

## More than Firewalls: Three Challenges to American Cyber Security

The rise in cyber attacks and continued vulnerability to anonymous cyber enemies is alarming. Yet the biggest threat to U.S. cyber security may be what's missing from it. "In terms of cyber warfare, there is a lot of strategic and doctrinal thinking not yet done. We don't know when a cyber war starts, how to declare it over, what proportionality means, and if there should be a cyber equivalent of the Geneva Convention. We are fighting on a battlefield created by man as opposed to nature, and one that is 85 percent owned and operated by the private sector."<sup>1</sup> To establish effective, long-term American cyber security, there are three key challenges the U.S. must address: definition, authority, and perception. Neglecting these basics of cyber security will only keep American assets – cyber and physical – at risk.

**Definition** If the first step in problem-solving methodology is defining the problem, then the U.S. should go back to square one. American cyber security has focused on preventing and protecting against cyber attacks, but little attention has been given to defining cyber attacks. As Rep. Jim Langevin, co-founder of the Congressional Cybersecurity Caucus, asked, "What are acceptable red lines for actions in cyberspace? . . . Does data theft or disruption rise to the level of warfare, or do we have to see a physical event, such as an attack on our power grid, before we respond militarily?" So, when is an attack considered cyber espionage or cyber terrorism or cyber warfare or something else?

The president and Congress currently "would decide that the human or economic damage is severe enough to consider a cyber event an act of war."<sup>2</sup> Cyber warfare is often defined as "actions by a nation-state to penetrate another nation's computers or networks for the purposes of causing damage or disruption."<sup>3</sup> Although attacks are often tracked to specific countries, the source may not be a nation-state. Cyber threat actors can also include non-governmental organizations, terrorist organizations, crime syndicates or simply motivated individuals. The potential damage from these individuals was demonstrated by the suspected source of leaked material in the WikiLeaks case, Army Private Bradley Manning. These insider threats bring cyber attacks even closer to home.

There are several complicating variables, such as the target itself. A cyber attack on military networks may be equivocal to an attack on a military installation. Less clear are attacks on high-value civilian targets, such as banks, power grids, financial and telecommunications networks. James Lewis, a cyber security expert who has advised the Obama administration, notes that "an attack on the transport system that closed down as much commerce as would a naval blockade could be considered an act of war."<sup>4</sup> With over 80% of critical American infrastructure owned by the private sector, it will be difficult to separate an attack on a company from an attack on the country. Timing is another example. The Stuxnet virus, considered to be the most advanced cyber weapon to date, was discovered on Iranian computers in

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<sup>1</sup> EastWest Institute, "Mobilizing for International Action, Second Worldwide Cybersecurity Summit in London," August 3, 2011, <http://dl.dropbox.com/u/869038/Cybersummit2011.pdf>.

<sup>2</sup> Ellen Nakashima, "U.S. cyber approach 'too predictable' for one top general," *Washington Post*, July 14, 2011, [http://www.washingtonpost.com/national/national-security/us-cyber-approach-too-predictable-for-one-top-general/2011/07/14/gIQAYJC6EI\\_story.html](http://www.washingtonpost.com/national/national-security/us-cyber-approach-too-predictable-for-one-top-general/2011/07/14/gIQAYJC6EI_story.html).

<sup>3</sup> Richard A. Clarke, *Cyber War: The Next Threat to National Security and What to Do About It* (New York: HarperCollins, 2010).

<sup>4</sup> Tom Leonard, "'Cyber attacks are an act of war': Pentagon to announce new rules of engagement against state sponsored hackers," *Daily Mail*, June 1, 2011, <http://www.dailymail.co.uk/news/article-1392746/Cyber-attacks-act-war-Pentagon-issue-new-rules-hackers.html>.

June 2010. However, it was believed to have been launched in June 2009 – a full year earlier.<sup>5</sup> How is a cyber attack addressed when there's no certainty of when it occurred?

