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Critical Infrastructures: Background, Policy, and Implementation

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Critical Infrastructures: Background, Policy and Implementation

Summary

The nation's health, wealth, and security rely on the production and distribution of certain goods and services. The array of physical assets, processes and organizations across which these goods and services move are called critical infrastructures (e.g. electricity, the power plants that generate it, and the electric grid upon which it is distributed).

The national security community has been concerned for sometime about the vulnerability of critical infrastructure to both physical and cyber attack. In May 1998, President Clinton released Presidential Decision Directive No. 63. The Directive set up groups within the federal government to develop and implement plans that would protect government-operated infrastructures and called for a dialogue between government and the private sector to develop a National Infrastructure Assurance Plan that would protect all of the nation's critical infrastructures by the year 2003. While the Directive called for both physical and cyber protection from both man-made and natural events, implementation focused on cyber protection against man-made cyber events (i.e. computer hackers). However, given the physical damage caused by the September 11 attacks, physical protections of critical infrastructures is receiving greater attention.

Following the events of September 11, the Bush Administration released two relevant Executive Orders (EOs). EO 13228, signed October 8, 2001 established the Office of Homeland Security. Among its duties, the Office shall "coordinate efforts to protect the United States and its critical infrastructure from the consequences of terrorist attacks." EO 13231, signed October 16, stated the Bush Administration's policy and objectives for protecting the nation's information infrastructure and established the President's Critical Infrastructure Protection Board chaired by a Special Advisor to the President for Cybersecurity (both of which were later abolished by an amending executive order). More recently (December 17, 2003), the Bush Administration released Homeland Security Presidential Directive 7, reiterating and expanding upon infrastructure protection policy and responsibilities which remain relatively unchanged through two Administrations.

Congress passed legislation in 2002 creating a Department of Homeland Security, consolidating into a single department a number of offices and agencies responsible for implementing various aspects of homeland security. However, infrastructure protection activities remain spread out between various directorates and agencies within the Department, including the Information Analysis and Infrastructure Protection Directorate and the Transportation Security Administration.

Issues in critical infrastructure protection include how to integrate cyber and physical protection; mechanisms for sharing information between the government, the private sector, and the public; the need to set priorities; and, whether or not the federal government will need to employ more direct incentives to achieve an adequate level of protection by the private sector and states. This report will be updated as warranted.

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Critical Infrastructures: Background, Policy, and Implementation

Latest Developments

Homeland Security Presidential Directive No. 7 called for the development of a comprehensive national plan for protecting the nation's critical infrastructure by December 2004. The Department of Homeland Security did not make that deadline. A draft plan is in review. For more discussion, see the National Critical Infrastructure Plan, in the Implementation section of this report. Also, much of the upper management of the Information Analysis and Infrastructure Protection Directorate have announced their departures from the Department. No names yet have been publically put forth as replacements.

Introduction

Certain socio-economic activities are vital to the day-to-day functioning and security of the country; for example, transportation of goods and people, communications, banking and finance, and the supply and distribution of electricity and water. Domestic security and our ability to monitor, deter, and respond to outside hostile acts also depend on some of these activities as well as other more specialized activities like intelligence gathering and command and control of police and military forces. A serious disruption in these activities and capabilities could have a major impact on the country's well-being.¹

These activities and capabilities are supported by an array of physical assets, processes, information, and organizations forming what has been called the nation's critical infrastructures. These infrastructures have grown complex and interconnected, meaning that a disruption in one may lead to disruptions in others.²

Disruptions can be caused by any number of factors: poor design, operator error, physical destruction due to natural causes, (earthquakes, lightning strikes, etc.) or physical destruction due to intentional human actions (theft, arson, terrorist attack, etc.). Over the years, operators of these infrastructures have taken measures to guard against, and to quickly respond to, many of these threats, primarily to improve

¹ As a reminder of how dependent society is on its infrastructure, in May 1998, PanAmSat's Galaxy IV satellite's on-board controller malfunctioned, disrupting service to an estimated 80-90% of the nation's pagers, causing problems for hospitals trying to reach doctors on call, emergency workers, and people trying to use their credit cards at gas pumps, to name but a few.

² The electricity blackout in August 2003 in the United States and Canada also illustrated the interdependencies between electricity, other elements of the energy market such as oil refining and pipelines, communications, drinking water supplies, etc.

reliability and safety. However, the terrorist attacks of September 11, and the subsequent anthrax attacks, demonstrated the need to reexamine protections in light of the terrorist threat, as part of overall critical infrastructure protection policy.³

This report provides an historical background and tracks the evolution of such an overall policy and its implementation. However, specific protections associated with individual infrastructures is beyond the scope of this report. For CRS products related to specific infrastructure protection efforts, see **For Additional Reading**.

Federal Critical Infrastructure Protection Policy: In Brief

As discussed below, a number of federal executive documents and federal legislation (notably the Homeland Security Act, P.L. 107-269) lay out a basic policy and strategy for protecting the nation's critical infrastructure. To summarize, the federal government will work with states, localities, and the owners and operators of critical infrastructure (in both the private and public sector) to identify those specific assets that are considered critical to the nation as a whole. Together, these entities will assess those assets' vulnerabilities to the threats facing the nation, determine the level of risk associated with possible attacks on those assets, and develop a set of prioritized protection measures that can be taken to reduce those risks. Primary responsibility for protection, response, and recovery lies with the owners and operators. However, the federal government holds open the possibility of intervening in those areas where owners and operators are unable (or unwilling) to provide adequate protection or response.

The reader who is not interested in the evolution of this policy and the organizational structures that have evolved to implement it can proceed to the Implementation and/or Issues sections of this report.

The President's Commission on Critical Infrastructure Protection

For reasons cited below, critical infrastructure protection, to many people before September 11, was synonymous with cyber security. This report takes as its starting point the establishment of the President's Commission on Critical Infrastructure Protection (PCCIP) in July 1996.⁴ Its tasks were to: report to the President the scope and nature of the vulnerabilities and threats to the nation's critical infrastructures

³ Besides loss of life, the terrorist attacks of September 11 disrupted the services of a number of critical infrastructures (including telecommunications, the internet, financial markets, and air transportation). In some cases, protections already in place (like off-site storage of data, mirror capacity, etc.) allowed for relatively quick reconstitution of services. In other cases, service was disrupted for much longer periods of time.

⁴ Executive Order 13010. Critical Infrastructure Protection. Federal Register. Vol 61. No. 138. July 17, 1996. pp. 3747-3750. Concern about the security of the nation's information infrastructure and the nation's dependence on it preceded the establishment of the Commission.

