of the principal amount of the Notes, plus accrued and unpaid interest, if any, to the fundamental change repurchase date. In addition, upon conversion of the Notes, unless we elect to deliver solely shares of our common stock to settle such conversion (other than paying cash in lieu of delivering any fractional shares), we will be required to make cash payments in respect of the Notes being converted. Moreover, we will be required to repay the notes in cash at their maturity, unless earlier converted or repurchased.

Our ability to refinance the Notes, make cash payments in connection with conversions of the Notes or repurchase the Notes in the event of a fundamental change will depend on market conditions and our future performance, which is subject to economic, financial, competitive and other factors beyond our control. We also may not use the cash we have raised through the issuance of the Notes in an optimally productive and profitable manner. However, since inception we have incurred significant operating losses and we historically had not been cash flow positive and may not be in the future. As a result, we may not have enough available cash or be able to obtain financing on commercially reasonable terms or at all, at the time we are required to make repurchases of notes surrendered therefor or pay cash with respect to notes being converted or at their maturity and our level of indebtedness could adversely affect our future operations by increasing our vulnerability to adverse changes in general economic and industry conditions and by limiting or prohibiting our ability to obtain additional financing for future capital expenditures, acquisitions and general corporate and other purposes. In addition, if we are unable to make cash payments upon conversion of the Notes we would be required to issue significant amounts of our common stock, which would be dilutive to existing stockholders. If we do not have sufficient cash to repurchase the Notes following a fundamental change, we would be in default under the terms of the Notes, which could seriously harm our business. In addition, the terms of the Notes do not limit the amount of future indebtedness we may incur. If we incur significantly more debt, this could intensify the risks described above.

Our business is subject to the risks of earthquakes, fire, power outages, floods and other catastrophic events, and to interruption by man-made problems such as terrorism.

A significant natural disaster, such as an earthquake, fire, flood or significant power outage could have a material adverse impact on our business, operating results, and financial condition. Our headquarters and certain of our co-located data center facilities are located in the San Francisco Bay Area, a region known for seismic activity. Despite any precautions we may take, the occurrence of a natural disaster or other unanticipated problems at our data centers could result in lengthy interruptions in our services. In addition, acts of terrorism and other geo-political unrest could cause disruptions in our business. All of the aforementioned risks may be further increased if our disaster recovery plans prove to be inadequate. We have implemented a disaster recovery program, which allows us to move production to a back-up date center in the event of a catastrophe. Although this program is functional, we do not currently serve network traffic equally from each data center, so if our primary data center shuts down, there will be a period of time that our products or services, or certain of our products or services, will remain inaccessible to our users or our users may experience severe issues eccessing our products and services.

We do not carry business interruption insurance sufficient to compensate us for the potentially significant losses, including the potential harm to our business that may result from interruptions in our ability to provide our products and services.

We may have exposure to greater than anticipated tax liabilities, which could adversely impact our operating results.

Our income tax obligations are based in part on our corporate operating structure, including the manner in which we develop, value and use our intellectual property and the scope of our international operations. The tax laws applicable to our international business activities, including the laws of the United States and other jurisdictions, are subject to interpretation. The taxing authorities of the jurisdictions in which we operate may challenge our methodologies for valuing developed technology (or other intangible assets) or intercompany arrangements, which could increase our worldwide effective tax rate and harm our financial condition and operating results. On October 5, 2015, the Organization for Economic Cooperation and Development (OECD), an international association of thirty four countries, including the U.S. and UK, released the final reports from its Base Erosion and Profit Shifting (BEPS) Action Plans. The BEPS recommendations covered a number of issues, including country-by-country reporting, permanent establishment rules, transfer pricing rules and tax treaties. Future tax reform resulting from this development may result in changes to long-standing tax principles, which could adversely affect our effective tax rate or result in higher cash tax liabilities. We are subject to review and audit by U.S. federal and state and foreign tax authorities. Tax authorities may disagree with certain positions we have taken and any adverse outcome of such a review or audit could have a negative effect on our financial position and operating results. In addition, our future income taxas could be adversely affected by earnings being lower than anticipated in jurisdictions that have lower statutory tax rates and higher than anticipated in jurisdictions that have higher statutory tax rates, by changes in the valuation of our deferred tax assets and liabilities, or by changes in tax laws, regulations or accounting principles, as well as certain discrete items. Greater than anticipated tax expenses, or disputes with tax authorities, could adversely impact our operating results.

If our goodwill or intangible assets become impaired, we may be required to record a significant charge to earnings.

