

EXAMINING DHS SCIENCE AND TECHNOLOGY
DIRECTORATE'S ENGAGEMENT WITH ACADEMIA AND INDUSTRY

HEARING

BEFORE THE

SUBCOMMITTEE ON
CYBERSECURITY, INFRASTRUCTURE
PROTECTION, AND SECURITY
TECHNOLOGIES

OF THE

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CONTENTS

	Page
STATEMENTS	
The Honorable John Ratcliffe, a Representative in Congress From the State of Texas, and Chairman, Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies	1
The Honorable Cedric L. Richmond, a Representative in Congress From the State of Louisiana, and Ranking Member, Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies:	
Oral Statement	3
Prepared Statement	4
The Honorable Bennie G. Thompson, a Representative in Congress From the State of Mississippi, and Ranking Member, Committee on Homeland Security:	
Prepared Statement	5
WITNESSES	
Mr. Jacob Parker, Director, Government Relations, Security Industry Association:	
Oral Statement	6
Prepared Statement	8
Mr. Marc A. Pearl, President and Chief Executive Officer, Homeland Security and Defense Business Council:	
Oral Statement	10
Prepared Statement	12
Dr. Samuel H. Aronson, President, American Physical Society:	
Oral Statement	17
Prepared Statement	19
APPENDIX	
Questions From Honorable James R. Langevin for Jacob Parker	31
Questions From Honorable James R. Langevin for Marc A. Pearl	31
Questions From Honorable James R. Langevin for Samuel H. Aronson	33

EXAMINING DHS SCIENCE AND TECHNOLOGY DIRECTORATE'S ENGAGEMENT WITH ACADEMIA AND INDUSTRY

Tuesday, May 19, 2015

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON HOMELAND SECURITY,
SUBCOMMITTEE ON CYBERSECURITY, INFRASTRUCTURE
PROTECTION, AND SECURITY TECHNOLOGIES,
Washington, DC.

The subcommittee met, pursuant to call, at 10:09 a.m., in Room 311, Cannon House Office Building, Hon. John Ratcliffe [Chairman of the subcommittee] presiding.

Present: Representatives Ratcliffe, Clawson, Richmond, and Langevin.

Mr. RATCLIFFE. The Committee on Homeland Security, Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies will come to order.

The subcommittee meets today to examine the Department of Homeland Security's Science and Technology or S&T Directorate. The ability for S&T to engage with academia and industry is a critically important function, especially in times of shrinking budgets and limited resources.

S&T must be able to leverage the resources of academia, Federally-Funded Research and Development Centers, industry, and the full spectrum of what S&T Under Secretary Dr. Reginald Brothers has called the "S&T ecosystem" in order to better enable the DHS components to carry out their missions to protect the homeland.

To accomplish this, Dr. Brothers has made the development of the Homeland Security Industrial Base one of his top priorities. Dr. Brothers is modeling the Homeland Security Industrial Base off of the Department of Defense's Defense Industrial Base or DIB, which is largely successful in being the private-sector engine for our military.

While the DOD model is a good one for DOD, there needs to be greater focus on meeting the needs of the Department of Homeland Security. The DOD DIB model cannot simply be applied to DHS; they are vastly different agencies, on vastly different scales, and have different mission needs of their technology investments. DHS does not buy, acquire, or conduct research and development on the same scale as the military.

I think Dr. Brothers is on the right path, but we need to ensure that we are addressing the needs of DHS, messaging the needs and direction of its components to the small and medium-sized busi-

nesses that are interested in doing business in the homeland security ecosystem.

The S&T Directorate has several programs and divisions within the directorate aimed at enabling the communication and notification of business and academic research opportunities including: The S&T Small Business Innovation Research Program; the Technology Transfer Program; and the Commercialization Office. Over the past year the subcommittee has met with several industry, academic, and Federally-Funded Research and Development Centers that collaborate with S&T to better understand the very broad scope and research and development mandate that S&T is presently faced with.

Additionally, we have learned about many of the successes of the directorate, but also many of the challenges that S&T has in fulfilling its mission. Feedback from industry and academia informs us that S&T does not always effectively communicate its R&D priorities and the technology needs of the components it serves.

In turn, this poor outreach and messaging leaves small and medium-sized businesses in the dark on how they should best invest their internal R&D dollars to position themselves to compete and win contracts within the Department.

Additionally, S&T's coordination of awarding contracts to small and medium-sized businesses, FFRDCs, and academia is inconsistent within the divisions of the directorate, which must be problematic for these organizations that don't have the time or resources to wait around for several months for S&T to award a contract.

This appears to be a Department-wide issue however it is particularly problematic when trying to develop R&D contracts in a very fast-moving and dynamic technological environment.

Some of the actions that Dr. Brothers has taken to address the communication of priorities and notification of business and research opportunities have been to develop and publish visionary goals developed in consultation with industry leaders. These visionary goals coupled with the strategic plan should help industry and academia better understand S&T's priorities to inform their own technology developments to meet the needs of the DHS components.

Today the subcommittee meets to examine the progress Dr. Brothers has made in addressing these challenges, to hear directly from academia and industry representatives on their engagement experience with S&T, and what improvements still need to be made.

I applaud Dr. Brothers for the steps that he has taken to create visionary goals and the strategic plan, although it remains to be seen if this strategic plan can be properly implemented and effectively communicated to S&T's academic and industry partners.

In Dr. Brothers' testimony before this subcommittee last fall, he acknowledged the work S&T still has to do to improve transparency and information sharing with industry and academia so that they may align their investments to better suit DHS's S&T and DHS component needs.

I look forward to working with Dr. Brothers, industry, FFRDCs, and academic leaders to help make S&T successful in their mission to serve the Department.

The Chairman now recognizes the Ranking Minority Member of the subcommittee, the gentleman from Louisiana, Mr. Richmond, for any statement that he may have.

Mr. RICHMOND. Thank you, Chairman Ratcliffe for yielding, and thank you for convening this hearing on the Science and Technology Directorate.

I, too, want to thank the representatives of industry and business for being here today. I especially want to thank Dr. Sam Aronson for agreeing to give us his scientific research perspective. This is an issue that he is well-versed in. We are pleased to have you all here today.

But I want to take a moment to talk about Dr. Aronson's experience. Not only are you the current president of the American Physical Society and you are representing them today, some 50,000 physicists throughout the country, you are also a former director of the Brookhaven Laboratory, where you now direct the RIKEN Research Center for the study of nuclear physics, and you are a research professor at Stony Brook University's College of Engineering. We are grateful that you found the time to appear before us today. Thank you.

The Science and Technology Directorate is an essential component of the Department of Homeland Security's efforts. The mission of the Science and Technology Directorate is to help provide innovative science and technology solutions for the Homeland Security enterprise that will strengthen America's security posture and resiliency capabilities.

In order to meet the needs of the many front-line components of DHS, covering all mission areas, we have seen the S&T Directorate strive to rapidly develop and deliver knowledge, analysis, and innovative solutions that advance the mission of the Department. It is a complex and difficult mission. The ultimate goal of S&T, as I see it, is to strengthen the homeland security first responders' capabilities to protect and respond to disaster, whether it is a natural disaster, like a hurricane, earthquake, flood, or tornado, or a man-made event.

In 2009, before I came to this subcommittee, the National Academy of Public Administration, or NAPA, published a comprehensive overview of the directorate, and this subcommittee initiated its own year-long comprehensive review of S&T, led by then-Chairwoman Yvette Clarke. The purpose was to identify areas within the directorate that could use a fresh set of eyes and additional oversight on modifications or legislative authorities. As a result, we produced a comprehensive, bipartisan bill, which passed the House unanimously in 2010.

We are at a similar moment, Mr. Chairman. I understand that you and Chairman McCaul plan to offer an authorization of S&T later this summer, and this hearing is a first step. I am hoping that some of the things we learned during the process in 2010 can be used in this upcoming authorization effort. One of the things we did learn was that with such a large and complex portfolio, the di-

rectorate has found it difficult to craft a cohesive, comprehensive strategy.

The NAPA analysis suggested that the Department had not developed a clear, risk-based methodology to determine what research projects to fund, how much to fund, and how to evaluate a project's effectiveness or usefulness. These questions remain today.

I want to support the scientific R&D efforts of the directorate in every way that I can, and part of that help will be to plan for and authorize research rules and metrics that are more fully considered and comprehensively established.

We all know these are challenging budget times, especially as the appropriations process is upon us. After I reviewed the 2012 sequester cuts, that basically left S&T with little more than the lights on, I suggest that we will need to be prepared to defend the R&D funding at S&T and defend it from sequester efforts that can damage scientific efforts and the Department at large.

Striving to do more with less is always the hallmark of an efficiently-run business or Government program. But trying to protect our citizens and our Nation with programs that are backed by underfunded and depleted science and technology research assets is another matter.

With that, Mr. Chairman, I thank you and I yield back.

[The statement of Mr. Richmond follows:]

STATEMENT OF RANKING MEMBER CEDRIC L. RICHMOND

MAY 19, 2015

Thank you Chairman Ratcliffe for convening this hearing on the Science and Technology Directorate.

I too, want to thank the representatives of industry and business for being here today, and I especially want to thank Dr. Sam Aronson for agreeing to give us his scientific research perspective—this is an issue that he is well-versed in. We are pleased to have you all here today.

In fact Dr. Aronson, I want to make sure that your experience is sufficiently reflected in the record. Not only are you the current president of the American Physical Society, and you are representing them today—some 50,000 physicists throughout the country, you are also a former director of the Brookhaven Laboratory, where you now direct the RIKEN Research Center for the study of nuclear physics, and you are a research professor at Stony Brook University's College of Engineering. We are grateful that you found the time to appear before us today.

The Science and Technology Directorate is an essential component of the Department of Homeland Security's efforts. The mission of the S&T Directorate is to help provide innovative science and technology solutions for the Homeland Security Enterprise that will strengthen America's security posture, and resiliency capabilities.

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¹<http://www.napawash.org/2009/1374-dhs-science-and-technology-directorate-developing-technology-to-protect-america.html>.

result, we produced a comprehensive, bipartisan bill, which passed the House unanimously in 2010.

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We all know these are challenging budget times, and especially as the appropriations process is upon us. After I reviewed the 2012 sequester cuts that basically left S&T with little more than the lights on—I suggest that we will need to be prepared to defend the R&D funding at S&T, and to defend it from sequester efforts that can damage the scientific efforts in the Department at large.

Striving to do more with less is always the hallmark of an efficiently-run business or Government program, but trying to protect our citizens and Nation with programs that are backed by underfunded and depleted science and technology research assets, is another matter.

Thank you Mr. Chairman and I yield back.

Mr. RATCLIFFE. I thank the gentleman and remind the other Members of the committee that opening statements may be submitted for the record.

[The statement of Ranking Member Thompson follows:]

STATEMENT OF RANKING MEMBER BENNIE G. THOMPSON

MAY 19, 2015

Good morning, Mr. Chairman, and thank you for holding this hearing on the Science and Technology Directorate.

