The Wiki and the Blog:

Toward a Complex Adaptive Intelligence Community

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ABSTRACT

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US policy-makers, war-fighters, and law-enforcers now operate in a real-time worldwide decision and implementation environment. The rapidly changing circumstances in which they operate take on lives of their own, which are difficult or impossible to anticipate or predict. The only way to meet the continuously unpredictable challenges ahead of us is to match them with continuously unpredictable changes of our own. We must transform the Intelligence Community into a community that dynamically reinvents itself by continuously learning and adapting as the national security environment changes.

Recent theoretical developments in the philosophy of science that matured in the 1990's, collectively known as Complexity Theory, suggest changes the community should make to meet this challenge. These changes include allowing our officers more autonomy in the context of improved tradecraft and information sharing. In addition, several new technologies will facilitate this transformation. Two examples are self-organizing knowledge websites, known as Wikis, and information sharing websites known as Blogs. Allowing Intelligence Officers and our non-intelligence National Security colleagues access to these technologies on SIPRNet, will provide a critical mass to begin the transformation.

THE WIKI AND THE BLOG

Problem Statement

US policy-makers, war-fighters, and law-enforcers now operate in a real-time worldwide decision and implementation environment. Information about a new development in Baghdad is known in Washington within minutes. Decisions about a response are made in Washington within minutes. These decisions are implemented in Baghdad within minutes of the decision. The total "intelligence – decision – implementation" cycle time can be as short as 15 minutes. While this is an extreme example, it highlights the tremendous compression of the response time required by all involved compared to previous generations. This severe compression not only affects the highest priority issues, it also ripples back into the most routine intelligence, decision, and implementation processes.

It does so for good reason. The compressed response cycle gives the United States significant strategic and tactical superiority over our adversaries. Our national security is best protected when we operate more quickly than those who would do harm to our people and our freedom. This compressed response time allows us to disrupt, interdict, preempt, and respond to injurious efforts before our adversaries can achieve their goals against us.

This compression is not just a preferred work style within the US National Security community. It is a characteristic of the way the world works in the 21st Century. Thus, not only do we respond more quickly, but also the circumstances to which we respond—in and of themselves—develop more quickly. These rapidly changing circumstances take on lives of their own, which are difficult or impossible to anticipate or predict. The US National Security Community—and the Intelligence Community within it—is faced with the issue of how to operate in a security

environment that, by its nature, is changing rapidly in ways we cannot predict. A simple answer is that the Intelligence Community, by its nature, must change rapidly in ways we cannot predict. What was that? How can we change ourselves in ways we cannot predict? More directly, how do we modify our nature to enable such unpredictable changes? Before giving the right answer, there is a wrong answer that can be dismissed up front—reorganization. Any reorganization by its nature is both predictable and slow. By the time any particular reorganization has taken effect, the causes that spawned it will have been replaced by new and different causes. The reorganization is thus not suited to address these new and different causes. All major restructurings are based on the assumption that we can take the recent past and predict the future. Such assumptions may have been reasonable in previous centuries, but not in this one.

The only way to meet the continuously unpredictable challenges ahead of us is to match them with continuously unpredictable changes of our own. ***We must transform the Intelligence Community into a community that dynamically reinvents itself by continuously learning and adapting as the national security environment changes.*** Unless we, in the Intelligence Community, allow ourselves this ability to change, we cannot hope to fulfill our mission to insure domestic tranquility, provide for the common defense, and secure the blessings of liberty (U.S. Constitution, preamble) for our fellow citizens from those whose aim it is to deprive us of these values.

Theoretical Development

To describe a community that "dynamically reinvents itself by continuously learning and adapting" in response to environmental changes harks to theoretical developments in the

philosophy of science that matured in the 1990's collectively known as Complexity Theory (Lewin, 1992). Complexity theory arises out of a rich and diverse intellectual heritage. Four significant theoretical building blocks undergird Complexity Theory. The scope of this paper only allows for a brief mention of these building blocks (though Complexity Theory itself will be treated in more detail over the next couple of pages). Briefly, the four building blocks are:

- General System Theory (von Bertalanffy, 1968). This theory was formulated in the 1930's and 1940's as a reaction to the then popular theory of reductionism that asserted in order to understand a phenomenon, one only had to decompose it into its components. System Theory elevated the system itself as the subject of inquiry, independent of its parts.
- Information Theory (Shannon, 1948). This theory is built on the premise that no communication channel is error free—that is, random errors are always introduced into the message—in spite of error correction routines. Shannon showed how to transmit correct messages in noisy channels. Moreover, he showed that the noise in the channel was information in and of itself and thus can be used to transmit messages. There is meaning in the noise.
- Chaos theory (Lorenz, 1993). This theory dates from Lorenz's 1963 article in the Journal of the Atmospheric Sciences where he showed that minor differences in the beginning of a weather pattern produced unpredictably large differences in how the weather pattern played out. He summarized this observation in the title of his 1972 address to the American Association for the Advancement of Science, "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set off a Tornado in Texas?" The unpredictability of

outcomes due to small changes in initial conditions has thus come to be known as "The Butterfly Effect."