Defining the array of cyber attacks and conflicts, from which countermeasures, processes and metrics can be developed, is a much-needed first step in enhancing American cyber security. How would the U.S. respond if North Korea attacked – even shut down – NASDAQ or the New York Stock Exchange? There is no proportional response because there is no North Korean stock exchange. “Will the U.S. drop a bomb that takes human lives because financial damage cannot be inflicted? Where is the line that other nation states recognize they must not cross or risk retaliation? Where is the policy that defines what that retaliation will comprise? That ‘cyber line’ is blurred because the United States ‘has not thought enough about it.’”<sup>6</sup> Simply put, a problem can't be solved if no one knows what the problem is.

**Authority** In February 2010, a cyber security simulation called Cyber Shockwave had a group of high-ranking former national security officials respond to a massive cyber attack that brought down cellular and Internet service across the country, as well as power on the East Coast.<sup>7</sup> At the mock National Security Council meeting, the acting attorney general announced that the government didn't have the authority to quarantine people's cell phones. The acting White House cyber coordinator proclaimed, “If we don't have the authority, the attorney general ought to find it.”<sup>8</sup> The simulation begged the question: Who's in charge?

The question of authority addresses the chains of command, coordination and cooperation. At the national level, responsibility over government systems is divided. U.S. Cyber Command (USCYBERCOM) centralizes command of cyberspace operations and synchronizes the defense of military networks, while the Department of Homeland Security (DHS) has responsibility over federal civilian networks. In May 2011, President Obama “signed executive orders that set forth the parameters by which the U.S. military can engage its adversaries and conduct routine espionage in the cyber realm.”<sup>9</sup> These guidelines, likened to those that govern the use of traditional weapons of war, such as missiles and secret surveillance, still require the military to obtain “presidential approval for a specific cyber assault on an enemy and weave cyber capabilities into U.S. war fighting strategy.”<sup>10</sup>

At DHS, the National Cyber Response Coordination Group is the principal federal agency mechanism for cyber incident response. Made up of 13 federal agencies, the Group also coordinates the law enforcement and intelligence communities. However, there is no point group for coordinating non-emergency cyber security activities. Nor are there comprehensive guidelines about coordination with state and local authorities. The prevailing policy, set forth in the 2009 Comprehensive National Cybersecurity Initiative, focuses on consolidating and improving technical capabilities across federal

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<sup>5</sup> Kim Zetter, “DHS Fears a Modified Stuxnet Could Attack U.S. Infrastructure,” *Wired*, July 26, 2011, <http://www.wired.com/threatlevel/2011/07/dhs-fears-stuxnet-attacks/>.

<sup>6</sup> Gilman Louie, “Keeping the Nation's Industrial Base Safe from Cyber Threats,” Symposium held March 1, 2011.

<sup>7</sup> Bipartisan Policy Center, *Cyber ShockWave*, <http://www.bipartisanpolicy.org/events/cyber2010>.

<sup>8</sup> Ellen Nakashima, “War game reveals U.S. lacks cyber-crisis skills,” *Washington Post*, February 17, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/02/16/AR2010021605762.html>.

<sup>9</sup> “Obama issues cyber warfare rules of engagement, Presidential approval required in some scenarios,” *Defense Systems*, June 22, 2011, <http://defensesystems.com/articles/2011/06/22/agg-dod-obama-cyber-warfare-strategy.aspx>.

<sup>10</sup> Lolita C. Baldor, “New orders detail Pentagon cyberwar guidelines,” *Air Force Times*, June 22, 2011, <http://www.airforcetimes.com/news/2011/06/ap-pentagon-gets-cyberwar-guidelines-062211/>.

agencies. However, if cyber security is an enterprise-wide endeavor, there must be better coordination across the government.