I join you in welcoming our witnesses from industry and business associations, and I particularly want to thank Dr. Sam Aronson for joining us today.

Many of my concerns about the Science and Technology Directorate stem from our work in the committee a few years ago during my Chairmanship, when we all worked together over a period of 2 years to pass a comprehensive, bipartisan Science and Technology authorization bill. That bill sought to provide much-needed direction for the research and development efforts of the Department.

Within S&T, conducting R&D on technologies is a key component of DHS’s efforts to detect, prevent, and mitigate terrorist threats.

Many components of DHS conduct different types of R&D for their respective missions, but GAO tells us that DHS does not have a unified Department-wide policy defining R&D, or guidance directing components to report R&D activities and investments.

We have had questions over the years on how we can determine the Department’s total investment in R&D across all the components, and how S&T can effectively oversee components’ R&D efforts to align them with agency-wide R&D goals and priorities.

If we are going to authorize S&T this year, we should establish policies and guidance for defining R&D across the Department, and having clear processes and procedures for overseeing R&D, that would provide more oversight of R&D investments across the board.

Though I have met with Under Secretary Brothers, it is still unclear to me whether there is a system to monitor research milestones and collect feedback from customers and end-users on the effectiveness of the services delivered by the directorate.

These milestones and feedback would allow this committee to offer an objective assessment of the successes and failures of the agency.

Without objective measurement tools, it is impossible for Congress to assess what should be changed or what should be kept.

Today, we are going to hear from industry associations and academia on how they interact with the research and development efforts of the directorate.

I hope to hear some suggestions on how those relationships—among the directorate, industry, and academia—can be improved, particularly in the Small Business Innovation Research program, or SBIR.

Finally, I believe we are at a crossroads because in this budget atmosphere of sequestered funding, the directorate will be challenged to prioritize or eliminate programs that help protect the American people today.

In 2012, just a few years ago, the House passed extreme budget cuts to the fiscal year 2012 S&T funding levels with the support of many of my Republican colleagues—and they were harsh by any standard.

There are some who are predicting that we are on the way to more cuts, similar to the fiscal year 2012 sequester.

Officials with cybersecurity responsibilities have seen large increases in their budgets, but research and development in the S&T budget could be an easy target for offsets, as we have seen before.

These potential cuts will have consequences, because if you have less money for science and technology, you can only do less scientific and technological research.

I caution that the S&T Directorate should be prepared for such a possibility in today's budget atmosphere.

Mr. Chairman, I hope the committee will take these matters seriously as we learn how the directorate interacts with industry and academia, and its operational programs going forward.

Thank you, and I yield back.

Mr. RATCLIFFE. We are pleased to have a very distinguished panel of witnesses before us today on this important topic.

Mr. Jake Parker is the director of government relations at the Security Industry Association. Welcome, Mr. Parker.

Mr. Marc Pearl is the president and CEO of the Homeland Security and Defense Business Council. Good to see you again, Mr. Pearl.

Dr. Samuel Aronson, as the gentleman from Louisiana stated in his opening remarks is the president of the American Physical Society. Welcome, Dr. Aronson.

The witnesses' full written statements will appear in the record. I would now like to swear in the witnesses en banc—

[Witnesses sworn.]

Mr. RATCLIFFE. You may be seated.

The Chairman now recognizes Mr. Parker for 5 minutes for an opening statement.

STATEMENT OF JACOB PARKER, DIRECTOR, GOVERNMENT RELATIONS, SECURITY INDUSTRY ASSOCIATION

Mr. PARKER. Good morning Chairman Ratcliffe, Ranking Member Richmond, and distinguished Members of the subcommittee.

I am Jake Parker, director of government relations for the Security Industry Association. SIA is a non-profit international trade association representing nearly 600 companies that develop, manufacture, and integrate electronic and physical security solutions. Technology provided by the security industry plays a key role in DHS component operations, and in protecting each of the 16 critical infrastructure sectors.

Thank you for the opportunity to testify before you today on the important relationship between the DHS Science and Technology Directorate and the private sector. The input I am providing here is based on experiences of SIA members in working with S&T, which I have collected and summarized for you at a high level in

order to give you a sense of the nature and direction of this partnership.

If there is any information requested that I cannot provide today, I will certainly work with our members to provide helpful responses as soon as possible.

In general, we have seen an increase in S&T efforts to engage with industry and we believe the partnership is moving in the right direction. In 2013, S&T signed a unique memorandum of understanding with the association to promote the use of electronics innovation in Homeland Security applications. Since taking the helm of the organization last year, Under Secretary Brothers and his leadership team have certainly set the right tone for improving engagement with industry.

In fact, almost 1 year ago, Dr. Brothers spoke at our annual policy conference, the SIA Government Summit, and gave us a preview of his new vision for the agency. This was articulated further with the release of his visionary goals last year and just last month with the unveiling of S&T's 5-year strategic plan.

The plan properly recognizes that technology is evolving so quickly that it often outpaces traditional Government R&D and acquisition vehicles. Faced with very limited funding as you alluded to and personnel, successful DHS operators need what Dr. Brothers has called force-multiplying technology.

Indeed, the rapid pace of innovation in the security industry especially in the identity and biometric space holds enormous potential to counter current and future homeland security threats. A number of S&T projects are underway to harness these advances. We believe leveraging them will maximize return on taxpayer dollars especially as security technology becomes more and more affordable through economies of scale as that market expands worldwide.

The strategic plan calls for ramping up a surge effort to engage the homeland security industrial base by fiscal year 2016. We welcome this and we think that in order to maximize the effectiveness of the effort, it should include certain elements.

First, improving and articulating the value proposition of doing business with S&T will be necessary. While S&T projects ultimately help inform component agency decision making, few historically have led to a successful acquisition program.

Within the industry, one barrier to potential partners is skepticism regarding the commitment of participating DHS components to the S&T projects that they are working with, since they can ultimately choose alternative solutions developed through internally-funded research programs.

It is encouraging to see an acknowledgement of this issue within a strategic plan in several proposals on how to better coordinate and reduce the duplication of effort between S&T and the component agencies.

The business case could also be improved through portfolio balance and prioritization which is one of the organization's biggest challenges as the Ranking Member alluded to. Our members feel that given the limited size of the S&T budget, the portfolio may simply be too large, causing projects to be supported at levels insuf-

ficient to capitalize on the successes that they have as the funding runs out.

Again, the strategic plan seems to acknowledge this as an issue. S&T estimates that the total number of portfolio projects would be reduced as funding shifts to higher priorities under the plan's provisions. Another critical element, we believe, is ensuring the technology vendor community is considered a project stakeholder that is on an equal footing within users and other parties.

Some of our members have reported inconsistency in the part of DHS personnel as to what communications with industry they believe are permitted in the course of a project. Congress should consider affirming in any reauthorization legislation the appropriateness of communications with industry that can help improve program results and ultimately the success of any subsequent acquisition.

Lastly, members feel that communications on available opportunities has improved with an increase in the number of industry days, speaking engagements, and webinars led by S&T leaders, but it could still benefit from additional coordination.

To conclude, what we have heard from S&T leadership on their plans to leverage industry partnerships is very encouraging. Ultimately, what matters is whether the strategy can be carried out in a meaningful way. The Security Industry Association is committed to helping facilitate such partnerships.

I appreciate the opportunity to provide this collective input from our industry. We stand ready to provide any additional information that you may need. Thank you.

[The prepared statement of Mr. Parker follows:]

PREPARED STATEMENT OF JACOB PARKER

MAY 19, 2015

Good morning Chairman Ratcliffe, Ranking Member Richmond, and distinguished Members of the subcommittee. I am Jake Parker, director of government relations for the Security Industry Association, a non-profit international trade association representing nearly 600 companies that develop, manufacture, and integrate electronic and physical security solutions, and employ thousands of technology leaders. Technology provided by the security industry plays a key role in DHS component operations, and in protecting critical infrastructure such as chemical facilities, airports, seaports, mass transit systems, the energy sector, and Government facilities.

Thank you for the opportunity to testify before you today on the critically important partnership between the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) and the private sector. The input I am providing is based on the experiences of SIA member companies in working with S&T, which I have collected and summarized for you at a high level in order to give you a sense of the nature and direction of this partnership.

I will do my best to answer any questions you may have, however if there is any information requested I cannot provide today, I will be happy to work with our members to provide helpful responses.

NEW LEADERSHIP

Generally we have seen an increase in S&T efforts to engage with industry and believe the partnership is moving in the right direction. I will highlight aspects of planning or programing at S&T we see as positive, as well as several areas identified by our members where there is room for significant improvement.

Since taking the helm of the organization last year, DHS Under Secretary for Science and Technology Dr. Reginald Brothers and his leadership team have set the right tone for improving engagement with industry. In one of his first major speaking engagements following Senate confirmation, Dr. Brothers participated in our association's annual public policy conference, the SIA Government Summit, and gave

us a preview of his new vision for the agency. This was articulated further with the release of his “visionary goals” for the organization last year, and just last month with the unveiling of S&T’s 2015–2019 strategic plan.

The plan correctly acknowledges that technology is now evolving so quickly that it often outpaces traditional Government R&D and acquisition vehicles. Meanwhile, technology-based solutions are more important than ever to achieving DHS component missions. Faced with limited funding and personnel, operators need force-multiplying technology for success. The rapid pace of technology advancement in the security industry, particularly in the identity and biometrics space, holds enormous potential to counter current and future homeland security threats. Harnessing these advances funded by the private sector and developed for commercial and international markets would maximize the return on taxpayer dollars, especially as the technology become more and more affordable through economies of scale.

EFFECTIVE USE OF INDUSTRY EXPERTISE

From our perspective, S&T programs that have had the most success are often those that integrate off-the-shelf technology developed commercially, to provide solutions that both meet operational capability gaps and provide new opportunities for industry. Take for example, the Mobile Biometrics Program. The recent Stockton Latent Print Mobile Pilot, concluded in fiscal year 2014, demonstrated the results of putting mobile latent fingerprint capture devices in the hands of law enforcement. Using this force-multiplying technology, latent prints were collected from crime scenes then matched against the local fingerprint search database in as little as 2 minutes. For such projects, even if a Federal acquisition does not result, game-changing solutions using products, technologies, and new processes may be developed and made available to serve State and local law enforcement needs.

The Biometric Identification at Sea pilot with the Coast Guard, features fingerprint collection and database search using mobile devices, during alien migrant interdiction operations in what is known as the Mona Passage in the Caribbean Sea. Utilizing wireless transfer of data and back-end matching to the OBIM/IDENT database, the project resulted in several watch list hits in just the first weeks.

In building on such successes we see value in many aspects of the strategic plan’s proposals to further partner with and engage the Homeland Security Enterprise, such as jointly-staffed Innovation Centers within DHS components aimed at improving coordination of internally-funded component research, late-stage technology development and technology transfer.

The strategic plan calls for ramping up to a “surge effort” on engaging the Homeland Security Industrial Base by fiscal year 2016. In order for this to be successful, we have several suggestions for areas of improvement.