- Fractal Theory (Mandelbrot, 1977). This theory took shape with Mandelbrot's 1968 paper entitled, "How Long is the Coastline of Britain?" He demonstrated that as the ruler got smaller, the length of the coastline increased. He also showed that at ever-increasing smaller scales of observation the coastline remained constantly jagged. He discovered this pattern in many natural phenomena, such as mountains. While a mountain rises from the surface of the earth into the third dimension, as we get farther out into space it looks increasingly flat compared to the total earth's surface. From space, the mountain does not rise a full dimension from the surface of the earth, but just a fraction of a dimension. Something that exhibits this partial dimensionality is called a Fractal. Fractals also exhibit consistent complexity regardless of the scale at which they are observed.

Source: Pierce, 2004.

Four Examples

As an introduction to Complexity Theory itself, four examples of common phenomenon that express various concepts of Complexity Theory will be summarized below (cf. Johnson, 2001). Following these examples, an explanation of Complexity Theory will be given.

Example One: In one of the foundational treatises of modern western thought, Adam Smith's (1776) Wealth of Nations describes how individuals, in pursuing their own economic self-interest, create a market for goods and services. This market has an "invisible hand" that decides

which goods and services survive over time and which do not. It is "invisible" in the sense that no individual or group of individuals decides what the market should produce or consume. It just "happens" out of the aggregated actions of large numbers of individuals. The individuals are only trying to make their own lives better. Out of their collective and self-organized behavior, market behavior emerges. This market behavior is distinctly different from individual behavior. The market dynamically adapts prices in response to unpredictable supplies and demands. The market is able to do this because of continuous learning on the part of and information feedback to the individual purveyors and consumers of goods and services.

Markets are essentially bottom-up, self-regulated enterprises that become incredibly complex. Indeed, global markets emerge even when individuals behave locally. For example, German demand for bananas stimulates banana production in the South Pacific. Neither the German buyers nor the South Pacific suppliers need to travel to participate in the market (though some intermediary shippers do travel). The market price conveys information about the behavior of both the German consumers and the South Pacific providers. Moreover, billions of goods and services are supplied to people around the world and no central authority is needed to manage a list of what goods and services are to be produced and delivered where at what price.

Two and a half centuries of experience with free markets teaches us, however, that markets are subject to manipulation, distortion, and out-of-control spirals. We impose rules on markets to ameliorate the worst of these effects. These take the forms of trade agreements, taxes, and regulations with criminal and civil penalties. In sum, markets are complex adaptive systems with

properties that emerge out of simple behaviors by a large number of self-organized individuals. The sum is greater than the parts.

Example Two: The mathematician Alan Turing is considered to be one of the fathers of the discipline of computer science for his work in formalizing algorithmic computation. He was also an intelligence officer during WWII, leading the effort to decrypt the German Enigma Machine. In the last paper written before his death (Turing, 1952), he addressed himself to the subject of the Freshwater Hydra and the leaves of plants. Turing worked out a mathematical model showing that relatively simple homogeneous sets of chemical agents following relatively simple rules generate quite complex biological structures, such as tentacles of the Hydra and the leaf patterns of plants. While guided by strict rules, these biological structures dynamically adapt to their changing and somewhat unpredictable environment of varying combinations of sun, water, nutrients and predators, etc. From the same chemical base, each hydra has a unique tentacle set.

Source: Walsh, 2003.

Similarly, from the same chemical base, each plant of a particular species has a unique placement of leaves—and each leaf has a slightly different structure. The important point is that in the face of external changes, complex systems can change, albeit in unpredictable, but adaptive ways.

Example three: Jane Jacobs (1961) shows that decisions by many individuals about where to locate their homes and businesses create neighborhoods with distinctive properties. These distinctive neighborhoods persist even though individuals are constantly moving in and moving out. Similar kinds of people are attracted to similar neighborhoods. Some neighborhoods do

change over time in response to changes in the environment. Other neighborhoods (both exclusive and slum) resiliently maintain their character in spite of city planners' best efforts. For example, the silk merchants in Florence, Italy, have inhabited the same neighborhood for over 500 years. People, taking into account both the external environment and what the other people or businesses in their neighborhood are doing, decide to move or stay. This collective, self-organizing behavior determines how the neighborhood emerges and adapts.