(focusing primarily on cyber threats);⁵ recommend a comprehensive national policy and implementation plan for protecting critical infrastructures; determine legal and policy issues raised by proposals to increase protections; and propose statutory and regulatory changes necessary to effect recommendations.

The PCCIP released its report to President Clinton in October 1997.⁶ Examining both the physical and cyber vulnerabilities, the Commission found no immediate crisis threatening the nation's infrastructures. However, it did find reason to take action, especially in the area of cyber security. The rapid growth of a computer-literate population (implying a greater pool of potential hackers), the inherent vulnerabilities of common protocols in computer networks, the easy availability of hacker "tools" (available on many websites), and the fact that the basic tools of the hacker (computer, modem, telephone line) are the same essential technologies used by the general population indicated to the Commission that both threat and vulnerability exist.

The Commission generally recommended that greater cooperation and communication between the private sector and government was needed. The private sector owns and operates much of the nation's critical infrastructure. As seen by the Commission, the government's primary role (aside from protecting its own infrastructures) is to collect and disseminate the latest information on intrusion techniques, threat analysis, and ways to defend against hackers.

The Commission also proposed a strategy for action:

- facilitate greater cooperation and communication between the private sector and appropriate government agencies by: setting a top level policy-making office in the White House; establishing a council that includes corporate executives, state and local government officials, and cabinet secretaries; and setting up information clearinghouses;
- develop a real-time capability of attack warning;
- establish and promote a comprehensive awareness and education program;
- streamline and clarify elements of the legal structure to support assurance measures (including clearing jurisdictional barriers to pursuing hackers electronically); and,
- expand research and development in technologies and techniques, especially technologies that allow for greater detection of intrusions.

The Commission's report underwent interagency review to determine how to respond. That review led to a Presidential Decision Directive released in May 1998.

⁵ Given the growing dependence and interconnectedness of the nation's infrastructure on computer networks, there was concern that computers and computer networks presented a new vulnerability and one that was not receiving adequate attention.

⁶ President's Commission on Critical Infrastructure Protection, *Critical Foundations: Protecting America's Infrastructures*, October 1997.

Presidential Decision Directive No. 63

Presidential Decision Directive No. 63 (PDD-63)⁷ set as a national goal the ability to protect the nation's critical infrastructure from intentional attacks (both physical and cyber) by the year 2003. According to the PDD, any interruptions in the ability of these infrastructures to provide their goods and services must be "brief, infrequent, manageable, geographically isolated, and minimally detrimental to the welfare of the United States."⁸

PDD-63 identified the following activities whose critical infrastructures should be protected: information and communications; banking and finance; water supply; aviation, highways, mass transit, pipelines, rail, and waterborne commerce; emergency and law enforcement services; emergency, fire, and continuity of government services; public health services; electric power, oil and gas production, and storage. In addition, the PDD identified four activities where the federal government controls the critical infrastructure: internal security and federal law enforcement; foreign intelligence; foreign affairs; and national defense.

A lead agency was assigned to each of these "sectors" (see **Table 1**). Each lead agency was directed to appoint a **Sector Liaison Official** to interact with appropriate private sector organizations. The private sector was encouraged to select a **Sector Coordinator** to work with the agency's sector liaison official. Together, the liaison official, sector coordinator, and all affected parties were to contribute to a sectoral security plan which was to be integrated into a **National Infrastructure Assurance Plan**. Each of the activities performed primarily by the federal government also were assigned a lead agency who was to appoint a **Functional Coordinator** to coordinate efforts similar to those made by the Sector Liaisons.

The PDD also assigned duties to the **National Coordinator** for Security, Infrastructure Protection, and Counter-terrorism.⁹ The National Coordinator reported to the President through the Assistant to the President for National Security Affairs.¹⁰ Among his many duties outlined in PDD-63, the National Coordinator chaired the **Critical Infrastructure Coordination Group**. This Group was the primary interagency working group for developing and implementing policy and for coordinating the federal government's own internal security measures. The Group

⁷ See *The Clinton's Administration's Policy on Critical Infrastructure Protection: Presidential Decision Directive 63*, White Paper, May 22, 1998. Available at the Federation of American Scientist website: [<http://www.fas.org/irp/offdocs/pdd/pdd-63.htm>].

⁸ Ibid.

⁹ The National Coordinator position was created by Presidential Decision Directive 62, "Combating Terrorism." PDD-62, which was classified, codified and clarified the roles and missions of various agencies engaged in counter-terrorism activities. The Office of the National Coordinator was established to integrate and coordinate these activities. The White House released a fact sheet on PDD-62 on May 22, 1998.

¹⁰ President Clinton designated Richard Clarke (Special Assistant to the President for Global Affairs, National Security Council) as National Coordinator.

included high level representatives from the lead agencies (including the Sector Liaisons), the National Economic Council, and all other relevant agencies.

Each federal agency was made responsible for securing its own critical infrastructure and was to designate a Critical Infrastructure Assurance Officer (CIAO) to assume that responsibility. The agency’s current Chief Information Officer (CIO) could double in that capacity. In those cases where the CIO and the CIAO were different, the CIO was responsible for assuring the agency’s information assets (databases, software, computers), while the CIAO was responsible for any other assets that make up that agency’s critical infrastructure. Agencies were given 180 days from the signing of the Directive to develop their plans. Those plans were to be fully implemented within two years and updated every two years.

Table 1. Lead Agencies per PDD-63

Department/Agency	Sector/Function
Commerce	Information and Communications
Treasury	Banking and Finance
EPA	Water
Transportation	Transportation
Justice	Emergency Law Enforcement
Federal Emergency Management Agency	Emergency Fire Service
Health and Human Services	Emergency Medicine
Energy	Electric Power, Gas, and Oil
Justice	Law Enforcement and International Security
Director of Central Intelligence	Intelligence
State	Foreign Affairs
Defense	National Defense

The PDD set up a **National Infrastructure Assurance Council**. The Council was to be a panel that included private operators of infrastructure assets and officials from state and local government officials and relevant federal agencies. The Council was to meet periodically and provide reports to the President as appropriate. The National Coordinator was to act as the Executive Director of the Council.

The PDD also called for a **National Infrastructure Assurance Plan**. The Plan was to integrate the plans from each of the sectors mentioned above and should consider the following: a vulnerability assessment, including the minimum essential capability required of the sector’s infrastructure to meet its purpose; remedial plans to reduce the sector’s vulnerability; warning requirements and procedures; response strategies; reconstitution of services; education and awareness programs; research and development needs; intelligence strategies; needs and opportunities for international cooperation; and legislative and budgetary requirements.