INDUSTRY AS A STAKEHOLDER

When engineered systems are being developed and evaluated, versus stand-alone devices, it is critical that industry be considered a stakeholder in the development process and have an opportunity for input on any end-to-end analysis.

Clear guidelines and assurances need to be provided to DHS S&T personnel with respect to communications with industry participants. In some cases there is a reluctance or fear that sharing information could violate acquisition regulations or other rules, which is usually unfounded. This contributes to a culture biased towards restricting access to technical information and other data that would be helpful to industry in efforts to meet the needs S&T has identified. It would be helpful, in any legislation re-authorizing the directorate, for Congress to affirm the appropriateness of communications with industry that will help improve program results and ultimately the success of any subsequent acquisition.

Further, improving the identification of high-priority operational requirements and capability gaps from DHS component agencies, as envisioned in the strategic plan, is extremely important. Equally important is the communication of this information on needs to industry, and we recommend that it be shared in a systematic way with industry partners. If information on needs is shared openly, industry is far more likely to be able to deliver solutions that solve problems in the real world.

IMPROVING THE VALUE PROPOSITION OF DOING BUSINESS WITH S&T

S&T project results ultimately help inform component agency decision making on whether to pursue acquisition, and if pursued which solutions should be acquired versus ruled out. However, some of our members point out that historically, few S&T projects have led to a successful acquisition program. There is also some skepticism as to whether DHS components are fully committed to the S&T projects they are involved with, due to the risk a component could choose solutions developed

through internally-funded research programs. While a level of disconnect between S&T and its customers is undoubtedly due in part at least to the fragmented nature of DHS, it is encouraging to see an acknowledgement of this as an issue and several proposals in the strategic plan on how to better coordinate.

We know S&T is grappling with the fact that as a research organization, the directorate's portfolio is expected to include a mix of high-risk/high-reward projects that explore extreme approaches to component business/mission challenges, and actionable results that that inform or initiative acquisition.

One of the biggest challenges faced by S&T leadership, as well as Congress in seeking to provide guidance through re-authorization legislation, is how to prioritize and balance the S&T research portfolio. Our members feel that, given the limited size of the S&T budget, the portfolio may be too wide, causing projects to be funded at levels insufficient to be concluded in a timely or successful way. Here, S&T appears to be moving in this direction. Under the strategic plan, S&T estimates that the total number of portfolio projects would be reduced as funding shifts to higher-priority programs.

COMMUNICATIONS ON OPPORTUNITIES

Communications to industry on opportunities has increased, but it is still fragmented and in need of better coordination. As S&T appears to have provided in a preliminary way within the recent strategic plan, it would be extremely helpful to provide a time line for achieving project stages as well as deliverables to DHS components.

It takes considerable time and effort to respond to RFIs and requests for white papers. S&T should close the feedback loop by providing confirmation and/or responses that would help industry steer research and product development priorities. Further, the recent increase in number of industry days, speaking engagements, and webinars led by S&T leaders has provided increased opportunities for communication with industry and this trend should continue.

CONCLUSION

What we have heard from S&T leadership on plans to improve industry engagement is very encouraging. Ultimately what matters is whether the strategy can be carried out in a meaningful way. We have identified improving the business case for industry involvement, ensuring stakeholder input from technology vendors, and communications improvements as key elements to success.

As part of an effort to increase outreach to industry, the Science and Technology Directorate signed a unique memorandum of understanding (MOU) with the Security Industry Association in September 2013, intended to facilitate information sharing that would help "promote the adaptation of electronics-related technological innovation at the Federal, State, and local level for homeland security applications." SIA is committed to helping facilitate such communication and productive relationships with industry.

On behalf of the Security Industry Association, I appreciate the opportunity to provide collective input from our industry on both the challenges and great opportunities of working with S&T. We stand ready to answer any additional questions or provide any additional input you may need as you craft legislation re-authorizing the DHS Science and Technology Directorate.

Mr. RATCLIFFE. Thank you, Mr. Parker.

The Chairman now recognizes Mr. Pearl, for 5 minutes, for his opening statement.

STATEMENT OF MARC A. PEARL, PRESIDENT AND CHIEF EXECUTIVE OFFICER, HOMELAND SECURITY AND DEFENSE BUSINESS COUNCIL

Mr. PEARL. Chairman Ratcliffe, Ranking Member Richmond, my name is Marc Pearl. I serve as the president and CEO of the Homeland Security and Defense Business Council which is a non-partisan, nonprofit industry organization.

Our members include the leading large, mid-tier, and small companies that provide the homeland security and homeland defense technology, product, and service solutions to DHS and other Government entities, as well as in the commercial market. We thank

you for giving us this opportunity to appear before you this morning to provide our perspective on the S&T Directorate's engagement with industry.

Our head testimony which as you have said is now going to be included in the record highlights three things: The progress that S&T has made as a result of the under secretary's leadership and its impact on industry, the key challenges that still remain at the directorate, and lastly, a few recommendations on what could be done to encourage even more effective engagement with industry as well as what we believe would be greater success with S&T.

With regard to positive steps forward, our written testimony describes a number of areas that show how the S&T Directorate's work is working hard to increase transparency and communication—two areas that I would like to highlight.

Last month, as Mr. Parker said, the S&T released its updated 5-year strategic plan, probably the best one that has ever been put forward. It includes capability roadmaps and specific objectives delineated by fiscal year. These capability roadmaps are a necessary and important first step in creating a process that will help companies align their individual investments to where the Government needs help.

Second, the directorate is also encouraging greater involvement of both DHS components and industry through its APEX programs. These programs are vital to help integrate an operational perspective, and I want to emphasize, an operational perspective, into S&T's work earlier in the process and helping create a deeper connection between the directorate and the components who are the end-users.

If successful, the APEX programs will help establish a credibility and relevance for S&T which in turn may increase industry's desire to work more actively with the directorate.

Despite this progress, the directorate still faces a number of uphill challenges which I outlined in the written testimony that impact its ability to effectively engage with and motivate industry in a manner that allows it to accomplish its mission, particularly: Budget constraints, a lack of understanding its audience, and an inability to make the business case for industry involvement.

Because of budget cuts, S&T has been forced to ask the private sector to spend its own resources on research and development, to spend additional resources demonstrating its capabilities at a Government-sponsored venue and then maybe they will consider buying it.

As a result, the directorate has lost its relevance to many mid to large companies because they are, there just is not a compelling enough business case for their interest, for their involvement, or their investment in the directorate's work. Absent the promise of a future market or acquisition, why should industry spend its money in this way?

My written testimony goes into greater detail with respect to recommendations that could help tackle some of these challenges, but briefly: The directorate could take more time to better understand the market dynamics of the homeland security industrial base; in order to build a market case to determine what types of industry incentives are needed, it could visit leading-edge private-sector labs

to learn more about industry's R&D; it could develop an industry engagement strategy for the APEX programs and do a better job of sharing their tactical business plans; and lastly, it should be encouraged, whatever way, shape, and form to find new and better means of ensuring greater integration of the components into its work.

So, in conclusion, the work of this S&T Directorate is vital and it is important. The Homeland Security industrial base very much wants to be a partner in its mission and help it succeed. We believe Dr. Brothers' plan is leading the directorate in the right decision, but even more can be accomplished if S&T focuses some time on understanding its audience and its current work, builds a business case, and creates incentives.

As a result, there would be a much better chance that industry will step up and direct their work towards the needs of S&T and the Department as a whole.

Congress, may I say at the end, can also play an important role by supporting S&T in its effort to become more relevant to the Department and the industry. You could either increase its funding or narrow the scope of its work. You could enhance its authority over the components or promote even closer cooperation and integration between the directorate and the components.

These are just some of our recommendations and our oversight. On behalf of the members of the council, I appreciate the opportunity to provide this collective perspective of our members on S&T's engagement and look forward to answering any questions that you might have.

Thank you.

[The prepared statement of Mr. Pearl follows:]

PREPARED STATEMENT OF MARC A. PEARL

MAY 19, 2015

Chairman Ratcliffe, Ranking Member Richmond, and distinguished Members of the subcommittee, my name is Marc Pearl, and I am the president and CEO of the Homeland Security & Defense Business Council (Council), a non-partisan, non-profit industry organization that is made up of the leading large, mid-tier, and small companies that provide homeland security and homeland defense technology, product, and service solutions to DHS and other Government and commercial markets. We thank you for giving us the opportunity to appear before you today to provide our perspectives on the DHS Science and Technology (S&T) Directorate's engagement with industry.

The mission of the Council is to sponsor and promote programs and initiatives that encourage greater and more effective communication between Government and industry. We seek to facilitate a dialogue that can inform the implementation of policy and process, help address mission challenges, and improve the management and organization of DHS. We often bring both sides together to gain a greater understanding of each other's perspectives and processes so we can identify improved ways of doing business together. In this regard, we have a history of working with S&T to discuss the best ways of engaging with industry to develop and find advanced technologies.

Effective engagement with industry is a priority area of interest for the Council. In 2014, we developed a "Framework for Government—Industry Engagement Through the Planning and Execution of the Acquisition Process." Through this effort, our member companies have worked closely with the DHS directorates and components to identify critical points of communication throughout the different stages of the acquisition process (which includes pre-acquisition strategic and business planning), the challenges and barriers to communication, and to share best practices and options for effective methods and forums for engagement. Many of the lessons learned from this initiative apply to S&T.

The Council's testimony today will focus on the progress that S&T has made as a result of Dr. Reginald Brothers' leadership and how it impacts industry, the challenges that still remain, and our recommendations for what can be done to encourage more effective engagement with industry, as well as greater success for the directorate.

In September of 2014, Dr. Brothers testified before this subcommittee and outlined his vision and six priority areas of focus for the directorate, which included:

1. Visionary goals that serve as 30-year horizon points to build towards.
2. A 5–10 year strategic plan which would provide a nearer-term roadmap for how the organization seeks to achieve its visionary end goals.
3. An updated and balanced R&D portfolio that includes APEX programs, technology engine programs, and other focused programs not captured under one of these umbrellas.
4. A refined process for identifying capability gaps.
5. An empowered 21st Century workforce with multi-lingual program managers that can slide between operational and technical environments.
6. The ability to foster deeper engagement and transparency with the homeland security industrial base.

Industry is a critical stakeholder and partner in S&T's mission and each of these priorities impacts industry's ability and willingness to engage with S&T.

PROGRESS WITHIN S&T

While S&T has not yet accomplished all of these goals, there have been a number of positive changes at S&T that show progress in Dr. Brother's priority areas of focus. He should be applauded for the following proactive efforts that demonstrate that S&T is trying to improve transparency and communication with industry.