Example four: Deborah Gordon (1999) dispels the myth of the ant queen. For many years, entomologists thought the ant queen exerted a controlling, organizing influence over "her" colony. In fact, individual ants make individual decisions about what activities to perform (from a limited set of behaviors) based on what their nearest neighbors are doing. For example, if too many ants are cleaning a particular area of the colony, an individual ant will decide to go hunt food. Adherence to simple rules at an individual level allows ant colonies at the group level to respond to both strategic (seasonal) and tactical (predatory) changes in their environment. From a limited set of individual self-organized behaviors, an ant colony emerges and survives for more than a decade.

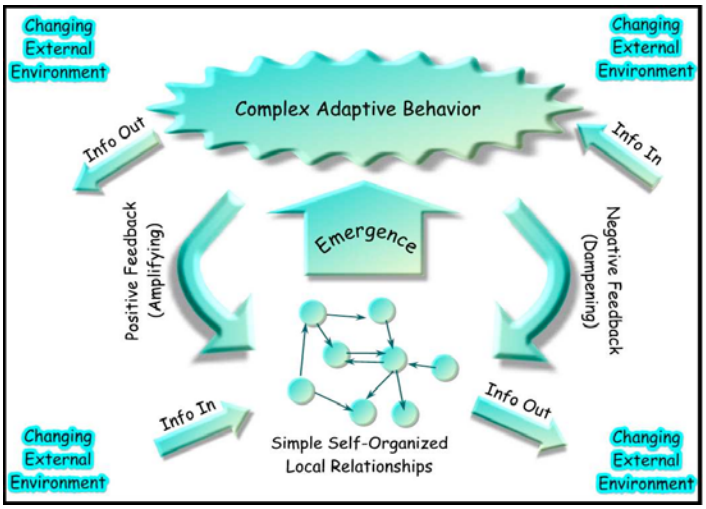
Complexity Theory

The Santa Fe Institute (www.santafe.edu) founded in 1984 and The Center for Complex Systems Research founded in 1986 at the University of Illinois (www.ccsr.uiuc.edu) have inspired a body of work (e.g., Johnson, 2001) that articulates a coherent framework of complex adaptive systems. The six critical components of a complex adaptive system are:

1. Self-organization – individuals (people, ants, chemicals) decide to act in similar ways in proximity to and in concert with each other, for their own reasons. For example, 2 boys independently shooting hoops decide to go one-on-one to 20 points. In addition, a critical mass of individuals is required for self-organization to happen.
2. Emergence – the whole is greater than the sum of the parts. For example, twelve Canadian Geese flying in a "V" is more than just 12 individual geese flying. The group behavior is distinct from the individual behavior.
3. Relationships – individuals look at their nearest neighbors to try and figure out what is happening so they can make decisions. For example, House Speaker 'Tip' O'Neil declared, "All politics is local." By this he meant that people vote for national leaders on the basis of what is happening in and around one's home. It doesn't matter what the national unemployment rate is, it only matters what the local unemployment rate is.
4. Feedback – information circulates in the system, is modified by others, and then comes back to influence the behavior of the originator either as a positive (amplified) or negative (dampened) influence. For example, an ant crosses a pheromone trail it previously laid down. The ant says to itself, "I've already been here, so I'd better wander somewhere else." It is also important that the historical memory of the system be part of the feedback (amplifying or dampening) loop.
5. Adaptability – the system is open so that information (and/or energy) flows in and out of the system. This new information enters into the feedback loops and influences the behavior of the individuals, and thus the overall behavior of the system adapts to the external environment. For example, think of a group of kids engaged in unsupervised play in the basement as a self-organized system. When the dad opens the basement door

and yells "everyone gets an ice cream cone when the toys are picked up" and closes the door, he adds new external information into the system. The kids adapt to the external influence by stopping play and putting the toys away. Systems that are 1) continuously open to new information from the environment, and 2) circulate the information within the system, will continuously change in response.

6. Non-Linearity – Small changes in the initial conditions or external environment have large (unpredictable) consequences in the outcomes of the system – also known as the "butterfly effect," cited earlier. For example, when the dad yells down the stairs for ice cream, the kids adapt by fighting over who made which mess. In the ruckus, they knock over a shelf that breaks one child's arm. The dad did not predict he would be going to the emergency room by offering ice cream to the children.



Source: Author

This graphic depicts these six characteristics. From simple, self-organized personal relationships emerges complex adaptive behavior. Information from the external environment enters the system and impinges on the on these relationships as either positive or negative feedback. The personal relationships are changed and the complex behavior adapts.