The PDD also set up a National Plan Coordination Staff to support the plan's development. Subsequently, the **Critical Infrastructure Assurance Office (CIAO)**, not to be confused with the agencies' Critical Infrastructure Assurance Officers) was established to serve this function and was placed in the Department of Commerce's Export Administration. CIAO supported the National Coordinator's efforts to integrate the sectoral plans into a National Plan, supported individual agencies in developing their internal plans, helped coordinate a national education and awareness programs, and provided legislative and public affairs support.

Most of the Directive established policy-making and oversight bodies making use of existing agency authorities and expertise. However, the PDD also addressed operational concerns. These dealt primarily with cyber security. The Directive called for a national capability to detect and respond to cyber attacks while they are in progress. Although not specifically identified in the Directive, the Clinton Administration proposed establishing a **Federal Intrusion Detection Network (FIDNET)** that would, together with the **Federal Computer Intrusion Response Capability (FedCIRC)**, established just prior to PDD-63, meet this goal.¹¹ The Directive explicitly gave the Federal Bureau of Investigation the authority to expand its existing computer crime capabilities into a **National Infrastructure Protection Center (NIPC)**. The Directive called for the NIPC to be the focal point for federal threat assessment, vulnerability analysis, early warning capability, law enforcement investigations, and response coordination. All agencies were required to forward to the NIPC information about threats and actual attacks on their infrastructure as well as attacks made on private sector infrastructures of which they become aware. Presumably, FIDNET¹² and FedCIRC would feed into the NIPC. According to the Directive, the NIPC would be linked electronically to the rest of the federal government and use warning and response expertise located throughout the federal government. The Directive also made the NIPC the conduit for information sharing with the private sector through an equivalent **Information Sharing and Analysis Center(s)** operated by the private sector, which PDD-63 encouraged the private sector to establish.

While the FBI was given the lead, the NIPC also included the Department of Defense, the Intelligence Community, and a representative from all lead agencies. Depending on the level of threat or the character of the intrusion, the NIPC was to have been placed in direct support of either the Department of Defense or the Intelligence Community.

¹¹ FedCIRC was renamed the Federal Computer Incident Response Center and has since been absorbed into the Department of Homeland Security's National Cyber Security Division.

¹² From the beginning FIDNET generated controversy both inside and outside the government. Privacy concerns, cost and technical feasibility were at issue. By the end of the Clinton Administration, FIDNET as a distributed intrusion detection system feeding into a centralized analysis and warning capability was abandoned. Each agency, however, is allowed and encouraged to use intrusion detection technology to monitor and secure their own systems.

Quite independent of PDD-63 in its origin, but clearly complimentary in its purpose, the FBI offers a program called **INFRAGARD** to private sector firms. The program includes an Alert Network. Participants in the program agree to supply the FBI with two reports when they suspect an intrusion of their systems has occurred. One report is “sanitized” of sensitive information and the other provides more detailed description of the intrusion. The FBI will help the participant respond to the intrusion. In addition, all participants are sent periodic updates on what is known about recent intrusion techniques. The FBI has set up local INFRAGARD chapters that can work with each other and regional FBI field offices. In January, 2001, the FBI announced it had finished establishing INFRAGARD chapters in each of its 56 field offices. Rather than sector-oriented, INFRAGARD is geographically-oriented.

It should also be noted that the FBI had, since the 1980s, a program called the **Key Assets Initiative (KAI)**. The objective of the KAI was to develop a database of information on “key assets” within the jurisdiction of each FBI field office, establish lines of communications with asset owners and operators to improve physical and cyber protection, and to coordinate with other federal, state, and local authorities to ensure their involvement in the protection of those assets. The program was initially begun to allow for contingency planning against physical terrorist attacks. According to testimony by a former Director of the NIPC, the program was “reinvigorated” by the NIPC and expanded to include the cyber dimension.¹³ The Department of Homeland Security has taken over the effort to create a data base of critical assets.

Restructuring by the Bush Administration

Pre-September 11. As part of its overall redesign of White House organization and assignment of responsibilities, the in-coming Bush Administration spent the first eight months reviewing its options for coordinating and overseeing critical infrastructure protection. During this time, the Bush Administration continued to support the activities begun by the Clinton Administration.

The Bush Administration review was influenced by three parallel debates. First, the National Security Council (NSC) underwent a major streamlining. All groups within the Council established during previous Administrations were abolished. Their responsibilities and functions were consolidated into 17 Policy Coordination Committees (PCCs). The activities associated with critical infrastructure protection were assumed by the Counter-Terrorism and National Preparedness PCC. At the time, whether, or to what extent, the NSC should remain the focal point for coordinating critical infrastructure protection (i.e. the National Coordinator came from the NSC) was unclear. Richard Clarke, himself, wrote a memorandum to the incoming Bush Administration that the function should be transferred directly to the White House.¹⁴

¹³ Testimony by Michael Vatis before the Senate Judiciary Committee, Subcommittee on Technology and Terrorism. Oct. 6, 1999. This effort was transferred to the Department of Homeland Security.

¹⁴ Senior NSC Official Pitches Cyber-Security Czar Concept in Memo to Rice. *Inside the* (continued...)

Second, there was a continuing debate about the merits of establishing a government-wide Chief Information Officer (CIO), whose responsibilities would include protection of all federal non-national security-related computer systems and coordination with the private sector on the protection of privately owned computer systems. Shortly after assuming office, the Bush Administration announced its desire not to create a separate federal CIO position, but to recruit a Deputy Director of the Office of Management and Budget that would assume an oversight role of agency CIOs. One of the reason's cited for this was a desire to keep agencies responsible for their own computer security.¹⁵

Third, there was the continuing debate about how best to defend the country against terrorism, in general. Some include in the terrorist threat cyber attacks on critical infrastructure. The U.S. Commission on National Security/21st Century (the Hart-Rudman Commission) proposed a new National Homeland Security Agency. The recommendation built upon the current Federal Emergency Management Agency (FEMA) by adding to it the Coast Guard, the Border Patrol, Customs Service, and other agencies. The Commission recommended that the new organization include a directorate responsible for critical infrastructure protection. While both the Clinton and Bush Administration remained cool to this idea, bills were introduced in Congress to establish such an agency. As discussed below, the Bush Administration changed its position in June 2002, and proposed a new department along the lines of that proposed by the Hart/Rudman Commission and Congress.