- *Release of S&T's Visionary Goals and 5-Year Strategic Plan.*—Through the release of S&T's long-term visionary goals and its recently-published 2015–2019 Strategic Plan, S&T has established the necessary framework to help guide the mid- to long-term future of the agency. The updated strategic plan is probably the best that S&T has ever put forward, in part because it includes capability roadmaps and specific objectives that are delineated by fiscal year. While more communication is still needed, the capability roadmaps are an important first step in developing a process that helps private companies align their own investments to where the Government needs help. The visionary goals and strategic plan provide a basic blueprint for the Government's future needs and allows the time for DHS and industry to have the necessary conversations required to align resources.
- *Greater Involvement of the Components and Industry through Apex Programs.*—One of the positive impacts of S&T's focus on Apex programs is the involvement and commitment by senior leaders of the DHS operational components. The collaborative nature of these programs is important because it helps integrate an operational perspective into S&T's work earlier in the process and creates greater connections between S&T and the end-users. If successful, this type of partnership will help build credibility and relevance for S&T, which in turn may increase industry's desire to work with the directorate.

We have also seen more outreach to industry through the Apex programs. Last October, the Council coordinated an industry tour with S&T and Customs and Border Protection at the Maryland Test Facility of the Apex Air Entry Re-Exit Engineering (AEER) Program. This program has used a series of briefings, webinars, work sessions, and industry events to promote transparency while developing a collaborative environment in which stakeholder expertise and best practices are solicited and incorporated into proposed solutions. Tours are an excellent way of helping industry see and better understand the operational working environment for technologies. In addition to tours, the Apex AEER program solicits industry information and ideas through an email address and uses information submitted to determine which companies to meet with in one-on-one discussions.

The S&T explosives division is hosting a Checkpoint Industry Day next month to discuss with stakeholders in an open forum the specific intentions of S&T and TSA regarding the newly-authorized Apex Checkpoint Program. It is encouraging to see outreach that is intended to solicit input and ideas from all stakeholders. We hope though that this Industry Day is not the only forum for engagement with industry. Group events are an important starting point for pushing out information and encouraging dialogue, however there are certain things that industry will not discuss in this type of setting. S&T should follow up with one-on-one meetings with relevant companies to ensure it gains the in-

formation it needs to formulate investment plans for checkpoint technologies and architectures.

- *More Information Available Through Website.*—There is a noticeable difference in the amount and type of information that is now publicly available on the S&T website. It includes information on its strategic direction, descriptions of its major programs and each of the component parts that make up S&T, identifies senior leaders, provides contact information for program managers, lists business opportunities, and includes upcoming events, press releases, blog entries, articles, videos, and other archived stories. This collection of information is valuable to those in industry who are seeking to better understand what S&T is working on, how it operates, and who to contact if they have questions.
- *S&T National Conversation.*—The National Conversation is a series of on-line and in-person discussions designed to bring together multiple and diverse stakeholders that play a role in innovating solutions for homeland security challenges. While it is still early in the process to determine the effectiveness of these tools, it is an example of S&T trying to use cost-effective forums and technology to gain insight and perspectives from all stakeholders in a collaborative environment.
- *Increased Number of Webinars.*—In the appropriate circumstances, webinars are a cost-effective tool to push out information to a large number of people because DHS does not need to spend the time and money on event planning or acquiring a large venue. Industry also saves time and money by not having to send employees to events that may require travel and extensive time out of the office. Over the past 2 years, there has been a noticeable increase in webinars that include joint participation by the components. This is one example of improving information sharing with both industry and other stakeholders.

CHALLENGES AND RECOMMENDATIONS

Despite this progress, S&T still faces a number of daunting challenges which impact its ability to motivate and effectively engage with industry in a manner that allows it to accomplish its mission. These challenges include budget constraints, a lack of understanding of its audience, the lack of a business case for industry involvement, and its ability to closely coordinate and integrate its work with the components. We believe that these challenges can be addressed through a combination of the following actions: Taking the time to understand the market dynamics of the industrial base, creating industry incentives, learning about industry R&D, developing greater transparency and more effective communication with industry through tactical business plans and industry engagement strategies, finding ways to ensure greater integration of the components into S&T's work, and focusing on what can be accomplished with limited resources.

After a peak budget award in fiscal year 2006, S&T experienced a series of decreasing and fluctuating budgets, particularly in fiscal year 2011–fiscal year 2012, when it received its lowest budgets ever. While its budget did increase in fiscal year 2014, the lack of an adequate, stable, or predictable funding picture over the years has created a number of interrelated problems.

Due to the budget cuts, many mid- to large-size companies lost interest in engaging with S&T because it has had difficulty making an attractive business case for their involvement. The budget constraints have forced S&T into a trap that other resource-constrained Government R&D organizations fall into, in which they want industry to spend its own resources on R&D, and then spend additional resources demonstrating its capabilities at a Government-sponsored venue, even when there is no clear return on investment that would motivate that behavior. Most industry providers do not have the time or money to invest in speculative R&D unless they are convinced it will translate directly to component acquisition or another market. Without an understanding of or promise of a future market or acquisition, industry will not spend its money in this way.

While the release of the S&T Strategic Plan is a necessary and important first step in communicating future priorities, the plan currently lacks the context of S&T's resources, its ability to implement the contents of the plan, and an understanding of the private sector. It is not yet credible. Industry will not align its investments in R&D until there is follow up communication that demonstrates that S&T understands its audience, has a tactical business plan that aligns with budget realities to accomplish its goals, and can demonstrate incentives and a business case to motivate industry.

- *Build a Business Case and Tailor Message to the Appropriate Audience.*—S&T tends to focus on trying to identify technologies and capabilities without regard to the kinds of companies that participate in that market. The market dynamics

for building a business case vary depending on the type and size of company. To be successful, S&T's messaging needs to be targeted to the appropriate audience. They should not be talking to systems integrators about innovative technology or talking to small companies about large systems integration. S&T should take the time to gain a better understanding of the market dynamics of the industrial base and tailor their communication and engagement to the appropriate audience based upon the need they are trying to solve.

One way to learn more about the industrial base is to consult with industry associations like the Council and other membership organizations that serve niche markets. These groups can provide information on different segments of industry as well as help push S&T's message out to the right audience.

- *Learn More About Industry's R&D Work.*—Large companies spend a tremendous amount of money in R&D and would welcome the opportunity to share their future technology direction and potentially direct research towards projects in areas where the Government has specific needs. The release of the S&T Strategic Plan helps provide information to industry on future direction, but it is also critical for S&T to engage with industry so it can learn more about industry IR&D. Particularly in a challenging budget environment, S&T should lean towards industry to create partnerships to assist them with technology needs. If there are detailed future requirements and adequate incentives, industry can assist DHS with additional out-of-the-box solutions ready for future deployment. We have heard of a few large companies inviting S&T to visit their laboratories so they can see and learn more about their R&D efforts, but these offers have not been accepted. It would be beneficial for S&T to host more industry days focused on specific technology areas and to visit leading-edge private-sector laboratories to learn more about the R&D that is taking place.
- *Create Incentives for Industry Involvement.*—S&T has been trying to model the Department of Defense (DoD) for its process innovation model. While the DoD model is robust, it is not geared for a tactical law enforcement perspective and quick acquisition. Without the carrot of visible available funding, few vendors have the resources to engage in a protracted dialogue with S&T that can be dropped at any step along the way. There are many examples of vendors, particularly in radiological/nuclear detection markets, that are building relationships with foreign governments, obtaining a seat at the table quickly and ramping up new technological solutions due to the promise of immediate available funding. Many of these companies say it does not pay to focus on this type of innovation in the United States because there is no incentive. If S&T cannot make the business case for industry involvement, it needs to create or seek legislation for the appropriate incentives. This was the approach used by Congress and the FDA when it created new business models and incentives for the development of drugs and other medical interventions for rare diseases through the adoption of the Orphan Drug Act of 1983.
- *Develop an Industry Engagement Strategy and Tactical Business Plans for Apex Programs.*—There are two important ways that S&T can expand on transparency and communication with industry related to its Strategic Plan. We believe that S&T should develop an industry engagement strategy for how it will introduce and roll out its Apex programs and it should share tactical business plans that explain how S&T plans to accomplish its goals within each program. An industry engagement strategy could consist of a flexible three-stage process. The first stage would focus on awareness and would introduce all of the Apex programs to industry in a single session so that there is greater transparency into the entire process and a better understanding of everything that S&T is trying to accomplish across all of the programs. In this stage, industry is introduced to the concept of Apex and they would receive a description of each Apex program at a high level. The information provided would include the purpose, goals, high-level time lines, high-level process description, goals for engaging with industry, and how other efforts from across the Department would be tied in. By hearing about all the programs in one session, industry would have a better sense of which programs they have the highest interest in and may be able to identify other efforts going on within DHS or in other Federal agencies that relate to those efforts. The second stage would include engagement forums to roll out each individual Apex program. These sessions would describe the state of play to industry for each program and would provide opportunities to discuss the state of current and emerging technologies. The final stage would focus on sessions that discuss specific opportunities within each program.

As part of this engagement process, industry would be looking to learn the following types of tactical information from S&T:

- What is the time line for execution and engagement with industry?
- Who are the players and stakeholders?
- Who from industry are you trying to target and attract?
- What do you want to get from industry throughout the process?
- When do you want industry involved?
- How do you plan to engage with industry?
- What are the projects that will support this program?
- Which projects have already started or are on-going?
- What are the major deliverables and milestones?
- What are the new business opportunities and incentives for industry participation?
- Who is the final end-user and likely purchaser?
- What is the funding profile? Does this include component-funded projects?
- What are the enablers and opportunities for collaboration?
- What are DHS's challenges/risks and plan to overcome them?
- What actions will you take to accomplish your goals?

We know that a lot of this tactical business information is available internally within S&T but has not yet been shared with industry. This type of information sharing would serve to help attract and motivate industry by giving them greater confidence in what S&T is doing and an understanding of how these programs will translate into opportunities for industry. If industry had a better understanding of specific objectives and challenges within these programs, it could also have an early dialogue with S&T on who needs to be included in engagement, impediments to getting those groups to participate, how to effectively message communications, how to incentivize the target audience, and the best forums for engagement.

Currently, the information available about different Apex programs is inconsistent. Many in industry do not know the specifics of each program or the business plan that S&T will use to accomplish its goals. We realize that the Apex programs are not all operating on the same time lines and that some will be complete in 2016 while others will not end until 2019 and beyond. It would be helpful to have some kind of roadmap that allows industry to easily determine what S&T has done so far, where it is going with each program, and if changes are occurring along the way.