Complex systems that under-adapt, such as snowflakes, present us with a model that is too staid for our use. Complex systems that over-adapt, such as the 1994 Rwandan massacres of more than one million people, are too chaotic for our use. The best complex adaptive systems are those that are poised on the edge of chaos. These vibrant systems thrive by continuously learning and adapting to the continuous changes in the environment. They have achieved a healthy circulation of positive (amplifying) and negative (dampening) feedback in the system.

Network Centric Warfare

There has been a recent attempt to apply the principles of complexity theory to government—specifically to the military services. The Department of Defense (DoD) is subject to the same response time compression as the Intelligence Community. The DoD understands that the command and control regimes that worked in the 20th Century do not serve as well in the 21st. In response, they are pursuing an effort called Network Centric Warfare (NCW) which is being championed by the Office of Force Transformation (OFT) and supported by the Command and Control Research Program (CCRP), both under the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD/C3I). While Network Centric Warfare has its detractors, it nevertheless does offer an example for the Intelligence Community. Alberts, Garstka, and Stein (1999, p2.) define NCW as:

> . . . an information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. In essence, NCW translates

information superiority into combat power by effectively linking knowledgeable entities in the battlespace.

Wilson (2004, p2.) identifies four main objectives of NCW.

1. Self-synchronization, or doing what needs to be done without traditional orders;
2. Improved understanding of higher command's intent;
3. Improved understanding of the operational situation at all levels of command; and
4. Increased ability to tap into the collective knowledge of all U.S. (and coalition) forces to reduce the "fog and friction" commonly referred to in descriptions of fighting.

The impact of NCW was seen in Operation Iraqi Freedom. Only about 250,000 US troops were deployed in Operation Iraqi Freedom compared to the nearly 500,000 US troops that were deployed a decade earlier in Operation Desert Storm. Individual units were smaller and moved faster. Because units knew the location of other nearby units without line of sight, they spread out in a "swarm" fashion. If one unit got into trouble the other nearby units gave aid by converging on the enemy from all directions. Knowing the location of nearby units greatly reduced friendly fire accidents. Because the high priority objectives were clear, there was no need to secure all of the rear. Units could hit the heart of the enemy command and thus disable enemy units on the periphery without having to engage them. When units encountered difficult obstacles, they could engage experts off the battlefield in real-time—sometimes as far away as Washington—to help solve problems. Moreover, units moved more quickly because damage and opportunity assessments were made and conveyed during the battle, rather than waiting for overnight analysis.

What were the key ingredients that helped make NCW a winning component in Operation Iraqi Freedom? The units were highly trained, professional warriors. Not only were they experts in the use of their advanced equipment and well practiced in the tactical art of battle, they knew the rules of engagement and the strategic and tactical objectives. Thus enabled, they were trusted to act on their own in the battlefield. From the thousands of deployed units—each pursuing their own tactical objectives—emerged an integrated land, air, and sea force unparalleled in human history. No other military on earth can match the effectiveness of the US Military.

Application to Intelligence

The objective that was identified at the outset of this paper was that the Intelligence Community must be able to dynamically reinvent itself by continuously learning and adapting as the national security environment changes. Complexity Theory tells us that we can only achieve this objective if several conditions exist. Enabling these conditions will be a big change for the Intelligence Community, but if we are serious about succeeding in improving ourselves, it is imperative that these changes be made.

1. Intelligence Officers must be enabled to act more on their own. Just as people in a market are empowered to make their own purchases, and individual ants in a colony can decide which task to perform, and military units are able to choose battlefield tactics in real-time, so too, intelligence officers must be allowed to react—in independent self-organized ways—to developments in the National Security environment.
2. Intelligence Offices must be more expert in Tradecraft. It is this expertise that engenders the trust required for independent action. Military units know the rules of engagement

and are thus entrusted to engage in battle. Ants have a hardwired rule set, which enables the colony. Cities are built on the rules that govern property deeds, titles, and liens. Expertise in tradecraft for each intelligence discipline must become a constant quest for each officer.

3. Intelligence Officers must share much more information. Just as military units in the field must know where other units are located in geographic space, intelligence analysts, for example, must know where their colleagues across the Community are located in intellectual space. This knowledge results from sharing information. From the previously cited examples, we understand that information sharing among individuals allows market niches to be filled, ants to fend off predator attacks, and plants to distribute themselves in the ecosystem. Increased information sharing among Intelligence officers will allow these Intelligence officers to self-organize to respond in near real-time to National Security concerns.
4. Intelligence Offices must receive more feedback from the National Security environment. The only way to learn from and adapt to the changing National Security environment is to be in constant receipt of feedback from that environment. Just as zoo-raised animals cannot compete in the wild, intelligence officers cloistered in the Intelligence Community are not adapted to or fitted for the National Security environment.
5. Intelligence Managers must be more persuasive about strategic objectives. Quadrennial strategic directions are good, but these directions must become part of the everyday dialog at all levels in the community. Many intelligence officers, with their noses to the grindstones, know little about the overall strategic intelligence objectives. One must know how one's own piece of work fits into the overall intelligence mosaic, because the

> intelligence mosaic is constantly changing, and thus one's own piece must constantly change to remain well fitted. Intelligence managers must be constantly communicating their constantly changing objectives. Intelligence officers will, in turn, adapt.