Under generally accepted accounting principles in the United States, or GAAP, we review our intangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Goodwill is required to be tested for impairment at least annually. As of June 30, 2017, we had recorded a total of $1.25 billion of goodwill and intangible assets. An adverse change in market conditions or financial results, particularly if such change has the effect of changing one of our critical assumptions or estimates, could result in a change to the estimation of fair value that could result in an impairment charge to our goodwill or intangible assets. Any such material charges may have a material negative impact on our operating results.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

As of December 31, 2016, we had U.S. federal net operating loss carryforwards of approximately $3.47 billion and state nat operating loss carryforwards of approximately $1.41 billion. Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, if a corporation undergoes an "ownership change," the corporation's ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes, such as research tax credits, to offset its post-change income and taxes may be limited. In general, an "ownership change" occurs if there is a cumulative change in our ownership by "5% shareholders" that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. In the event that it is determined that we have in the past experienced an ownership change, or if we experience one or more ownership changes as a result of future transactions in our stock, then we may be limited in our ability to use our net operating loss carryforwards and other tax assets to reduce taxes owed on the net taxable income that we earn. Any such limitations on the ability to use our net operating loss carryforwards and other tax assets could adversely impact our business, financial condition and operating results.

Risks Related to Ownership of Our Common Stock

Anti-takeover provisions contained in our amended and restated certificate of incorporation and amended and restated bylaws, as well as provisions of Delaware law, could impair a takeover attempt.

Our amended and restated certificate of incorporation, amended and restated bylaws and Delaware law contain provisions which could have the effect of rendering more difficult, delaying, or preventing an acquisition deemed undesirable by our board of directors. Among other things, our amended and restated certificate of incorporation and emended and restated bylaws include provisions:

- creating a classified board of directors whose members serve staggered three-year terms;
- authorizing "blank check" preferred stock, which could be issued by our board of directors without stockholder approval and may contain voting, liquidation, dividend and other rights superior to our common stock;
- limiting the liability of, and providing indemnification to, our directors and officers;

- limiting the ability of our stockholders to call and bring business before special meetings;
- requiring advance notice of stockholder proposals for business to be conducted at meetings of our stockholders and for nominations of candidates for election to our board of directors; and
- controlling the procedures for the conduct and scheduling of board of directors and stockholder meetings.

These provisions, alone or together, could delay or prevent hostile takeovers and changes in control or changes in our management.

As a Delaware corporation, we are also subject to provisions of Delaware law, including Section 203 of the Delaware General Corporation law, which prevents certain stockholders holding more than 15% of our outstanding common stock from engaging in certain business combinations without approval of the holders of at least two-thirds of our outstanding common stock not held by such 15% or greater stockholder.

Any provision of our amended and restated certificate of incorporation, amended and restated bylaws or Delaware law that has the effect of delaying, preventing or deterring a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock, and could also affect the price that some investors are willing to pay for our common stock.

The market price of our common stock has been and will likely continue to be volatile, and you could lose all or part of your investment.

The market price of our common stock has been and may continue to be highly volatile in response to various factors, some of which are beyond our control. Since shares of our common stock were sold in our initial public offering in November 2013 at a price of $26.00 per share, the reported high and low sales prices of our common stock has ranged from $74.73 to $13.72, through June 30, 2017. In addition to the factors discussed in this "Risk Factors" section and elsewhere in this Quarterly Report on Form 10-Q, factors that could cause fluctuations in the market price of our common stock include the following:

- price and volume fluctuations in the overall stock market from time to time;
- volatility in the market prices and trading volumes of technology stocks;
- changes in operating performance and stock market valuations of other technology companies generally, or those in our industry in particular;
- sales of shares of our common stock by us or our stockholders;
- rumors and market speculation involving us or other companies in our industry;
- failure of securities analysts to maintain coverage of us, changes in financial estimates by securities analysts who follow our company, or our failure to meet these estimates or the expectations of investors;
- the financial or non-financial metric projections we may provide to the public, any changes in those projections or our failure to meet those projections;
- announcements by us or our competitors of new products or services;
- the public's reaction to our press releases, other public announcements and filings with the SEC;
- actual or anticipated changes in our operating results or fluctuations in our operating results;
- actual or anticipated developments in our business, our competitors' businesses or the competitive landscape generally;
- our issuance of shares of our common stock, whether in connection with an acquisition or upon conversion of some or all of our outstanding Notes;
- litigation involving us, our industry or both, or investigations by regulators into our operations or those of our competitors;
- developments or disputes concerning our intellectual property or other proprietary rights;
- announced or completed acquisitions of businesses or technologies by us or our competitors;
- new laws or regulations or new interpretations of existing laws or regulations applicable to our business;
- changes in accounting standards, policies, guidelines, interpretations or principles;

- any significant change in our management; and
- general economic conditions and slow or negative growth of our markets.

In addition, in the past, following periods of volatility in the overall market and the market price of a particular company's securities, securities class action litigation has often been instituted against these companies. Any securities litigation can result in substantial costs and a diversion of our management's attention and resources. We are currently subject to securities litigation and may experience more such litigation following any future periods of volatility.

The note hedge and warrant transactions may affect the value of our common stock.