In 2010, USCYBERCOM Commander, Lt. Gen. Keith B. Alexander, wrote that cyber warfare was changing so swiftly that there was a "mismatch between our technical capabilities to conduct operations and the governing laws and policies."<sup>11</sup> Competition may be the problem. There are already more than 40 committees and well over 100 subcommittees in Congress that address cyber security.<sup>12</sup> In July 2011, there were 22 cyber security bills in queue for Congress and pending legislation from the White House.<sup>13</sup> The Energy, Commerce and Defense departments have also all put forward separate initiatives on the subject.

Cyber security cooperation must be advanced on an international level. The 2010 WikiLeaks scandal showed how the U.S. government couldn't even shut down the damaging website because their servers were in countries, like Sweden and France, where the U.S. has no jurisdiction.<sup>14</sup> Unilateral action to shut down servers in another country could even be considered an act of war. "There's no cyberspace Geneva Convention to govern specifically what is allowed in the event of a cyber war, and there's precious little formal agreement around the world on issues like international freedoms in cyberspace and governance of the Internet."<sup>15</sup> International cyber security conferences allow representatives of governments, international and non-governmental organizations, and businesses to discuss international cyber principles. However, the lack of international agreements, both formal and informal, on the rules of cyber space has greatly impeded the authority of the U.S. to protect itself from cyber attacks.

Even though the private sector owns most of the country's critical infrastructure, exerting authority over these companies is a sensitive endeavor. The government "has no regulatory authority and relies on voluntary cooperation from the private sector, and security has lagged behind rapidly evolving and growing cyber threats."<sup>16</sup> The increasing use of public-private partnerships has been one way to bridge this gap. Initiatives, like the Defense Industrial Base Cyber Security/Information Assurance program and the InfraGard program, have been valuable information sharing collaborations, but they are not a substitute for a mandate. "While experts and leaders from government and industry agree that public-private partnerships must be part of any effective strategy and program to counter cyber and insider threats, it is clear the U.S. government needs to take the lead on defending the nation's critical infrastructure."<sup>17</sup>

There has been slow progress since the Cyber Shockwave exercise to clarify questions of authority. While the Pentagon may have improved guidelines, the rest of the federal government does not.

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<sup>11</sup> John P. Mello Jr., "NSA Chief: Cyberwar Rules of Engagement a Policy Minefield," *Tech News World*, April 15, 2010, <http://www.technewsworld.com/story/69780.html?wlc=1312399087>.

<sup>12</sup> Ben Pershing, "On cybersecurity, Congress can't agree on turf," *Washington Post*, July 18, 2011, [http://www.washingtonpost.com/politics/on-cybersecurity-congress-cant-agree-on-turf/2011/07/18/gIQACGCWMI\\_story.html](http://www.washingtonpost.com/politics/on-cybersecurity-congress-cant-agree-on-turf/2011/07/18/gIQACGCWMI_story.html).

<sup>13</sup> Allan Friedman, "Economic and Policy Frameworks for Cybersecurity Risks," *Brookings Institution*, July 21, 2011, [http://www.brookings.edu/~media/Files/rc/papers/2011/0721\\_cybersecurity\\_friedman/0721\\_cybersecurity\\_friedman.pdf](http://www.brookings.edu/~media/Files/rc/papers/2011/0721_cybersecurity_friedman/0721_cybersecurity_friedman.pdf).

<sup>14</sup> Amazon.com's Web Services arm took the WikiLeaks site off their servers in December 2010.

<sup>15</sup> Karl Rauscher, "EastWest examines best practices of international cyber collaboration," *EastWest Institute*, July 8, 2011, <http://www.ewi.info/eastwest-examines-best-practices-international-cyber-collaboration>.

<sup>16</sup> William Jackson, "After 13 years, critical infrastructure security still lacking," *Government Computer News*, July 27, 2011, <http://gcn.com/Articles/2011/07/27/Critical-infrastructure-still-vulnerable-House-hearing.aspx?Page=1>.