About 1843, the newest and largest western frontier city—larger than Chicago or St. Louis—was also the most orderly and well kept. A visiting dignitary asked the mayor of Nauvoo, Illinois, how he managed so many people so well. He replied, "I teach them correct principles and they govern themselves" (Taylor, 1851). This sound bite encapsulates the spirit of what complexity theory suggests as a model for the intelligence community. From intelligence officers who are allowed to share information and act upon it within a simple tradecraft regime will emerge an intelligence community that continuously and dynamically reinvents itself in response to the needs of the national security environment.

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Self-organizing Tools

At first blush—and in the context of how the intelligence community now operates—the five prescriptions seem almost ridiculous, especially the two most important ones about information sharing and independent, self-organized action. The good news is that technology advances in the last four years make implementing such prescriptions easier than one might initially think. There is a new generation of Internet tools that enable people to self-organize around shared knowledge.

The first of these self-organizing tools is known as "Wiki" (pronounced whicky) and is named after the Hawaiian term *wiki wiki*, which means fast (Leuf and Cunningham, 2001). Wiki tools allow 1) any person to add content to a web site, and 2) any other person to edit the content. The most famous implementation of Wiki is the Wikipedia (wikipedia.org). This is an encyclopedia created and edited by Internet users. It has been in existence since 2001 and now has over 1,000,000 entries in over 100 different languages. By comparison, the 2004 edition of the 32-volume Encyclopedia Britannica contains just over 65,000 entries (see store.britannica.com). Other Wikis include dictionaries (en.wiktionary.org), books (en.wikibooks.org), quotations (en.wikiquotes.org), and document collections (wikisource.org).

Source: en.wikipedia.org

The Wikipedia has an interesting and innovative 'tradecraft' or a rule set to which contributors and editors must abide. All content contributions are self-initiated. There is no editor-in-chief. Because all contributors are also editors, when a person notices an article that needs content revisions or does not abide by the rules, that person makes the edit. All previous versions of the article are available and all changes are attributable. Another wiki rule for the encyclopedia is that explicit or implicit points of view are out of bounds. These are edited out quickly.

There are privileged contributors with administrative powers beyond the normal contributor. They can adjudicate disputes among contributors. The existing administrators confer administrative powers to a person on the basis of the quantity and quality of that person's

contributions. If a person disengages from performing administrative duties the privileges are revoked.

The rules themselves are also subject to the Wiki process. Any person can introduce changes at any time. Disputes over the rules can be escalated to a board of administrators.

In sum, from the little bits of work by many, many people, following simple rules of content contribution and editing, the most comprehensive and authoritative, and bias-free encyclopedia in the world has been produced in four years. This is an encyclopedia that is dynamically and constantly changing in response to the world as the world itself is changing. The lists of medals received in the 2004 Athens Olympics were updated as the events concluded. No manager made the assignment. No editor-in-chief reviewed the accuracy. It happened, as if by magic. A person took the initiative to update the entries and hundreds (or possibly thousands) of others reviewed the content for quality.

One of the Wikipedia's strengths is also a weakness—no points of view. Much of the self-corrective knowledge that exists in the intelligence community exists in personal points of view. Currently, there exists almost no official outlet for points of view in the intelligence community. A healthy market of debatable ideas emerges from the sharing of points of view. From the ideas that prosper in a market, will arise the adaptive behaviors the intelligence community must adopt in order to respond to the changing national security environment. Not all good ideas originate at the top.

A second self-organizing information-sharing tool has matured in the last few years. It is called "blogging." The term comes from "web log" shortened to 'blog. A blog is a journal or diary that is kept in the public space of the Internet. Individuals maintain their own blogs on an hourly, daily, weekly, or periodic basis. They are their own editors. Current blogging technology makes it easy to manage one's blog (see www.blogger.com, for example). Most blogs take the form of citing a current event and offering a point of view about it. Often one blog will cite a comment in another blog and comment on it. The 'blogosphere' is truly a marketplace of ideas.