Post-September 11. Soon after the September 11 terrorist attacks, President Bush signed two Executive Orders relevant to critical infrastructure protection. These have since been amended to reflect changes brought about by the establishment of the Department of Homeland Security (see below). The following is a brief discussion of the original E.O.s and how they have changed.

E.O. 13228, signed October 8, 2001 established the **Office of Homeland Security**, headed by the **Assistant to the President for Homeland Security**.¹⁶ Its mission is to “develop and coordinate the implementation of a comprehensive national strategy to secure the United States from terrorist threats and attacks.” Among its functions is the coordination of efforts to protect the United States and its critical infrastructure from the consequences of terrorist attacks. This includes strengthening measures for protecting energy production, transmission, and distribution; telecommunications; public and privately owned information systems; transportation systems; and, the provision of food and water for human use. Another function of the Office is to coordinate efforts to ensure rapid restoration of these critical infrastructures after a disruption by a terrorist threat or attack.

¹⁴ (...continued)

Pentagon. January 11, 2001. p 2-3.

¹⁵ For a discussion of the debate surrounding this issue at the time, see CRS Report RL30914, *Federal Chief Information Officer (CIO): Opportunities and Challenges*, by Jeffery Seifert.

¹⁶ President Bush selected Tom Ridge to head the new Office.

The EO also established the **Homeland Security Council**. The Council is made up of the President, Vice-President, Secretaries of Treasury, Defense, Health and Human Services, and Transportation, the Attorney General, the Directors of FEMA, FBI, and CIA and the Assistant to the President for Homeland Security, and the Secretary of Homeland Security. Other White House and departmental officials can be invited to attend Council meetings.¹⁷ The Council advises and assists the President with respect to all aspects of homeland security. The agenda for those meetings shall be set by the Assistant to President for Homeland Security, at the direction of the President. The Assistant is also the official recorder of Council actions and Presidential decisions.

In January and February 2003, this E.O. was amended (by Executive Orders 13284 and 13286, respectively). The Office of Homeland Security, the Assistant to the President, and the Homeland Security Council were all retained. However, the Secretary of Homeland Security was added to the Council. The duties of the Assistant to the President for Homeland Security remain the same, recognizing the statutory duties assigned to the Secretary of Homeland Security as a result of the Homeland Security Act of 2002 (see below).

The second Executive Order (E.O. 13231) signed October 16, 2001, stated that it is U.S. policy “to protect against the disruption of the operation of information systems for critical infrastructure...and to ensure that any disruptions that occur are infrequent, of minimal duration, and manageable, and cause the least damage possible.”¹⁸ This Order also established the **President’s Critical Infrastructure Protection Board**. The Board’s responsibility was to “recommend policies and coordinate programs for protecting information systems for critical infrastructure...” The Order also established a number of standing committees of the Board that includes Research and Development (chaired by a designee of the Director of the Office of Science and Technology), Incident Response (chaired by the designees of the Attorney General and the Secretary of Defense), and Physical Security (also chaired by designees of the Attorney General and the Secretary of Defense). The Board was directed to propose a National Plan on issues within its purview on a periodic basis, and, in coordination with the Office of Homeland Security, review and make recommendations on that part of agency budgets that fall within the purview of the Board.

The Board was chaired by a **Special Advisor to the President for Cyberspace Security**.¹⁹ The Special Advisor reported to both the Assistant to the President for National Security and the Assistant to the President for Homeland Security. Besides presiding over Board meetings, the Special Advisor, in consultation with the Board, was to propose policies and programs to appropriate officials to ensure protection of

¹⁷ For more information on the structure of the Homeland Security Council and the Office of Homeland Security, see CRS Report RL31148. *Homeland Security: The Presidential Coordination Office*, by Harold Relyea.

¹⁸ Executive Order 13231 — Critical Infrastructure Protection in the Information Age. Federal Register. Vol. 86. No. 202. Oct. 18, 2001.

¹⁹ President Bush designated Richard Clarke.

the nation's information infrastructure and to coordinate with the Director of OMB on issues relating to budgets and the security of computer networks.

The Order also established the **National Infrastructure Advisory Council**. The Council is to provide advice to the President on the security of information systems for critical infrastructure. The Council's functions include enhancing public-private partnerships, monitoring the development of ISACs, and encouraging the private sector to perform periodic vulnerability assessments of critical information and telecommunication systems.

Subsequent amendments to this E.O. (by E.O. 13286) abolished the President's Board and the position of Special Advisor. The Advisory Council was retained, but now reports to the President through the Secretary of Homeland Security.

In July 2002, the Office of Homeland Security released a *National Strategy for Homeland Security*. The Strategy covered all government efforts to protect the nation against terrorist attacks of all kinds. It identified protecting the nation's critical infrastructures and key assets (a new term, different as implied above by the FBI's key asset program) as one of six critical mission areas. The Strategy expanded upon the list of infrastructure considered to be critical to include the chemical industry, postal and shipping services, and the defense industrial base. It also introduced a new class of assets, called key assets, which are potential targets whose destruction may not endanger vital systems, but could create local disaster or profoundly affect national morale. Such assets could include schools, court houses, individual bridges, or state and national monuments.

The Strategy reiterated many of the same policy-related activities as mentioned above: working with the private sector and other non-federal entities, naming those agencies that should act as liaison with the private sector, assessing vulnerabilities, and developing a national plan to deal with those vulnerabilities. The Strategy did not create any new organizations, but assumed that a Department of Homeland Security would be established (see below).

On December 17, 2003, the Bush Administration released **Homeland Security Presidential Directive 7 (HSPD-7)**. HSPD essentially updated the policy of the United States and the roles and responsibilities of various agencies in regard to critical infrastructure protection as outlined in previous documents, national strategies, and the Homeland Security Act of 2002 (see below). For example, the Directive reiterated the Secretary of Homeland Security's role in coordinating the overall national effort to protect critical infrastructure. It also reiterated the role of Sector-Specific Agencies (i.e. Lead Agencies)²⁰ to work with their sectors to identify, prioritize, and coordinate protective measures. The Directive captured the expanded set of critical infrastructures and key assets and Sector-Specific Agencies assignments made in the *National Strategy for Homeland Security*. The Directive also reiterated the relationship between the Department of Homeland Security and other agencies in certain areas. For example, while the Department of Homeland

²⁰ This report will continue to use the term "Lead Agency" to refer to the agency assigned to work with a specific sector.