<sup>17</sup> "Keeping the Nation's Industrial Base Safe from Cyber Threats," forthcoming symposium report.

Looking at the various cyber activities and actors, there is the potential for great confusion and inefficiency. And as the simulation demonstrated, a cyber attack will not be the right time to resolve the authority question.

**Perception** To say that cyber attacks have challenged traditional national security thinking is an understatement. At his Senate confirmation hearing in June 2011, Defense Secretary Leon Panetta warned that the “next Pearl Harbor we confront could very well be a cyber-attack that cripples our power systems, our grid, our security systems, our financial systems, our governmental systems.”<sup>18</sup> However ambiguous the enemy or intangible the battlefield may be, the effects of a cyber attack are very real. Yet when it comes to cyber security, the perception is far from reality.

While anyone with an internet connection is vulnerable to a cyber attack, it is the perception of vulnerability that is a bigger concern for many. A recent study found that about 85 percent of all U.S. companies have experienced one or more malicious attacks with each incident costing an average of \$7.2 million.<sup>19</sup> Yet many companies are afraid or too embarrassed to admit they’ve been hit. “Companies often don’t understand the threats, and if they do they hide it.”<sup>20</sup> They fear that acknowledging an attack would cause financial and legal problems with shareholders, competitors and customers. In April 2011, Sony waited nearly a week to inform stakeholders that the personal information of more than 100 million users of their PlayStation Network and other online entertainment services had been stolen. The attack cost the company \$173 million in increased customer support and retention costs, legal fees, lower sales and measures to strengthen security.<sup>21</sup> In contrast, when Heartland Payment Systems was hit with what was the largest data breach in American history at the time (2008), within three days it had contacted over 150,000 retail customers about scope of the problem and protective steps. Heartland’s response “not only protected consumer relationships, but also made each subsequent step in the recovery process all the more credible.” Although the attack cost the company \$140 million, Heartland also used the crisis as an opportunity to lead industry-wide cyber security reforms.<sup>22</sup> After years of putting its head in the sand, corporate America seems to be finally catching up to the idea that ignoring the problem won’t make it go away.

The perception of protection is another challenge. Many companies also believe they have done enough to adequately protect their systems. “Cybersecurity is often delegated to IT departments which may put in place generic defenses that are not aimed at specific advanced threats.”<sup>23</sup> The problem seems to start at the top. A 2010 Carnegie Mellon University survey of corporate directors and executives found that no one listed improving data security among their boards’ top three priorities and more than half of the responding companies did not employ a Chief Information Security Officer.<sup>24</sup> This doesn’t bode well

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<sup>18</sup> Joe Lieberman, Susan Collins and Tom Carper, “A gold standard in cyber-defense,” *Washington Post*, July 7, 2011, [http://www.washingtonpost.com/opinions/a-gold-standard-in-cyber-defense/2011/07/01/gIQAjsZk2H\\_print.html](http://www.washingtonpost.com/opinions/a-gold-standard-in-cyber-defense/2011/07/01/gIQAjsZk2H_print.html).

<sup>19</sup> Kelly Riddell, “SEC Says Companies Should Disclose Cyber Attacks in Filings,” *Bloomberg*, June 8, 2011, <http://www.bloomberg.com/news/2011-06-08/sec-says-companies-should-disclose-cyber-attacks-in-filings.html>.

<sup>20</sup> “Many firms reluctant to report cyber attacks,” *Business Insurance*, June 6, 2011, <http://www.businessinsurance.com/article/20110606/NEWS01/110609950>.

<sup>21</sup> Tomoko Hosaka, “Sony faces jittery shareholders after cyberattack,” *Seattle Post-Intelligencer*, June 30, 2011, <http://www.seattlepi.com/business/article/Sony-faces-jittery-shareholders-after-cyberattack-1443190.php>.