Source: www.blogger.com

Enabling intelligence officers across the community to express and share opinions may be one of the largest paradigm shifts for the IC. It will be uncomfortable for some because it will be in the blogosphere where the community will ride along the edge of chaos. The blogosphere probably will obey the 99-to-1 Edison rule ("Genius is one percent inspiration and ninety-nine percent perspiration" – from wikiquotes.com). For every ninety-nine mediocre ideas, there will likely only be one brilliant idea. The few brilliant ideas, however, are worth the investment of many mediocre (and chaotic) ones. It is these few brilliant ideas that will provide the direction for the community to adapt to the changing national security environment. The few brilliant ideas will survive in the market place of ideas. As individual blogs comment on each other's ideas, the brilliant ideas will spread as feedback throughout the community. Individuals, recognizing the brilliance, will respond. From this self-organized response will emerge the adaptive behavior required of the Intelligence Community.

Three Wrapper Technologies

The Wiki and the Blog are complimentary companion technologies that together form the core workspace that will allow intelligence officers to share, innovate, adapt, respond, and be—on occasion—brilliant. Blogs will cite Wiki entries. The occasional brilliant blog comment will shape the Wiki. The Blog will be vibrant, and make many sea changes in real-time. The Wiki, as it matures, will serve as corporate knowledge and will not be as fickle as the Blog. The Wiki will be authoritative in nature, while the Blog will be highly agile. The Blog is personal and opinionated. The Wiki is agreed-upon and corporate.

The Wiki and Blog, however, while standing together, cannot stand by themselves. Intelligence officers need a wellspring of intelligence from which to build the Wiki and about which to comment in the Blog. Such a wellspring would be a community-wide intelligence repository patterned after DIA's SAFE or CIA's CIRAS. These repositories are largely disordered, out-of-context piles of cables. That is okay. The intelligence repository is like unrefined ore. (The repository could actually be many federated databases.) The Blog and the Wiki serve as successive refining processes for the unrefined ore in the intelligence repository. The Blog would vet, comment, and establish context for the intelligence. This extracted intelligence knowledge from the intelligence repository would be placed in the well-organized Wiki. Both the Wiki and the Blog would link back to authoritative source documents in the repository.

While an intelligence repository is required "under" the Wiki and the Blog, two more technologies are required "above" them. One is a search technology and the other is a feedback technology. Part of the agility required in today's high-speed national security environment is to

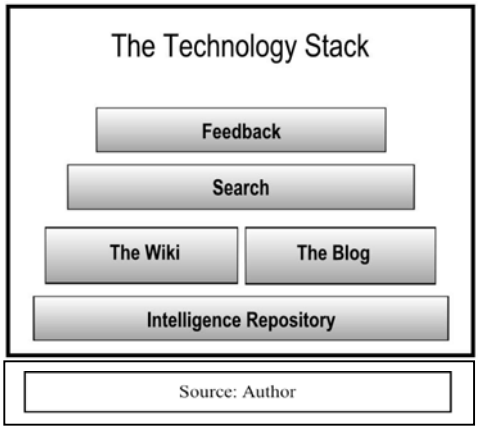
be able to quickly find information. One needs the ability to search for specific knowledge within or across the Wiki, or the Blog, or the Intelligence Repository in a Google-like (www.google.com) fashion.

While most intelligence officers are quite familiar with search technology, we are less acquainted with feedback technologies. These technologies are often in and of themselves self-organizing. For example, we might want to know which cables in the repository were most cited by the Blog over the last 24 hours. This feedback lets the visitor quickly know what the community thinks is important. It also lets the originator of the cable understand its impact. Feedback technologies let visitors know what areas of the Wiki are changing most rapidly as an indicator of newly vetted knowledge. Feedback technologies can utilize subscription techniques such as "send me an alert when more than 10 people have read my blog."

Wikipedia.org makes extensive use of these feedback technologies on its homepage. Another feedback Internet site (www.daypop.com) has dozens of real-time lists--from the top words to the top blog postings to and the top sources cited. Its Top 40 list not only gives the current ranking but whether the ranking is going up or down.

Feedback technologies are an integral part of the solution suggested by Complexity Theory. As important as information sharing is to the success of the solution, it is even more important to know who is sharing what information. This allows intelligence officers to accurately understand where they are in the intellectual space of the intelligence community. It also allows intelligence officers to see what gaps exist and where changes need to be made. The feedback

technologies allow an agile reading of the current state of play across the wide expanse of the Repository, the Wiki, and the Blog.



Together, these five technologies (Repository, Wiki, Blog, Search, Feedback), would allow the community to start down the path of implementing the five mission recommendations (self organization, tradecraft, information sharing, feedback, and strategic communication) suggested by Complexity Theory.