- *Greater Coordination, Integration, and Unity of Effort Between S&T and the Components.*—While the Apex programs are a good start, S&T still has much to do to establish value-added relationships and credibility with the components. Part of the problem is the lack of incentives or authority to require the components to work with S&T. Some components, like Coast Guard and DNDO, have separate and independent R&D budgets and organizations. None of the components are precluded from carrying out their own R&D activities as long as they coordinate with S&T. However, there is no clear guidance on what constitutes coordination and S&T has no direct oversight authority into their work. Partnership with the components is voluntary and based upon relationships, however close coordination is necessary to develop a common vision, ensure unity of effort, and reduce the potential for duplication of effort. S&T cannot be successful if a disconnect exists between their work and the end-users or if they fail to consider the operational systems perspective. The participation of components, particularly as it relates to identifying capability gaps and developing operational requirements, makes it more likely that research results will successfully transition into the field and that S&T is working on the priority needs of a component. Since acquisition authority and most of the money lies within the components, it is important for industry to see and understand the close coordination and integration between S&T and a component, because it makes it more likely that that there is a future market.
- *Increase Funding or Narrow Focus.*—S&T's scope of work is vast and serves a diverse group of customers. Its responsibilities include a wide range of activities such as funding basic and applied research, advanced development, oversight of testing and evaluation, technology foraging, acquisition support and operational analysis, maintenance of Federal research infrastructure, and providing technical, operational, and systems engineering support to the components. If S&T's budget is not going to increase to an amount that is adequate for its responsibilities and authorities, perhaps it should have a narrower focus. Right now, S&T is trying to be all things to all people and they cannot do this successfully with their budget. Tough decisions need to be made on what activities should be prioritized and would have the highest impact to its customers. If they were able to do a few things successfully, it would help build credibility with industry, with the components, and with Congress.

CONCLUSION

The work of S&T is important and industry wants to be a partner in their mission and help them succeed. We believe Dr. Brother's leadership and the recently-released 5-year strategic plan is leading the directorate in the right direction, but there is still more to do, particularly as it pertains to effective engagement with industry. The S&T budget and the lack of a business case for industry involvement remain the top challenges to moving forward. There are many things that S&T and Congress can do to help address the impact of these issues. We hope that S&T is ready to build on their progress and focus on the next steps. If they take the time to understand their audience and its current work, build a business case and create incentives, that industry will step up and direct their work towards the needs of S&T and the Department. However, greater transparency and communication through an industry engagement strategy and the sharing of tactical business plans is another aspect to making this happen.

Congress can also play a role by supporting S&T in these efforts with industry, by increasing funding for S&T, considering legislative incentives for industry, enhancing S&T's authority over the components, or promoting closer coordination and integration between S&T and the components. As a last resort, it may have to reconsider and narrow the scope of S&T's portfolio so that the directorate can focus on what can be accomplished with limited resources. We know the decisions are not easy, but are critical to producing results.

On behalf of the Homeland Security & Defense Business Council, I appreciate the opportunity to provide the collective perspectives of our members on S&T's engagement with industry. The Council stands ready to answer any additional questions you may have on these topics.

Mr. RATCLIFFE. Thank you, Mr. Pearl.

The Chairman now recognizes Dr. Aronson for 5 minutes for his opening statement.

STATEMENT OF SAMUEL H. ARONSON, PRESIDENT, AMERICAN PHYSICAL SOCIETY

Mr. ARONSON. Chairman Ratchliffe, Ranking Member Richmond, thank you for the opportunity to testify today on the scientific community's involvement with the S&T Directorate of Homeland Security.

I am a nuclear physicist and currently serve as president of the American Physical Society, and I thank Mr. Richmond for saving me a paragraph's worth of reading here because I will skip ahead to my concerns.

As a director at Brookhaven National Laboratory, I had a large, multi-purpose research institution with world-class facilities and an outstanding staff possessing broad scientific and technological expertise, spanning the life sciences and the physical sciences as well as engineering. Brookhaven's portfolio extends from discovery-driven research like the origins of the universe to applied research such as exploration of energy technologies and problems relevant to National and homeland security.

My own experience with DHS is as director at the laboratory and somewhat indirect in the sense of actually seeking funding from DHS. But, the people working at the lab provided me with plenty of insight into that process which I would have to say was mixed, at best. Unlike other Federal agencies that have research missions, DHS at least to the outside world and I am representing a different component of that outside world than Mr. Parker and Mr. Pearl did, seems to suffer from a lack of transparency and a culture that does not really encourage input from the Nation's outstanding science and technology community.

I think this can be improved. It doesn't have to be this way and a simple step toward that is to look at what other agencies and departments with research agendas do in that regard. Other agencies such as the National Science Foundation, the Department of Energy, the Department of Defense, I am particularly familiar with the Department of Energy since the laboratory is funded by the Department of Energy, use their committees—their external committees to solicit ideas, connect with the science and technology community, and to develop programming that helps them accomplish their mission.

The advisory committees are broadly-based scientifically. They meet frequently in open sessions, provide opportunities for public and community input and make their recommendations very widely known. I know for a fact that the Department of Energy's Office of Science actually lives by these recommendations.

By contrast, DHS' advisory committee is a small committee with a fairly narrow base and it meets infrequently and almost always in closed sessions. It doesn't make its recommendations easily accessible to interested parties, which include the science and technology community as well as industry.

By allowing the committee to operate in such a fashion, I think DHS is missing an important opportunity to engage the best scientific and technical minds to help the Department achieve its mission. The core missions themselves are daunting, preventing terrorism and enhancing security, securing and managing our borders, and forcing and administering our immigration laws, et cetera.

Each of these requires the best science and technology the Nation can muster. Collectively, they require scientific contributions from a broad multiplicity of disciplines, and the present composition of the S&T advisory committee is not really up to the task of representing and providing input from that broad constituency.

So, what should be done? First, the S&T advisory committee should be expanded to embrace a broader and more balanced membership, reflective of DHS' own diverse scientific and technological needs. I don't feel it does that at the present time. Second, an expanded advisory committee should play a more proactive role, providing external advice to the under secretary for science and technology.

Third, the under secretary himself should make greater use of the advisory committee and actively seek its advice, charge it to perform studies, request assistance and long-term planning, et cetera. I emphasize the word "external". This is an interested but separate community whose work underpins much of the science and technology of DHS.

Fourth, the advisory committee should conduct its work in a more transparent manner with meetings open to the public where feasible and Unclassified documents should be posted on the website in a timely way so that the public as well as Members of Congress can easily access them.

Finally, the charter of the committee should be sharpened to provide a more detailed description of its scope and expected outcomes.

In transforming the advisory committee, DHS Science and Technology Directorate should take its cue from the other Federal agencies that depend on R&D in fulfilling their missions. The Office of

Science and Department of Defense provide two rather different but very good examples.

DOE Office of Science relies on a multiplicity of committees, staffed from outside the Department and following the procedures set up in the FACA, the Federal Advisory Committee Act of 1972, with each committee representing a broad and diverse background and sets of points of view.

The Defense Science Board, the Department of Defense works in a different way. It is a single committee, more like the S&T advisory committee, but is also very much more effective than the advisory committee.

I think a more robustly constituted and more open advisory committee is the first step towards improving the Department's connection with the science and technology community, and as I learned from testimony already, with the rest of the interested stakeholders.

I would be happy to answer any questions.

Thank you.

[The prepared statement of Dr. Aronson follows:]

PREPARED STATEMENT OF SAMUEL H. ARONSON

MAY 19, 2015

Chairman Ratcliffe, Ranking Member Richmond and Members of the subcommittee, I appreciate the opportunity to testify today on the Department of Homeland Security Science and Technology Directorate and its interactions with the scientific community.

I am a nuclear physicist and currently serve as president of the American Physical Society, representing more than 50,000 physicists in universities, industry, and National laboratories. From 2006 until 2012, I was director of Brookhaven National Laboratory (BNL), where I now direct the RIKEN BNL Research Center.

As Brookhaven's director, I oversaw the operation of a multipurpose research institution with world-class facilities and an outstanding staff possessing broad scientific and technological expertise, spanning the life sciences, the physical sciences and engineering. Brookhaven's portfolio extends from discovery-driven research, such as studies of the birth of the universe, to applied research, such as exploration of energy technologies and problems relevant to National and homeland security.

Although I personally have had somewhat limited direct experience with the Department of Homeland Security (DHS), I have known many scientists who have attempted to engage with the DHS Science and Technology Directorate. And their experiences have been mixed, at best. Unlike other Federal agencies that have research missions, DHS to the outside world suffers from a lack of transparency and a culture that that does not encourage input from our Nation's outstanding science and technology community. It doesn't have to be that way.

Like other Federal agencies with science and technology mandates, DHS has an advisory committee that is intended to help the Department develop and manage its S&T portfolio. But, from all appearances, it is quite dysfunctional. Other agencies, such as the National Science Foundation and the Department of Energy, with which I am very familiar, use their committees to solicit ideas, connect with the science and technology community and develop programming that help the agencies accomplish their missions. The advisory committees are broadly-based scientifically, meet frequently in open sessions, provide opportunities for public commentary and make their recommendations widely known.

By contrast, the DHS S&T Advisory Committee comprises only six members drawn from a narrow, parochial community. It meets infrequently, almost always in closed session, and does not make its recommendations easily accessible to interested parties. By allowing the committee to operate in such a fashion, DHS is missing an opportunity to engage the best scientific and technical minds to help the Department achieve its goals.

The Department's core missions are daunting: Preventing terrorism and enhancing security; securing and managing our borders; enforcing and administering our immigration laws; safeguarding and securing cyber space; and ensuring resilience

to disasters. Each one of them requires the best science and technology the Nation can muster. Collectively, they require scientific contributions from a multiplicity of disciplines. The present composition and operation of the S&T Advisory Committee is shortchanging the Department and needlessly placing Americans at future risk.

What should be done?

First, the S&T Advisory Committee should be expanded to embrace a broader and more balanced membership, reflective of DHS's diverse scientific and technological needs.

Second, an expanded Advisory Committee should play a more proactive role in providing outside advice to the under secretary for science and technology.

Third, the under secretary should make greater use of the Advisory Committee, actively seeking advice, commissioning studies, and requesting assistance with long-term planning from people who are not part of his or her inner circle.

Fourth, the Advisory Committee should conduct its work in a more transparent manner, with meetings open to the public, to the extent feasible, and Unclassified documents posted on the DHS website on a timely basis so that the public and Members of Congress can easily access them.

Finally, the charter of the Advisory Committee should be sharpened to provide a more detailed description of its scope and expected outcomes.

In transforming the Advisory Committee, the DHS Science and Technology Directorate should take a cue from other Federal agencies that depend on research and development in fulfilling their missions. The Department of Energy's Office of Science and the Department of Defense provide two good examples.

The DOE Office of Science relies on six committees—comprising 15 to 24 members each—that follow procedures established by the 1972 Federal Advisory Committee Act, with each committee representing a balance of viewpoints and diversity of backgrounds. The Department of Defense relies principally on one advisory committee, the Defense Science Board (DSB) with 32 external members chosen on the basis of their preeminence in the fields of science and technology relevant to the DOD mission.

A DHS S&T Advisory Committee more robustly constituted would help the directorate maintain continuity in its programming, better capture the expertise of the Nation's research community and instill greater confidence in its work.

Thank you. I am happy to answer any questions you may have.

Mr. RATCLIFFE. Thank you, Dr. Aronson.

The Chairman now recognizes himself for 5 minutes of questions.

My first question relates to Dr. Brothers' public statement that developing a homeland security industrial base is one of his top priorities as under secretary. In that regard, he has referenced the success of the defense industrial base at the Department of Defense as an example.