<sup>22</sup> Richard S. Levick, “Sony’s Cyberattack and How Companies Fail In Data Security,” *Fast Company*, May 3, 2011, <http://www.fastcompany.com/1751318/directors-are-disengaged-on-data-security>.

<sup>23</sup> EastWest Institute, “Mobilizing for International Action, Second Worldwide Cybersecurity Summit in London,” op.cit.

<sup>24</sup> Levick, op.cit.

for the public at-large. “Today, most people understand that they have traded a certain degree of privacy for the conveniences of the Digital Age. But at the same time, they also expect those they trust with their personal data to act responsibly when problems arise.”<sup>25</sup> The expectation of privacy is clear when it comes to personal medical and financial records, but becomes a more complicated in a social media era where users willingly disclose otherwise sensitive personal information. As Michael Hayden, former director of the National Security Agency and the CIA noted, “What constitutes a reasonable expectation of privacy in the 21st century? We have no idea.”<sup>26</sup> While end-users can be made “aware of their responsibilities to maintain and operate their devices in a safe and secure manner,” no one should feel protected from cyber attacks.<sup>27</sup>

The challenge of holding the perpetrators of cyber attacks accountable has also created a perception of paralysis; that little or nothing can be done to deter attackers. Effective cyber security must include consequences for cyber attacks. “We’re on a path that is too predictable, way too predictable,” proclaimed Gen. James Cartwright, vice chairman of the Joint Chiefs of Staff. “It’s purely defensive. There is no penalty for attacking us now. We have to figure out a way to change that.”<sup>28</sup> Although the White House’s May 2011 International Strategy for Cyberspace states that, “The United States will ensure that the risks associated with attacking or exploiting our networks vastly outweigh the potential benefits,” there is little explanation to what this means. Under existing U.S. and international laws, there is an arsenal of retaliatory tools. Financial measures include economic sanctions, reduction of international trade, foreign investment and economic aid, as well as cutting off supply chains. Countries can also choose to discontinue professional and educational exchanges, or sever diplomatic relations. These measures also allow for the reasonable escalation to the threat of military action, if necessary. The U.S. is not without options when it comes to responding to cyber attacks and recognizing this capability will make American cyber security all the more effective.

In the classic *The Art of War*, ancient Chinese military general Sun Tzu warned that one shouldn’t rely on whether or not the enemy will attack, but on making your own position unassailable. U.S. cyber security to date has focused more on defending against attacks than its own position. As a result, there are many unknowns, holes, and gaps in American cyber security. These challenges can be overcome by doing a better job of defining the cyber threat, identifying the appropriate authorities that manage the cyber threat, and by changing perceptions of what the cyber threat means. “The (cyber) threat is still maturing,” noted Deputy Secretary of Defense William Lynn recently. “The threat we see today is probably not the threat we’re going to see tomorrow. We need to get ahead of that game.”<sup>29</sup> By re-evaluating its position, the U.S. will not only get ahead of the cyber security game, but perhaps even win it.

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<sup>25</sup> Ibid.

<sup>26</sup> “International Engagement on Cyber: Establishing International Norms & Improved Cyber Security,” Forum held March 29, 2011, <http://www.georgetown.edu/story/cybersecurityforum.html>.

<sup>27</sup> The White House, “International Strategy for Cyberspace; Prosperity, Security, and Openness in a Networked World,” May 2011, [http://www.whitehouse.gov/sites/default/files/rss\\_viewer/international\\_strategy\\_for\\_cyberspace.pdf](http://www.whitehouse.gov/sites/default/files/rss_viewer/international_strategy_for_cyberspace.pdf).

<sup>28</sup> Ellen Nakashima, “U.S. cyber approach ‘too predictable’ for one top general,” op.cit.

<sup>29</sup> Karen Parrish, “Lynn gains IT industry’s cybersecurity perspective,” *American Forces Press Service*, February 16, 2011, <http://www.af.mil/news/story.asp?id=123242964>.