Security will maintain an cyber security unit, the Directive stated that the Director of the Office of Management remains responsible for overseeing government-wide information security programs and for ensuring the operation of a federal cyber incident response center within the Department of Homeland Security. Also, while the Department of Homeland Security is responsible for transportation security, including airline security, the Department of Transportation remains responsible for control of the national air space system.

The only structural change made by the Directive was its establishment of the **Critical Infrastructure Protection Policy Coordinating Committee** which will advise the Homeland Security Council on interagency policy related to physical and cyber infrastructure security.

The Directive made a few other noticeable changes or additions. For example, the Department of Homeland Security was assigned as Lead Agency for the chemical and hazardous materials sector (it had been the Environmental Protection Agency). The Directive also now requires Lead Agencies to report annually to the Secretary of Homeland Security on their efforts in working with the private sector. The Directive also reiterated that all federal agencies must develop plans to protect their own critical infrastructure and submit those plans for approval to the Director of the Office of Management and Budget by July 2004.

The Directive also required that the Secretary of Homeland Security collaborate with other appropriate federal agencies to develop a program to geospatially map, analyze, and sort critical infrastructure and key resources, and to work with other federal, state, local, and private entities to develop a national indications and warning architecture that can develop a baseline of infrastructure operations and detect potential attacks.

While superceding PDD-63 in those areas where they differ, all together, the Bush Administration policy and approach regarding critical infrastructure protection represents a continuation of PDD-63. The fundamental policy statements are essentially the same: the protection of infrastructures critical to the people, economy, essential government services, and national security. National morale has been added to that list. Also, the stated goal of the government's efforts is to ensure that any disruption of the services provided by these infrastructures be infrequent, of minimal duration, and manageable. The infrastructures identified as critical were essentially the same (although expanded and with an emphasis placed on targets that would result in large numbers of casualties). Finally, the primary effort is directed at working collaboratively and voluntarily with the private sector owners and operators of critical infrastructure to identify critical assets and provide appropriate protection.

Organizationally, there remains an interagency group for coordinating policy across departments and for informing the White House. Certain agencies have been assigned certain sectors with which to work. A Council made up of private sector executives, academics, and State and local officials was established to advise the President. Certain operational units (e.g. the Critical Infrastructure Assurance Office (CIAO) and elements of the National Infrastructure Protection Center (at the FBI)) were left in place (though later moved to and restructured within the Department of Homeland Security).

The primary difference, at least initially, was the segregation of cyber security from the physical security mission of the Office of Homeland Security. Dissolution of the President's Critical Infrastructure Protection Board and the transfer of its duties to the Department of Homeland Security reintegrated the two, albeit with a greater emphasis on physical security than before. The relationship between physical security and cyber security is discussed in more detail in the Issues section of this report.

Department of Homeland Security

In November 2002, Congress passed the Homeland Security Act (P.L. 107-296), establishing a **Department of Homeland Security (DHS)**. The act assigned to the new Department the mission of preventing terrorist attacks, reducing the vulnerability of the nation to such attacks, and responding rapidly should such an attack occur. The act essentially consolidated within one department a number of agencies that have had, as part of their mission, homeland security-like functions (e.g. Border Patrol, Customs, Transportation Security Administration). The full impact of the act is beyond the scope of this report. The following discussion focuses on those provisions relating to critical infrastructure protection.

In regard to critical infrastructure protection the act transferred the following agencies and offices to the new department: the NIPC (except for the Computer Investigations and Operations Section), CIAO, FedCIRC, the **National Simulation and Analysis Center (NISAC)**,²¹ other energy security and assurance activities within DOE, and the **National Communication System (NCS)**.²² These agencies and offices were integrated within the **Directorate of Information Analysis and Infrastructure Protection (IA/IP)** (one of four operational Directorates established by the act).²³ Notably, the Transportation Security Administration (TSA), who is responsible for securing all modes of the nation's transportation system, is not part

²¹ The NISAC was established in the USA PATRIOT Act (P.L. 107-56), Section 1062. The Center builds upon expertise at Sandia National Laboratory and Los Alamos National Laboratory in modeling and simulating infrastructures (namely energy infrastructures) and the interdependencies between them.

²² The NCS is not a single communication system but more a capability that ensures that disparate government agencies can communicate with each other in times of emergencies. To make sure this capability exists and to assure that it is available when needed, an interagency group meets regularly to discuss issues and solve problems. The NCS was initially established in 1963 by the Kennedy Administration to ensure communications between military, diplomatic, intelligence, and civilian leaders, following the Cuban Missile Crisis. Those activities were expanded by the Reagan Administration to include emergency preparedness and response, including natural disaster response. The current interagency group includes 23 departments and agencies. The private sector, who own a significant share of the assets needed to ensure the necessary connectivity, is involved through the **National Security Telecommunication Advisory Committee (NSTAC)**. The National Coordinating Center, mentioned later in this report, and which serves as the telecommunications ISAC, is an operational entity within the NCS.

²³ The other operational directorates included **Science and Technology, Border and Transportation Security** and **Emergency Preparedness and Response**.

of this Directorate (it was placed within the Border and Transportation Security Directorate); nor is the Coast Guard, which is responsible for port security. The Directorates are headed by someone of Undersecretary rank. Furthermore, the act designated that within the Directorate of Information Analysis and Infrastructure Protection, there are to be both an Assistant Secretary for Information Analysis, and an **Assistant Secretary for Infrastructure Protection**.

Among the responsibilities assigned the IA/IP Directorate were:

- to access, receive, analyze, and integrate information from a variety of sources in order to identify and assess the nature and scope of the terrorist threat;
- to carry out comprehensive **assessments of the vulnerabilities** of key resources and critical infrastructure of the United States, including **risk assessments** to determine risks posed by particular types of attacks;
- to integrate relevant information, analyses, and vulnerability assessments in order to **identify priorities for protective and support measures**;
- to develop a comprehensive national plan for securing key resources and critical infrastructures;
- to administer the Homeland Security Advisory System;
- to work with the intelligence community to establish collection priorities; and,
- to establish a secure communication system for receiving and disseminating information.

In addition, the act provided a number of protections for certain information (defined as critical infrastructure information) that non-federal entities, especially private firms or ISACs formed by the private sector, voluntarily provide the Department. Those protections included exempting it from the Freedom of Information Act, precluding the information from being used in any civil action, exempting it from any agency rules regarding ex parte communication, and exempting it from requirements of the Federal Advisory Committee Act.