I would like to start with you, Mr. Pearl. You mentioned this briefly in your testimony. But from an industry perspective, can you give us your thoughts on the progress of this goal and what are some of the things that S&T could be doing better to develop this industrial base?

Mr. PEARL. Thank you, Mr. Chairman.

I think what first needs to be pointed out is that while we have internally discussed the concept of a homeland security industrial base, up until Dr. Brothers' testimony last fall, the phrase could not be found even over the last 13, 14 years since 9/11, most certainly, but since the formation in 2003 of the Department. There was—there is no concept of a homeland security industrial base and we have had internal discussions within our industry on whether or not it can and should it mirror the DOD model.

In many respects, it is very difficult and I think that we have to approach that. Notwithstanding Dr. Brothers coming out of DOD and Secretary Johnson and his chief of staff, this is not a DOD-lite organization, I think, that you probably have come to realize. In many respects, it mirrors a law enforcement organization.

There is also the history of using the term “industrial base” which came out of World War II with the need to make sure that there was an industry and there were labs even at peace time, able to kind-of get us to where we needed to be and in a time of emergency.

So, we take that very seriously when the Government starts calling the industry, the enterprise a homeland security industrial base. In many respects, it is not building tanks and fighter jets. It is almost like an intellectual base as opposed to an industrial base.

But that having been said, what the under secretary does realize is that there is an opportunity to reach out beyond just the National labs to excite, encourage industry. I would like him to include large and mid-tier companies beyond the small because there are a lot of opportunities that are going on there as well, but the context of industry being able to support the homeland security enterprise, not with subsidies, but with in essence, its creativity, its innovation, its capability set, its experience.

So that, in many respects, just setting the tone, I think, is—as I think we have all said, a great first step. What has to come is that the policy has to turn into a reality and that is what we are all looking for—an operational deployment implementation plan that is not just a policy plan that looks good and sounds good, but doesn’t get us to where we need to go.

Mr. RATCLIFFE. Thank you, Mr. Pearl.

Mr. Parker, I would like to give you an opportunity to respond to the same question or expound on what Mr. Pearl just related.

Mr. PARKER. Well, I guess I would echo Mr. Pearl’s comments and that there could be more participation from mid-sized and large companies and it is something that I think is necessary. Of course, small business engagement is something that is very important, as well.

But, I think with the homeland security industrial base, what that really gets at is having a stable source of technology development. You know, I think in cases where you have a lot of entry and exit from a market, that can interfere with having a stable source to go to. So, I would echo his comments.

Mr. RATCLIFFE. Thank you, Mr. Parker.

Dr. Aronson, the Centers of Excellence within S&T are meant to engage academic institutions, specifically consortium of the universities, to address specific research and technology development issues relevant to homeland security.

There seems to be a mix of basic and applied research centers and others are more targeted to incremental technology development. My question to you is: Do you think there is an appropriate balance of research activities and developmental activities?

Mr. ARONSON. If the question is—is S&T possessed of an appropriate balance, I would say the answer is no. I think there is a limited capacity to devote resources to longer-range, medium-range, and long-range issues that probably depend more on scientific and technological input and some of the more incremental and—or shorter-term activities.

While I understand the needs to put the right tools, robust, and easy-to-use, and cutting-edge tools in the hands of first responders, and that is a top priority for the Department. But there has to be

more, in my opinion, look ahead at evolving threats and more emphasis on technologies that are in a pipeline that I don't think industry can afford to drive. The National labs and academic institutions are more set up that way, and it seems to me that that balance has not been struck yet.

Mr. RATCLIFFE. Thank you, Dr. Aronson. My time has expired on this first round of questions. The Chairman now recognizes the Ranking Member, Mr. Richmond for 5 minutes of questions.

Mr. RICHMOND. Thank you. I will address this to all three and we will just go from my right to left and start with Dr. Aronson and end with Mr. Parker.

Over the years this subcommittee has spent a lot of time on S&T issues. Like I said early in 2009 to 2010, we did a complete staff review of S&T and a comprehensive bipartisan bill was passed out of committee and went on to be passed unanimously by the House of Representatives.

One of the things we asked then, and continue to ask for, is a clear and transparent mission statement and listing of goals, so industry, academia, and the public at large can understand what the goals of the directorate are.

In your opinion, what are the three most important things the S&T directorate does or should be doing and how does the scientific community and industry at large know, or will know, when S&T is succeeding at doing them?

Mr. ARONSON. Thank you for the question. In my opinion, the three most important issues for the S&T directorate are these: To ensure that the DHS components, in particular the first responders, are able to address the evolving homeland security challenges that face our Nation with, as I said earlier the most up-to-date, robust, and easy-to-use technologies that are on offer.

Second, to make full use of our Nation's scientific and technological minds and facilities in pursuit of those technologies, and third to anticipate medium- and long-term homeland security challenges by funding more high-risk, high-reward RND to produce game-changing scientific breakthroughs and innovations.

With regard to your second question, I think the under secretary has to proactively lay out in a clear and concise and transparent manner the directory's near- and longer-term goals and how the roster of activities proposed in the strategic plan accomplish those goals. Doing so might include benchmarks, how those benchmarks are reached and how and when goals are accomplished; in other words, transparency about the plan and its state of accomplishment.

Again, this should entail communicating not only within the homeland security community but more broadly with the wider science and technology community, the public, Members of Congress and others of the stakeholders.

Mr. RICHMOND. Mr. Pearl.

Mr. PEARL. Mr. Richmond, I guess the question—your first question in terms of the most important things comes—is a two-part question; one is for S&T and then, one is the most important things for industry.

I mean it is time for me to be a little selfish and reflecting as well. With respect to the things that the director can do, they have

to do the things that are most beneficial and of most value to their customers, which is in essence the components that are within DHS.

The decisions need to be coordinated and decided by the customers. It can't be done outside and what they produce in the fastest and available time with the least amount of dollars. That is where from an industry standpoint we would differ with the scientists. DHS has to in essence, unlike DOD, get stuff done now.

You as Members of Congress, as citizenry wants it done yesterday and it is not a long-range, you know, the long-range testing and the way that a strategic plan might be usually viewed upon.

But the industry in the end can't decide what those priorities are. It is a partner but the end-user. From an industry perspective we are saying, No. 1, there needs to be built a business case for industry to be involved in what is going on.

No. 2, as I think it has been said by all of us, we have to increase transparency and communication across the board through a sharing of tactical business plans that explain how they plan to accomplish those goals, and No. 3, find more ways to increase collaboration with the components.

If those three things are the most important one, we as industry are not going to direct what those priorities are for the Department, for the Secretary, for the President. But we then can respond accordingly with the best, most effective, and most efficient solutions.

Mr. PARKER. I do agree with what Mr. Pearl said and not to duplicate his comments, I will add few other things I think are at the core of the mission. One is to make sure that the DHS components have the tools and information they need to make decisions about what technology to deploy or not, depending on the results.

I think that, you know, there is an enormous amount of innovation going on in the security industry, the commercial, developed for commercial and international markets.

You know, from our perspective, one of the types of S&T projects that have had the most success is where you are integrating essentially off-the-shelf technology developed commercially into a system or solution to fulfill an urgent operational need in the components.

So, I think being able to harness that innovation is a key element of the mission.

Mr. RICHMOND. Thank you. I yield back.

Mr. RATCLIFFE. Thank the gentleman and I recognize myself for an additional 5 minutes of questions.

Mr. Pearl, I would like to start with you again. I mentioned this in my opening statement. S&T has a number of programs, offices, and initiatives to work with small and medium-sized businesses like the S&T small business innovation research program, the technology transfer program, and the commercialization office.

I would like to know: What experience do your stakeholders have with these programs and are they effective in working with industry from your perspective?

Mr. PEARL. Well, I don't want to speak to maybe any one particular one like the SBIR program. In many respects, some of our small businesses have been involved in it. Sometimes, they invite one or two large businesses to do a kind-of lecture or discussion.

I don't think that—I think that if we begin to draw lines between what your revenue is versus what your capabilities are, I think we get into trouble. I think DHS as a whole, this is an issue for all of DHS, you shouldn't just be checking a box to say we have hit these numbers in terms of small businesses. But that we have accomplished these goals and we are providing these solutions based on whatever size the business is and we need to work with you and the full committee on getting to that.

But having said that there have been a number of instances, the APEX program that I talked about. There is out in Landover a special entry/exit reengineering program, an APEX program that they are testing on site what that looks like.

We were the first organization to be able to bring a group of companies that were not necessarily submitting to that plan that S&T is running with CDP, but we could see what was going on.

The openness of the APEX programs and as I think my written testimony talked about, the more that there is this kind of transparency as a whole on what those APEX programs are going to be trying to do, the better off they are.

I am impressed with Dr. Aronson's, you know, suggestion on sharing information. The website now is in better shape than it has ever been. Just using the website, that kind of social media in its own way is something that has been done and our industry has responded.

I think next week there is going to be an industry day that S&T is putting together in the Rad/Nuc arena. Bottom line is more and more of encouraging industry's involvement and awareness far to the left of needs and requirements to what is the problem.

Let's all meet together, let's not push up intellectual property and proprietary rights. Let's just talk as an experienced group of scientists and the industry officials who have provided those solutions to talk together would be something that I would—I have seen beginning to happen. We just want to encourage more of it.

Mr. RATCLIFFE. Thank you, Mr. Pearl. So as you mentioned APEX programs, let me move to you, Dr. Aronson to get your perspective there. Under Secretary Brothers has plans to significantly expand the APEX programs in S&T including the creation of an APEX engines entity that performs crosscutting RND and technology development.

I would like to know your impressions of the APEX programs generally, and do you think that the planned expansion is a good idea.

Mr. ARONSON. Well, I am not terribly familiar with the APEX programs, but I do believe in general the issue of risk-taking and interdisciplinary research are important for any program that is attempting to look across a range of time horizon points that cover both very near-term and urgent needs to technologies that have to develop in order to provide the expected capabilities for emerging threats.

Mr. RATCLIFFE. Thank you, Dr. Aronson.

We have talked a little today about the problem of timeliness and contracting and awards. Mr. Parker, how would you suggest that S&T improve the awarding of research and development contracts,

since in the past there typically has been a delay between the award and the allocation of funds?

Mr. PARKER. Well, I think just—I mean opening the lines of communication is a good start. I mean there is, you know, one of the ideas that has come to us that maybe there should be industry day type of events or technology summits that are hosted at either the S&T labs or company labs, and many companies have innovation labs, to foster this open dialog between the director and the industry.

Mr. RATCLIFFE. Thank you, Mr. Parker. My time has again expired, and I would like to again recognize the Ranking Member for an additional 5 minutes of questions.

Mr. RICHMOND. Thank you, Mr. Chairman, I hope not to use it all. Again, I will pose this question to the entire panel and this time we will start from my left to my right.

As you know this subcommittee and committee has passed some important cyber authorization and security legislation. One of the recurring issues is developing, educating, and attracting a diverse work force to come work at DHS.