A Sharing Space

We need a space for change that is not organization dependent (remember, reorganizations are not part of the solution set). We need a space to begin implementing the five mission changes that is independent of organization. We need a space that is open not just to the intelligence community but also to other non-intelligence national security elements—to allow sharing and feedback. We need a space with a sufficiently large critical mass of intelligence officers. We need a space that is neither organizationally nor geographically nor temporally bound. We need a secure space that can host a corporate knowledge repository. We need a flexible space that supports tools for self-organizing (Wiki), information sharing (Blog), searching, and feedback as previously mentioned. We need a place in which tradecraft procedures can be implemented. In short, we need a space that is always on, ubiquitously distributed, and secure. We need an electronic network. We need SIPRNet.

SIPRNet (Secret Internet Protocol Router Network) is managed by the Defense Information Systems Agency (www.disa.mil). It is widely accessible by intelligence officers and other national security officers alike. It has been deployed to every Embassy and every Military Command. It is a more attractive experimental sharing space than the Top Secret Community Network (JWICS) because a critical mass accesses it, policy community officers access it, the tradecraft (security) rules are simpler, and it reaches all organizations and geographic locations. Moreover, SIPRNet is designed to host the Internet-based tools outlined above. Once the Wiki and the Blog processes and content mature on SIPRNet—that is, once the IC embraces the mission changes and becomes proficient in the use of the technology—the Wiki and Blog could be replicated on the Top Secret network.

Concept of Operations

Lipnak and Stamps (1997) in their seminal work on virtual communities identify four necessary conditions for success: a critical mass, trust, content, and purpose.

Critical Mass: Because the mission changes need to pervade the entire community, the technology needs to be available to every officer in the community. Because the community must operate symbiotically with the policy community, policy community officers must also have access to the technology. For the feedback mechanisms to work, there must be sufficient numbers of participants from the various intelligence disciplines across the community. To ensure the widest participation, the barriers to entry must be extremely low. This means the resources for deploying and operating these systems must be borne at the community level and provided as a common service for all. All SIPRNet users must be allowed to search the

intelligence repository, edit the Wiki, author a Blog, create links among these three, and get feedback. This means not only must the software be easy to use, but also self-registration and self-authorization services must be trivial.

Trust: As mentioned before, trust arises from tradecraft. Technical tradecraft has already secured the network. Technical tradecraft will also secure the tools and data. Procedural tradecraft in terms of the rules of use must be explicit and easily accessible. Security tradecraft has already cleared the users of SIPRNet. Applicable analytic and operational tradecraft principles must be identified and promulgated. For complexity theory to work, the procedural, analytic, and operational tradecraft rules must be simple.

Content: All intelligence organizations will need to identify content they can place into a community intelligence repository on SIPRNet. The repository will likely be a number of federated databases. For hyperlinks to work the objects in the repository must persist and the address to the objects must be permanent. There will need to be some priming of the Wiki and the Blog so the content is sufficiently broad and deep to have value. In the beginning some resources must be devoted on a full-time basis to bring the tools into full operational capability.

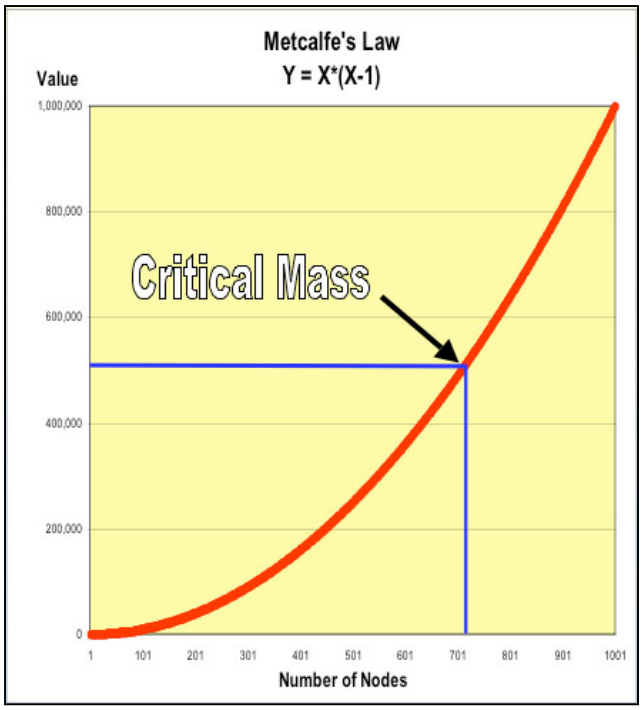
Purpose: This is where Community leadership, as well as feedback from the rest of the National Security environment, plays a key role. There are strategic, intermediate, and tactical purposes that must be communicated. A few community seniors may want to author a blog. These would be sure to get high readership. Posting strategic directions into the repository would also work.