Concurrently with the issuance of the Notes, we entered into note hedge transactions with certain financial institutions, which we refer to as the option counterparties. The note hedge transactions are generally expected to reduce the potential dilution upon any conversion of the Notes and/or offset any cash payments we are required to make in excess of the principal amount of converted Notes, as the case may be. We also entered into warrant transactions with the option counterparties. However, the warrant transactions could separately have a dilutive effect to the extent that the market price of our common stock exceeds the applicable strike price of the warrants.

The option counterparties or their respective affiliates may modify their initial hedge positions by entering into or unwinding various derivatives contracts with respect to our common stock and/or purchasing or selling our common stock or other securities of ours in secondary market transactions prior to the maturity of the Notes (and are likely to do so during any observation period related to a conversion of Notes or following any repurchase of Notes by us on any fundamental change repurchase date or otherwise). This activity could cause or avoid an increase or a decrease in the market price of our common stock.

In addition, if any such convertible note hedge and warrant transactions fail to become effective, the option counterparties or their respective affiliates may unwind their hedge positions with respect to our common stock, which could adversely affect the value of our common stock.

If securities or industry analysts do not publish or cease publishing research or reports about us, our business or our market, or if they change their recommendations regarding our common stock adversely, the price of our common stock and trading volume could decline.

The trading market for our common stock is influenced, to some extent, by the research and reports that securities or industry analysts publish about us, our business, our industry, our market or our competitors. If any of the analysts who cover us change their recommendation regarding our common stock adversely, or provide more fevorable relative recommendations about our competitors, the price of our common stock would likely decline. If any analysts who cover us were to cease coverage of our company or fail to regularly publish reports on us, we could lose visibility in the financial markets, which in turn could cause the price of our common stock or trading volume to decline.

We do not expect to declare any dividends in the foreseeable future.

We do not anticipate declaring any cash dividends to holders of our common stock in the foreseeable future. In addition, our credit facility contains restrictions on payments including payments of cash dividends. Consequently, investors may need to rely on sales of our common stock after price appreciation, which may never occur, as the only way to realize any future gains on their investment.

I tem 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

Unregistered Sales of Equity Securities

None.

Issuer Purchases of Equity Securities

None.

Item 6. EXHIBITS

The documents listed in the Exhibit Index of this Quarterly Report on Form 10-Q are incorporated by reference or are filed with this Quarterly Report on Form 10-Q, in each case as indicated therein (numbered in accordance with Item 601 of Regulation S-K).

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this Quarterly Report on Form 10-Q to be signed on its behalf by the undersigned, thereunto duly authorized.

TWITTER, INC.

Date: August 2, 2017

By: /s/ Jack Dorsey
Jack Dorsey
Chief Executive Officer
(Principal Executive Officer)

Date: August 2, 2017

By: /s/ Anthony Noto
Anthony Noto
Chief Financial Officer
(Principal Financial Officer)

EXHIBIT INDEX

Exhibit Number	Exhibit Description	Incorporated by Reference Form	File No.	Exhibit	Filing Date
3.2	Amended and Restated Bylaws of Twitter, Inc.	8-K	001-36164	3.1	April 7, 2017
31.1	Certification of Chief Executive Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.				
31.2	Certification of Chief Financial Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.				
32.1†	Certifications of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.				
101.INS	XBRL Instance Document.				
101.SCH	XBRL Taxonomy Schema Linkbase Document.				
101.CAL	XBRL Taxonomy Calculation Linkbase Document.				
101.DEF	XBRL Taxonomy Definition Linkbase Document.				
101.LAB	XBRL Taxonomy Labels Linkbase Document.				
101.PRE	XBRL Taxonomy Presentation Linkbase Document.				

† The certifications attached as Exhibit 32.1 that accompany this Quarterly Report on Form 10-Q, are deemed furnished and not filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of Twitter, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Quarterly Report on Form 10-Q, irrespective of any general incorporation language contained in such filing.

Exhibit 31.1

CERTIFICATION OF PERIODIC REPORT UNDER SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Jack Dorsey, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Twitter, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a–15(e) and 15d–15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and;

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 2, 2017

/s/ Jack Dorsey
Jack Dorsey
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PERIODIC REPORT UNDER SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Anthony Noto, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Twitter, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and eash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a–15(e) and 15d–15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effeetiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 2, 2017

/s/ Anthony Noto
Anthony Noto
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATIONS OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Jack Dorsey, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Quarterly Report on Form 10-Q of Twitter, Inc. for the fiscal quarter ended June 30, 2017 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Quarterly Report on Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of Twitter, Inc.

Date: August 2, 2017

By: /s/ Jack Dorsey
Name: Jack Dorsey
Title: Chief Executive Officer

I, Anthony Noto, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Quarterly Report on Form 10-Q of Twitter, Inc. for the fiscal quarter ended June 30, 2017 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Quarterly Report on Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of Twitter, Inc.

Date: August 2, 2017

By: /s/ Anthony Noto
Name: Anthony Noto
Title: Chief Financial Officer