Can you give us some examples, specifically, probably, you, Dr. Aronson, of how Brookhaven, your laboratory or other labs have interacted with or collaborated with minority-serving institutions that are part of the S&T university programs, especially in the areas of internships, mentoring, or faculty exchanges?

So however you all want to answer. I am okay with that. Whoever wants to jump on it first?

Mr. ARONSON. Well, since you mentioned Brookhaven my ears went up, and I would like to say a couple of things, but I would like to introduce it by saying that this is an issue for the entire S&T and R&D community in this country.

We don't have a good record of inclusivity and we desperately need to fill the ranks of the next generation of scientists and engineers. Mostly I think or to a greater extent than before from domestic resources.

So just out of a pure business sense it is crazy not to be looking for all the brightest minds in the country. At Brookhaven like many of the other National labs, we have a lot of educational programs and work force development programs serving K through 12 as well as college undergraduates, graduate students, of course, come to do their advanced research there.

Even science teachers. We run programs to bring the local communities' science teachers to the lab to understand how science is really done is something I think is missing in the schools in general.

A lot of our programs are targeted to minority-serving institutions. I am just going to mention one of them, there are a bunch. But we have a program we started about 8 years ago called INCREASE that stands for Interdisciplinary Consortium for Research and Educational Access in Science and Engineering.

It trains teams from minority-serving institutions, both faculty and students in the use of some of the cutting-edge scientific facilities that the Government has paid for and we operate at Brookhaven National Laboratory, like our nanoscience center, the Center for Functional Nanomaterials, and our currently world-lead-

ing X-ray light source. These teams learn how to write scientific proposals, how to build and conduct experiments, how to do those experiments and analyze the data and publish the results.

Basically, provide them the resources, if they can write a proposal that is deserving of time on those machines, they get the time on those machines at no cost and they get to join the scientific team that way. So I am extremely proud of that program, it is only one of a number that we do, but I will end by saying we have an awful long way to go in terms of inclusivity.

Mr. RICHMOND. Mr. Pearl.

Mr. PEARL. I think your question which went to the issue of science and long-range planning is something that is naturally in the labs and naturally in the academia world.

To a great extent, industry is a here-and-now as DHS has been the components of here-and-now. What can you do for me in this context? The length of time that it takes to even get from the beginning of an identity of a problem to the solution, it takes so long sometimes. Sometimes there are a lot of inquiries, but the responses by industry going to like another sphere, we don't hear back from them and what is going on, that many companies have gone across the pond.

My written testimony gives an example of that where they have, in certain areas, they can get a decision made particularly in radiological and nuclear detection markets much faster in the foreign countries and they get a seat at the table and they are developing aspects of R&D in the moment of potential business opportunity.

So I think that to a great extent, how we get women, veterans, minorities, the most capable and dedicated and effective people who whether they are in the sciences or whether they are in the applications of the solutions, we have to do a better job.

In the cyber bills that you have been talking about that are out there, we now have offices within Government that are competing for the top cybersecurity specialists, forget about what industry might be able to have in terms of expertise.

We have to do a better-coordinated effort. That is something that a science and technology directorate possibly could take on and how do you coordinate taking the best and the brightest and putting them in the spots that they are most valuable and most needed?

Mr. RICHMOND. Mr. Parker, my time has expired but if you can answer very quickly, I would appreciate it and I would yield back.

Mr. PARKER. I will just say that, you know, finding a qualified workforce in the science field is very challenging, but we have a number of members who are small or minority-owned businesses, veteran-owned businesses that benefit enormously from Federal programs that encourage their involvement, so thank you.

Mr. RICHMOND. Okay. Thank you, Mr. Chairman, and I would just say for the record that just last week Google announced that it is going to send some of their engineers to HBCUs so that they can attract a more diverse workforce and work students and faculty.

So with that, Mr. Chairman, I yield back and thank you for indulgence in letting me go over a little while.

Mr. RATCLIFFE. Thank you, gentlemen. The Chairman now recognizes other Members of the subcommittee for 5 minutes of questions beginning with the gentleman from Florida, Mr. Clawson.

Mr. CLAWSON. Thank you. Thank you to the three of you for coming today, and sorry I was late, so if any of my questions is repetitive you all will forgive me for that.

So I am putting this in a box in my mind and what is coming out is we are using public money either directly for research or through the small business innovation program to companies to try to motivate the private sector at some level to help solve a problem which is a public good program, security is a public good, right?

So sometimes it is through universities, which is why they have research parks, sometimes it is—you are trying, we are trying to get, DHS is trying to get a private company without any involvement through a grant to solve a security problem through innovation, right, so I got that right. Okay.

Now, I think most technological innovation is driven by the profit motive; that may be shorter, Mr. Pearl in your mind, and I understand that. There is always a mismatch of incentives between public and private sectors because the time lines are different, because the public sector doesn't have quarterly profits.

So it doesn't make the private guys bad, they just have a different incentive? Correct. I think you are with me so far, right?

Can you give me, given that that is the framework here, if I have understood at all, right through my study and listening, do we have any examples, and I know you all are not DHS and no one is here from DHS, where DHS is kind-of saying, look, we have this security problem. This is the kind of innovation we need. We are spending all this money to try to get a catalyst for that—a solution to that. Either a private company or a private pseudo-company through a research park or a university or whatever comes up with an innovation that is now in the security sector that I could see.

So, yes, this is—has made the public good of security more secure, and the private guys have made some money and their shareholders were already—are also happy about that. Can you all give me any exam—I think that is how this is supposed to work. We are spending a lot of money on it.

Am I wrong in my—in how I am viewing this? If not, can you give me any—knowing you all are not DHS, do we have any real live examples of success?

Mr. PEARL. There are a number of individual examples and for the purposes of the record what I would love to do and I assume that Mr. Parker will do likewise is go back and talk to our members specifically and answer to the question about from our point of view from industry, what has worked.

But the general statement is this and that is my concern—Government only knows what Government knows. So when Government says, any agency says, I want this, it is only based on maybe the person they talk to.

It is not based on knowledge of what exists in the market. It doesn't know what is going on down the road. To a certain extent that is the role that S&T could and should play, particularly with its funding of the National labs, et cetera.

The analogy I used of 100 years ago, a department said I need the fastest horse, that was the RFP. Give me the fastest horse to get from point A to point Z. All the horse guys would come in, but if Henry Ford had walked in, they would have said, “No, no. You are not the fastest horse.”

I think that we have got to get to a point that before we come up with the need, with the requirement, with the solution, we have to have an earlier conversation that talks about, how do you frame the problem? What is your problem?

Oh, I can't get stuff from point A to point Z fast enough. Well, locate it at point Y might be the case. So all that I am saying hypothetically is that we have to have more communication, more discussion and get all of the players in who can come up with—no one company has the solution. I am sure a lot of my members think so, but they don't. We need to have that collaborative discussion.

Mr. CLAWSON. So we would say before we came up with a strategy, we would have to understand conditions on the ground or the market conditions, if you will. Okay? So does that mean the Government comes up with the market conditions and then outsources the strategy given those conditions or do—or are we outsourcing the market conditions analysis?

Mr. PEARL. You have to define the problem. Congress defines the problem. The administration through its Executive branch defines how it is going to best address the problem. Labs and the industry comes in, not to tell you what the problem is but to provide the solutions to what you have identified as our public policy leaders is the way I would see it.

Mr. CLAWSON. Yes, sir. Can I continue? You are—Mr. Lee?

Go ahead, Mr. Parker—

Mr. PARKER. Sir, I would—Congressman, I would—I have two examples that are kind of a little bit further down the line once, you know, the problem has been identified. One is years ago US-VISIT which is now open had a challenge, they issued a challenge to industry.

They are expanding the use of biometric technology to record fingerprints. The type of device they were using was as big as a large microwave that sat on a customs officers, you know, desk and they said, “We need to get this down to a 6-by-6-inch cube size.”

They had many other technical requirements that were very clear and performance requirements that were laid out. They—it was also, certainty was provided; it was, hey, we are going to buy X number of these devices.

So then industry responded, investment occurred, and several prototypes were produced and one was eventually chosen giving the agency that capability within 1 year. So it is one of the, which one of the success stories of how this has worked out.

In one more example, right now, there is a mobile biometrics program, it is using a lot of technologies that is developed commercially. There is one called the Stockton Latent Print mobile pilot where they are using—law enforcement officers were using mobile devices to take latent fingerprints from crime scenes and doing matches within a few minutes to fingerprint databases.

That is something that even if the Federal Government doesn't develop an acquisition program directly from it, products will be

developed that will be available for State and local law enforcement.

Mr. CLAWSON. I yield back.

Mr. RATCLIFFE. I thank the gentleman from Florida. I would like to recognize my friend and colleague from Rhode Island, Mr. Langevin for 5 minutes of questions.

Mr. LANGEVIN. Thank you, Mr. Chairman. I too want to thank our panel of witnesses for their testimony today. It has been very helpful, and I am sorry that I couldn't get here sooner, but I appreciate what I have heard and look forward to reviewing your testimony further.

So my question is—so like many members of the panel I am so deeply interested in cybersecurity and DHS's role in protecting our networks. The S&P Directorate considers itself the lead Unclassified cybersecurity—lead provider of Unclassified cybersecurity R&D in the Federal Government.

So how does that mesh with your experiences in the industry and academia? I am particularly interested, Dr. Aronson, in how the directorate is viewed by university researchers in the field as it has never established an information security, information engineering center of excellence, which I find a bit curious.

But I am very curious to hear all your perspectives on DHS's role in this vital area of research.

Mr. ARONSON. I think the landscape of interest in cybersecurity is certainly Government-wide and probably universal. I think it is a little difficult. I think for the lack of a more comprehensive R&D policy that spans departments in the Government for academia to address it in any coherent way.

It is kind of a multi-dimensional space and people, I think, tend to work with agencies that they are familiar with, if they have the capability, and the need is there and it is—the need is everywhere. So it is a little bit hard to see DHS in particular as an attractor for that.

I think it is just—the problem, we haven't recognized the appropriate level or coordinated at the appropriate level.

Mr. LANGEVIN. Okay. Anyone else from the panel got a comment?

Mr. PEARL. I would only piggyback to what Dr. Aronson said, Congressman, in the context of when you are talking about dollars as one incentive to doing it, yes, there are the altruistic reasons for doing it and working on cyber. Even academia will go where the dollars are.

DHS is in charge of in essence the .gov space and the .com space as it oversees cyber. But the major amount of dollars going in is going more into our National security arena, so why would—if you are going to provide a specific need, you are going to go to where to a certain extent where the dollars are, whether it is research dollars or it is industry dollars.

Having said that, however, I think that we need to in essence look at the overall aspect of specificity. Meaning, if Government is going to ask for something, it can't be a general, well come up with something that is cyber-related, and we will look at it. Because nobody is going to spend the time and the resources doing that and then nothing happening.