Effecting the Transformation

Robert Metcalfe, inventor of the Ethernet protocol and founder of 3Com, asserted that the value of a communication system grows as approximately the square of the number of nodes of the system. This assertion has become known as Metcalfe's Law (Metcalfe, 1996). A single telephone or a single fax machine has no communication value. Two phones have a little value. Two thousand phones have some value. Two hundred million interconnected phones are a system that has incredible communication value.

I suggest a corollary to Metcalfe's Law. The value of a knowledge sharing web space (Wiki and Blog) grows as the square of the number of links created in the web space. There is not just knowledge in the content item (an intelligence cable, for example), but there is also knowledge in the link between one content item and another (a link from a comment in a blog to the intelligence cable). Think of the value of a blog that links a human source cable to an intercept cable to an image cable to an open source document to an analytic comment within the context of a national security issue. When such links are preserved for subsequent officers to consider, the value of the knowledge sharing web space increases dramatically. When ten thousand intelligence and national security officers are preserving such links on a daily basis, the Wiki and Blog system has incredible intelligence value (Drezner and Farrell, 2004).

At some point in the accelerating value along the Metcalfe curve, a critical mass is reached and the way we work begins to change. Two phones do not change society. Nor does two thousand phones. Two hundred million phones, however, change society forever. The way the human world works is qualitatively different in the era of two hundred million phones than in the era of



Source: Author

no phones. This technology-driven societal change is what authors Downes and Mui (1998) call the Law of Disruption. Once the Intelligence Community has a robust and mature Wiki and Blog knowledge sharing web space, ***the nature of Intelligence will change forever***. This is precisely the prescription we are looking for as laid out in the problem statement at the beginning of this paper. The community will be able to rapidly adapt to the dynamic national security environment by creating and sharing web links and insights through the Wiki and the Blog.

Conclusions

This paper identified a pressing Intelligence Community issue; namely, that the Intelligence Community must transform itself into a community that dynamically reinvents itself by continuously learning and adapting as the national security environment changes. The paper elucidated the principles from an exceptionally rich and exceedingly deep theory (Complexity Theory) about how the world works and has shown how these principles apply to the Intelligence Community. These principles include self-organization, information sharing, feedback, tradecraft, and leadership. The paper argues that from intelligence officers who are allowed to share information and act upon it within a simple tradecraft regime will emerge an intelligence

community that continuously and dynamically reinvents itself in response to the needs of the national security environment.

Lipnack and Stamps (1997) make a case that a successful virtual community is 90 percent culture and 10 percent technology. The most profound culture change will be for Intelligence managers to let go of their officers the same way the battlefield commanders have let go of their battlefield troops. Managers must trust their officers to directly share with each other and directly with the policy community. Intelligence managers' role will become less command and control and more teacher of tradecraft and communicator of purpose and objectives. The Intelligence Community will need to put into place powerful incentives and rewards for managers to change. Indeed, Intelligence Officers must feel encouraged by their managers to spend their workday engaged in sharing activities. These changes will allow the dynamic learning community to emerge.

Recognizing that these changes in attitude and work processes will be challenging to implement, the paper recommended some first steps. It was suggested that recent self-organizing and information-sharing tools from the Internet, **the Wiki and the Blog**, be deployed on the SIPRNet. Wrapping these tools in an intelligence repository, a search tool, and feedback reporting would complete the technology package. This paper also suggested a few process principles (critical mass, trust, content, and purpose) for success to be deployed along with the technology. As these tools and processes become robust and mature, a critical mass will emerge that will change the Intelligence Community's nature so that it can adapt to the rapidly changing national security environment.

The Intelligence Community is under extreme political pressure in the wake of the 9/11 Report (National Commission, 2004) , the Senate's report on pre-war intelligence (U.S. Senate, 2004), and the WMD Commission's report (Commission, 2005). If ever there was a time for the Community to re-examine its *modus operandi* it is now. Our political leaders are now demanding these changes from us (Bush, 2004). The changes in mindset suggested in this paper are significant. Enabling intelligence officers to independently express their point of view in a community-wide setting is groundbreaking. Equally avant-garde is letting intelligence officers create a body of intelligence knowledge without an editor in chief. Moreover, inviting our policy community counterparts at State, Homeland Security, the Commands, etc., to be full participants in these information-sharing activities is breathtaking. If anything, however, these changes are timid compared to the changes required to bring the community into the 21st Century. We must act, or we will certainly continue to be acted upon. May we have the will to overcome our inertia and succeed in our efforts.

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