The act basically built upon existing policy and activities. Many of the policies, objectives, missions, and responsibilities complement those already established (e.g. vulnerability assessments, national planning, communication between government and private sector, and improving protections).

Policy Implementation

There is an element of continuity in the policies and activities undertaken by the Clinton and Bush Administrations. For example, the Bush Administration maintains the effort to communicate with infrastructure operators through ISACs, although it has also developed parallel mechanisms to communicate with them. The Bush Administration also maintains certain lead agencies as the main liaison with certain sectors. The following discusses the implementation of major elements of PDD-63 and the Bush Administration's policy as policy and action continue to evolve.

Lead Agencies and Selection of Sector Liaison Officials and Functional Coordinators. The *National Strategy for Homeland Security*, released by the Bush Administration in July 2002, maintained the role of lead agencies as outlined in PDD-63, with the then proposed Department of Homeland Security acting as coordinator of their efforts. However, the Strategy did shift liaison responsibilities for some sectors to the new Department. The liaison responsibilities outlined in the National Strategy are noted in **Table 2** below, with the former liaison agency noted in parenthesis. HSPD-7 modified the Strategy assignments slightly, giving the chemical sector to the Department of Homeland Security instead of the Environmental Protection Agency.

Table 2. Current Lead Agency Assignments

Department/Agency (PDD-63 liaison)	Sector/Function
Agriculture	Agriculture
	Food
Agriculture	Meat/Poultry
Health and Human Services	All other
Homeland Security (Commerce)	Information and Communications
Treasury	Banking and Finance
EPA	Water
Homeland Security (Transportation)	Transportation
Homeland Security (Federal Emergency Management Agency, Justice, Health and Human Services)	Emergency Services
Health and Human Services	Public Health
	Government
Homeland Security	Continuity of Government
Individual departments and agencies	Continuity of Operations
	Energy
Energy	Electric Power
Energy	Oil and Gas
Homeland Security-Transportation Security Administration	Pipelines
Department of Homeland Security (per HSPD-7)	Chemical Industry and Hazardous Materials
Defense	Defense Industrial Base
Homeland Security	Postal and Shipping
Interior	National Monuments and Icons

Identifying and Selecting Sector Coordinators. Different sectors present different challenges to identifying a coordinator. Some sectors are more diverse than others (e.g. transportation includes rail, air, waterways, and highways; information and communications include computers, software, wire and wireless communications) and raises the issue of how to have all the relevant players represented. Other sectors are fragmented, consisting of small or local entities. Some sectors, such as banking, telecommunications, and energy have more experience than others in working with the federal government and/or working collectively to assure the performance of their systems.

Besides such structural issues are ones related to competition. Inherent in the exercise is asking competitors to cooperate. In some cases it is asking competing industries to cooperate. This cooperation not only raises issues of trust among firms, but also concerns regarding anti-trust rules.

Table 3. Sector Coordinators

Sector	Identified Sector Coordinators
Information and Telecommunications	A consortium of 4 associations: Information Technology Assn. of America; Telecommunications Industry Assn.; U.S. Telephone Assn.; Cellular Telecom. & Internet Assn.
Banking and Finance	Donald Donahue - Depository Trust Corp. ²⁴
Water	Assn. of Metropolitan Water Agencies
Electricity Oil/Gas	North American Electric Reliability Council National Petroleum Council
Railroads Mass Transit Airports	Association of American Railroads American Public Transportation Assn. Airport Council International-North America
Emergency Fire Services	U.S. Fire Administration
Law Enforcement	Emergency Law Enforcement Services Forum

Table 3 above shows those individuals or groups that CRS has been able to determine have agreed to act as Coordinators. Sector coordinators have been identified for most of the major privately operated sectors: banking and finance, energy, information, and communications. In the public sector, EPA early on identified the Association of Metropolitan Water Agency as sector coordinator. In the area of transportation, the Association of American Railroads has been identified

²⁴ The financial services sector coordinator is selected by the Secretary of Treasury. Mr. Donahue was selected in May 2004, taking over from Rhonda McLean from Bank America. As sector coordinator, Mr. Donahue also chairs the Financial Services Sector Coordinating Council, a private sector group that works closely with the Treasury Department in securing the banking and financial sector.

as the coordinator for the rail sector. More recently, the American Public Transportation Association was selected to represent commuter transportation systems. The U.S. Fire Administration, a component of FEMA, has an established communication network with the nation's fire associations, the 50 State Fire Marshals, and other law enforcement groups. The Department of Justice, through the NIPC, helped to create the Emergency Law Enforcement Services (ELES) Forum. The Forum is a group of senior law enforcement executives from state, local, and non-FBI federal agencies.

Other sectors have groups that have assumed the role of sector coordinator, although may not have been officially designated as such. For example, the American Chemistry Council and the Food Marketing Institute communicate and coordinate with the federal government and the members of their respective sectors.

In December 1999, a number of the sectors formed a **Partnership for Critical Infrastructure Security** to share information and strategies and to identify interdependencies across sectoral lines. The Partnership is a private sector initiative. Five working groups were established (Interdependencies/Vulnerability Assessment, Cross-Sector Information Sharing, Legislation and Policy, Research and Development, and Organization). The federal government is not officially part of the Partnership, but the Department of Homeland Security acts as a liaison and has provided administrative support for meetings. Sector Liaison from lead agencies are considered ex officio members. The Partnership has helped coordinate its members input to a number of national strategies released to date.

Appointment of the National Infrastructure Assurance Council. The Clinton Administration released an Executive Order (13130) in July, 1999, formally establishing the council. Just prior to leaving office, President Clinton put forward the names of 18 appointees.²⁵ The Order was rescinded by the Bush Administration before the Council could meet. In Executive Order 13231,²⁶ President Bush established a National Infrastructure Advisory Council (with the same acronym, NIAC) whose functions are similar to those of the Clinton Council. On September 18, 2002, President Bush announced his appointment of 24 individuals to serve on Council.²⁷ The E.O. amending 13231 makes some minor modifications to NIAC. Primarily, the Council now reports to the President through the Secretary of Homeland Security.

Internal Agency Plans. There had been some confusion about which agencies were required to submit critical infrastructure plans. PDD-63 directed every agency to develop and implement such a plan. A subsequent Informational Seminar on PDD-63 held on October 13, 1998 identified two tiers of agencies. The first tier included lead agencies and other "primary" agencies like the Central Intelligence

²⁵ White House Press Release, dated January 18, 2000.