There is no acquisition that comes out of it. No procurement that comes out of it. No even response that comes out of that and that is what this whole, I think what the Chairman has put together as a hearing is to say, how can we encourage S&T to in essence be more specific, more clear, more transparent about what it is looking for so that academia and industry can better respond to a specific need? In this case, I want to say a specific problem that exists that we then can put our minds to and tackle.

Mr. LANGEVIN. Okay. So let me—I could build off of that because I think it is a good segue to this question—following up on Chairman Ratcliffe’s earlier question, Dr. Aronson in your prepared testimony you lament the fact that the S&T research is not well-guided by an independent advisory committee, and I am curious beyond setting priorities among different capabilities and threats, do you believe that this lack of guidance might also affect the balance of basic research, applied research, and development funded by the directorate? Do you see specific ways that balance could be improved?

Mr. ARONSON. Yes, I do see that that situation exists where there is not sufficient balance across the spectrum of science and technology. I believe it is because there is not good communications between the community that can say, you know, what their capabilities are, what is physically possible, what is, you know, reasonably buildable to inform discussions about priority—technology priorities or even policy priorities.

I remember in the Department of Energy during an earlier phase in the cybersecurity wars, somebody came up with the idea that we would essentially close the Government except for two penetrations to the firewall to the rest of the world.

It is an idiotic idea. But nobody asked a computer scientist I guess or somebody who actually uses the system. That is a kind of problem you can get into if you are missing a piece.

I see that in the science and technology strategic plan. If you look at the stakeholders, there is a nice little pie chart that describes the stakeholders in there; there is almost nobody from non-Governmental or academic sectors contributing to the thinking about the strategic plan. That is the issue.

Mr. LANGEVIN. Thank you.

Anyone else? Or I will yield back. Mr. Chairman, thank you very much. I yield back.

Mr. RATCLIFFE. I think the gentleman and I thank the witnesses for their very insightful and thoughtful testimony today. I thank the Members for their questions. If Members have additional questions for the witnesses, we will ask you to respond to those in writing.

Pursuant to committee rule 7(e), the hearing will be held open for a period of 10 days. Without objection the subcommittee stands adjourned.

[Whereupon, at 11:11 a.m., the subcommittee was adjourned.]

APPENDIX

QUESTIONS FROM HONORABLE JAMES R. LANGEVIN FOR JACOB PARKER

Question 1a. One of the areas highlighted in testimony was the enormity of the research space tied to protecting our homeland. During debate on any reauthorization bill we consider in this subcommittee, I am sure we will address the scope of the S&T Directorate. Assuming a budgetary environment that remains constrained, what should the directorate focus on?

Should it have a narrow and deep focus—for instance, meeting immediate Departmental technological needs or funding a portfolio based primarily on extramural basic research?

Answer. Response was not received at the time of publication.

Question 1b. Conversely, should it have a broad and shallow focus knowing that, given budgetary restrictions, such a focus will necessarily preclude expertise? This will be one of the chief challenges facing the committee during reauthorization, and the more specific the guidance, the more helpful it will be.

Answer. Response was not received at the time of publication.

Question 2. A lot of the focus on R&D tends toward the hard sciences—math, physics, chemistry, computer science, etc. However, experience in cybersecurity domain suggests that social science research, such as psychology or economics, can play a vital role in combatting threats. Social engineering—convincing people to take actions that compromise their security (by, for example, clicking on a phishing email)—is one of the most-used cyber attack vectors. Similarly, the committee has spent a good deal of time studying the reasons that individuals become radicalized and turn to violent extremism, which is a sociological/psychological question at heart.

Do you believe that social science research is an important part of the S&T Directorate's portfolio?

Answer. Response was not received at the time of publication.

QUESTIONS FROM HONORABLE JAMES R. LANGEVIN FOR MARC A. PEARL

Question 1a. One of the areas highlighted in testimony was the enormity of the research space tied to protecting our homeland. During debate on any reauthorization bill we consider in this subcommittee, I am sure we will address the scope of the S&T Directorate. Assuming a budgetary environment that remains constrained, what should the directorate focus on?

Should it have a narrow and deep focus—for instance, meeting immediate Departmental technological needs or funding a portfolio based primarily on extramural basic research?

Question 1b. Conversely, should it have a broad and shallow focus knowing that, given budgetary restrictions, such a focus will necessarily preclude expertise? This will be one of the chief challenges facing the committee during reauthorization, and the more specific the guidance, the more helpful it will be.

Answer. This question should not be answered in isolation and without the proper context. S&T's role and portfolio should be consistent with a Departmental view of how the entire spectrum of R&D is to be accomplished to meet the most critical needs. The right answer depends on the overall R&D strategy for the Department, which is the missing piece needed to guide this decision.

For any organization, whether public or private, there is no one best model for R&D. The success of any R&D organization results from the interaction of many different factors and choices. R&D organizations cannot be designed to do all things equally well. Every approach to R&D has strengths and weaknesses that must be managed through a strategy.

To best understand why a strategy is so important, I urge this subcommittee to read the work of Gary P. Pisano on “Creating an R&D Strategy.”¹ This working paper provides a framework for designing an R&D strategy. It starts with the simple notion that a strategy is a system approach to solving a problem. An R&D strategy is defined as a coherent set of interrelated choices and decisions based on: Organizational architecture (how R&D is structured organizationally and geographically), processes (the formal and informal ways that R&D is carried out), people (choices about human resources), and project portfolios (desired allocation across different types of R&D projects and the criteria used to sort, prioritize, and select projects). Performance hinges on consistent and coherent choices across all four components. A good strategy must also align to the realities and limitations of the environment and the broader organizational context in which they operate. To illustrate the framework, Pisano uses examples of three pharmaceutical companies and examines how their different R&D strategies were rooted in different assumptions about the core driver of R&D performance. The examples provide an understanding about how and why different organizations pursue different strategies to address the same problem.

His work suggests that the very first question to be answered in strategy development is: What is our shared understanding of the root cause of the problem we are trying to solve? Another way of looking at it is to also ask “what does it take to win?”² The answer to these questions will then drive decisions about how to organize, prioritize, and conduct R&D within any given organization. Finally, because a strategy is a hypothesis, an R&D strategy must be evaluated against performance data, and organizations must recognize when the time has come to reject their initial hypothesis and change strategies.

In the Government context, a good example of how a strategy is driven by the answers to these questions is the “2011 Federal Cybersecurity R&D Strategic Plan.”² The direction of this plan relies on the hypothesis and principle that research must focus on addressing the root causes of cybersecurity vulnerabilities as opposed to just treating the symptoms. Cybersecurity is a multi-dimensional problem, involving both the strength of security technologies and the variability of human behavior. Therefore, solutions depend not only on expertise in mathematics, computer science, and electrical engineering but also in biology, economics, and other social and behavioral sciences. Due to these underlying principles, the strategic plan thus focuses on the need for expertise and resources from a wide range of disciplines and sectors. It is the underlying agreed-upon principles associated with how to address the problem that then help drive decisions about architecture, people, processes, and portfolio.

The Federal cybersecurity R&D plan includes four strategic thrusts that help organize and drive the direction of cybersecurity R&D. It provides a vision for the research necessary to develop game-changing technologies and also provides guidance for Federal agencies, policymakers, researchers, budget analysts, and the public in determining how to direct limited resources into activities that have the potential to generate the greatest impact. The themes compel a new way of doing business because they give focus to underlying causes in order to bring about change, which in the case of cybersecurity requires prioritization on interdisciplinary efforts. The plan also looks closely at the realities of the operating environment and the resources of all stakeholders. It recognizes that within that context, Government investment in basic research is essential because industry does not have the economic interest or return on investment time horizon to conduct that type of research. The themes present a logical path from research to transition, deployment, and cooperation with the private sector.

As you can see from the cybersecurity example above, the answer to the question of what the S&T Directorate should focus on depends on an agreed-upon Departmental strategy for how to address an underlying problem set. The Department as a whole should have a balanced R&D program, including funding for basic research, technology assessment, advanced development, test and evaluation, and capability integration. However, the allocation of funding to each of those areas and the division of responsibility (among all stakeholders) for those activities needs to be consistent with a Departmental view of how the entire spectrum of R&D should be accomplished to meet the most critical needs. S&T should not be seen as a competitor to the components. There are critical questions that need to be answered about the

¹See “Creating an R&D Strategy,” Gary P. Pisano, (Working Paper, 12-095, April 24, 2012), HARVARD BUSINESS SCHOOL. http://www.hbs.edu/faculty/Publication%20Files/12-095_fb1bd97-e0ec-4a82-b7c0-42279dd4d00e.pdf.

²https://www.whitehouse.gov/sites/default/files/microsites/ostp/fed_cybersecurity_rd_strategic_plan_2011.pdf.

value that S&T's past and current activities have and will provide to its customers and end-users, which activities have and will produce results that reduce risk and address priority problems, as well as who is best-suited to conduct specific activities. Without a Departmental R&D strategy to serve as a guide, it is quite difficult to make an educated and informed decision on these issues and to determine what should be prioritized and funded.

Question 2. A lot of the focus on R&D tends toward the hard sciences—math, physics, chemistry, computer science, etc. However, experience in cybersecurity domain suggests that social science research, such as psychology or economics, can play a vital role in combatting threats. Social engineering—convincing people to take actions that compromise their security (by, for example, clicking on a phishing email)—is one of the most-used cyber attack vectors. Similarly, the committee has spent a good deal of time studying the reasons that individuals become radicalized and turn to violent extremism, which is a sociological/psychological question at heart.

Do you believe that social science research is an important part of the S&T Directorate's portfolio?

Answer. Social science research is an important and appropriate part of the S&T Directorate's portfolio when it aligns with an agreed-upon strategic approach to how to address a specific problem set.

As mentioned in our response to Question 1, social and behavioral science research is a critical aspect to the 2011 Federal Cybersecurity R&D Strategic Plan because the developers of the plan agreed that cybersecurity vulnerabilities could not be successfully mitigated unless research and solutions were focused on root causes to bring about change. Since cybersecurity is a multi-dimensional problem that involves both the strength of security technologies and the variability of human behavior, it was critical that solutions depend not only on expertise in mathematics, computer science, and electrical engineering but also in biology, economics, and other social and behavioral sciences.

QUESTIONS FROM HONORABLE JAMES R. LANGEVIN FOR SAMUEL H. ARONSON

Question 1a. One of the areas highlighted in testimony was the enormity of the research space tied to protecting our homeland. During debate on any reauthorization bill we consider in this subcommittee, I am sure we will address the scope of the S&T Directorate. Assuming a budgetary environment that remains constrained, what should the directorate focus on?

Should it have a narrow and deep focus—for instance, meeting immediate Departmental technological needs or funding a portfolio based primarily on extramural basic research?

Question 1b. Conversely, should it have a broad and shallow focus knowing that, given budgetary restrictions, such a focus will necessarily preclude expertise? This will be one of the chief challenges facing the committee during reauthorization, and the more specific the guidance, the more helpful it will be.

Answer. Response was not received at the time of publication.

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