²⁶ Executive Order 13231—Critical Infrastructure Protection in the Information Age. Federal Register. Vol. 66. No. 202. October 18, 2001. pp53063-53071. The NIAC is established on page 53069.

²⁷ See White House Press Release, September 18, 2002.

Agency and Veteran's Affairs. These agencies were held to the Directive's 180 day deadline. A second tier of agencies were identified by the National Coordinator and required to submit plans by the end of February, 1999. The "secondary" agencies were Agriculture, Education, Housing and Urban Development, Labor, Interior, General Services Administration, National Aeronautics and Space Administration and the Nuclear Regulatory Commission. All of these "primary" and "secondary" agencies met their initial deadlines for submitting their internal plans for protecting their own critical infrastructures from attacks and for responding to intrusions. The Critical Infrastructure Assurance Office assembled an expert team to review the plans. The plans were assessed in 12 areas including schedule/milestone planning, resource requirements, and knowledge of existing authorities and guidance. The assessment team handed back the initial plans with comments. Agencies were given 90 days to respond to these comments. Of the 22 "primary" and "secondary" agencies that submitted plans, 16 modified and resubmitted them in response to first round comments.

Initially, the process of reviewing agency plans was to continue until all concerns were addressed. Over the summer of 1999, however, review efforts slowed and subsequent reviews were put on hold as the efficacy of the reviews was debated. Some within the CIAO felt that the plans were too general and lacked a clear understanding of what constituted a "critical asset" and the interdependencies of those assets. As a result of that internal debate, the CIAO redirected its resources to institute a new program called **Project Matrix**. Project Matrix is a three step process by which an agency can identify and assess its most critical assets, identify the dependencies of those assets on other systems, including those beyond the direct control of the agency, and prioritize. CIAO offered this analysis to agencies, including some not designated as "primary" or "secondary" agencies, such as the Social Security Administration and the Securities and Exchange Commission. Participation by the agencies has been voluntary. Project Matrix continues.

In the meantime, other agencies (i.e. those not designated as primary and secondary) apparently did not develop critical infrastructure plans. In a much later report by the President's Council on Integrity and Efficiency (dated March 21, 2001), the Council, which was charged with reviewing agencies' implementation of PDD-63, stated that there was a misunderstanding as to the applicability of PDD-63 to all agencies. The Council asserted that all agencies were required to develop a critical infrastructure plan and that many had not, because they felt they were not covered by the Directive. Also, the Council found that of the agency plans that had been submitted, many were incomplete, had not identified their mission-critical assets, and that almost none had completed vulnerability assessments. Two years later, the Government Accountability Office²⁸ reported that four of the agencies they reviewed for the House Committee on Energy and Commerce (HHS, Energy, Commerce, and EPA) had still not yet identified their critical assets and operational dependencies, nor have they set any deadlines for doing so.²⁹

²⁸ Note: The General Accounting Office has had its name changed legislatively to the Government Accountability Office.

²⁹ U.S. Government Accountability Office, Critical Infrastructure Protection: Challenges for (continued...)

Interestingly, HSPD-7 reestablished a deadline for agencies to submit a critical infrastructure protection plans to the Director of OMB for approval by July 2004. The Director of OMB provided guidance on how agencies should meet their requirement (Memorandum M-04-15, June 17, 2004). The memorandum stated that plans for the physical protection of assets would be reviewed by the Department of Homeland Security and plans for the cyber protection of assets would be reviewed as part of the requirements associated with the Federal Information Security Management Act of 2002, included as Title III of E-Government Act of 2002 (P.L. 107-347). These plans are to provide information to be included in the National Infrastructure Protection Plan (see below).

National Critical Infrastructure Plan. PDD-63 called for a National Infrastructure Protection Plan that would be informed by sector-level plans and would include an assessment of minimal operating requirements, vulnerabilities, remediation plans, reconstitution plans, warning requirements, etc. The National Strategy for Homeland Security, and the Homeland Security Act each have called for the development of a comprehensive national infrastructure protection plan, as well, although without being as specific regarding what that plan should include. HSPD-7 called for a comprehensive National Plan for Critical Infrastructure and Key Resources Protection by the end of 2004.

To date, three National Plans or Strategies have been released. In 2000, the Clinton Administration released Version 1.0 of a *National Plan for Information Systems Protection* in January 2000.³⁰ The Plan focused primarily on cyber-related efforts within the federal government. In September 2002, the Bush Administration, through the President's Critical Infrastructure Protection Board, released a draft of *The National Strategy to Secure Cyberspace*. The latter was released in its final form in February 2003, and could be considered Version 2.0 of the Clinton-released Plan. It addressed all stakeholders in the nation's information infrastructure, from home users to the international community, and included input from the private sector, the academic community, and state and local governments. Also in February 2003, the Office of Homeland Security released the *National Strategy for the Physical Protection of Critical Infrastructures and Key Assets*.

While these continue to call for assessments of vulnerabilities, risks, identification of critical assets, etc., the plans themselves do not include them. They do include how the federal government is or intends to go about some of these tasks. Some sectors have established guidelines regarding vulnerability assessments, incident reporting procedures, warning procedures, response agreements, etc. When and how the federal government may assist in responding to and reconstituting from an attack are less developed. It is not clear if these national and sectoral plans and guidelines adequately meet the original intent of PDD-63 or the intent for planning by the Homeland Security Act of 2002.

²⁹ (...continued)

Selected Agencies and Industry Sectors. Report to the Committee on Energy and Commerce, House of Representatives. GAO-03-233. February 2003. pp4-5.

³⁰ *Defending America's Cyberspace. National Plan for Information Systems Protection. Version 1.0. An Invitation to a Dialogue.* The White House. 2000.

The Department of Homeland Security missed the December 2004 deadline for releasing the National Infrastructure Protection Plan established in HSPD-7. A draft plan is in circulation for review by various stakeholders. According to media reports, some in the private sector have complained they were not be adequately consulted. The Plan eventually may be released in two parts: one focusing on the federal government's role in protecting the nation's critical infrastructure and one focusing on the private sector role.³¹

Information Sharing and Analysis Center (ISAC). PDD-63 envisaged a single ISAC to be the private sector counterpart to the FBI's National Infrastructure Protection Center (NIPC), collecting and sharing incident and response information among its members and facilitating information exchange between government and the private sector. The idea of a single ISAC evolved into each sector having its own center. Many were conceived originally as concentrating on cyber security issues, and some still function with that emphasis. However, others have incorporated physical security into their missions.

The sectors that have established ISACs to date³² have followed two primary models. One model involves ISAC members incorporating in some way and contracting out the ISAC development and operations to a security firm. The banking, information, water, oil and gas, railroad, and mass transit sectors have followed this approach.

The other model involves utilizing an existing industry or government-industry coordinating group and adding critical infrastructure protection to the mission of that group. The electric power (which uses North American Electricity Reliability Council (NERC)) and the telecommunications sector (which uses the National Coordinating Center (NCC)) follow this model. The emergency fire services sector incorporated ISAC functions into the U.S. Fire Administration (within the Federal Emergency Management Agency) which has interacted with local fire departments for years.

In addition to the different organization models developed for ISACs, so, too, has direct federal financial support for ISACs. In some cases, ISACs received start up funding from their Lead Agency (e.g. drinking water received funding from EPA). In some cases, that support has continued, or recently discontinued (e.g. DOE support for its energy and mass transit ISACs). Other ISACs are self-supporting.

³¹ See, "Still Waiting: Plan to Protect Critical Infrastructure Overdue from DHS," Congressional Quarterly. Homeland Security-Transportation & Infrastructure Newsletter,, Jan. 28, 2005. This Newsletter is electronic and available by subscription only. It can be found at [<http://homeland.cq.com/hs/news.do>] in the new archives. The article was last viewed on February 15, 2005.

³² A list of ISACs;, with links, can be found on the DHS website: [<http://www.dhs.gov/dhspublic/display?theme=73&content=1375>] . Also, eleven ISACs have formed an ISAC Council. See, [<http://www.isaccouncil.org/about/>]. Both of these sites were last viewed on February 15, 2005.

While PDD-63 envisioned ISACs to be a primary conduit for exchanging critical infrastructure information between the federal government and specific sectors, the Department of Homeland Security has developed a number of other information sharing systems and mechanism.

Establishing the Information Analysis and Infrastructure Protection Directorate. The first Undersecretary for Information Analysis and Infrastructure Protection, Frank Libutti, was approved by the Senate in June 2003. The first Assistant Secretary for Infrastructure Protection, Robert Liscouski, was approved in March 2003. The Assistant Secretary for Information Analysis assumed his duties on November 17, 2003. These appointments were relatively late when compared with comparable positions elsewhere in the Department.

The organization within the Directorate also appears to have taken some time to be settled and may yet experience changes. A survey by the DHS Office of Inspector General (IG) of the IA/IP Directorate reported an organization structure dated August 11, 2003, but noted that changes to that structure were under consideration at the time.³³ An organizational chart published by Carroll Publishing, dated November/December 2003, indicated that some of those changes were made. According to the chart, there were two divisions located under the Assistant Secretary for Information Analysis: Risk Assessment; and Information Management and Requirements. Three divisions were located under the Assistant Secretary for Infrastructure Protection: Infrastructure Coordination; Protective Services; and National Cyber Security. In addition, the Assistant Secretary for Infrastructure Protection has the National Communication System and the Office of Outreach and Partnership reporting to him. In the IG report, in addition to the standard support staff, the Undersecretary for Information Analysis and Infrastructure Protection had an Office of Competitiveness Analysis and Evaluation reporting to him. In addition, the IA/IP Directorate has operational control of the Homeland Security Operations Center. This seems to coincide with bits and pieces of information one can accumulate from testimony, news articles, etc. Even at this late date, the IA/IP Directorate does not have an organizational chart on the DHS webpage.

Recently, the Undersecretary for Information Analysis and Infrastructure Protection, the Assistant Secretary of Infrastructure Protection and the Division Chief of the National Cyber Security Division have resigned or announced their resignations. In addition, there are efforts in Congress to pull cybersecurity and the National Communication System from under the Assistant Secretary of Infrastructure Protection and create a separate Assistant Secretary for Cyber Security within the Directorate.³⁴

Vulnerability Assessments, Risk Assessments, and Prioritizing Protective Measures. Among the activities assigned to the Information Analysis and Infrastructure Protection Directorate by the Homeland Security Act of 2002 are:

³³ Department of Homeland Security. Office of the Inspector General. *Survey of the Information Analysis and Infrastructure Protection Directorate*. February, 2004.

³⁴ See, H.R. 285, introduced in the 109th Congress.

- access, receive, analyze, and integrate information from a variety of sources in order to identify and assess the nature and scope of the terrorist threat;
- carry out comprehensive assessments of the vulnerabilities of key resources and critical infrastructure, of the United States including risk assessments to determine risks posed by particular types of attacks;
- integrate relevant information, analyses, and vulnerability assessments in order to identify priorities for protective and support measures.

Furthermore, according to the National Strategy for the Physical Protection, the Department of Homeland Security will: a) in collaboration with other key stakeholders, develop a uniform methodology for identifying facilities, systems, and functions with national-level criticality to help establish protection priorities; b) build a comprehensive database to catalog these critical facilities, systems, and functions, and c) maintain an comprehensive, up-to-date assessment of vulnerabilities and preparedness across critical sectors.

In his testimony before the House Appropriations Committee in April, the Undersecretary for IA/IP stated that Directorate had assembled a list of 28,000 critical infrastructure assets (that list has reportedly grown to 80,000) and that it planned to conduct vulnerability assessments on 1700 of those judged to be of highest priority. Based on further testimony, budget documents, and DHS's recent strategic plan,³⁵ a priority asset is one that could be "catastrophically exploited."

It is not clear from the testimony how the list of critical assets was developed. States and certain urban areas have identified critical assets as part of their applications for State Homeland Security Grants and the Urban Areas Security Initiatives Grants. Also, firms in some sectors have been active in performing vulnerability assessments and prioritizing corrective actions. Some are required by law to do so (e.g. drinking water, ports). The Department has proposed regulations governing the voluntary submission of these assessments as critical infrastructure information (see, Information Sharing in the Issues section below). The Directorate, too, has researched various sector-oriented databases.

In his testimony to the House Appropriations Committee, the Undersecretary stated that 377 chemical plants were included in the 1700 priority sites. The IA/IP is also working with the Transportation Security Administration and the railroads to assess vulnerabilities of the transportation of hazardous materials, and with the Nuclear Regulatory Commission to assess the vulnerability of nuclear plants and the transportation of nuclear materials. It is not clear from the testimony if critical rail sites or nuclear plants are included in the 1700 priority sites. Nor is it clear how many of the 1700 priority assets have had their vulnerability assessed. According to the Senate Appropriation Committee's report for its FY2005 DHS appropriation, the

³⁵ Department of Homeland Security. Securing Our Homeland: U.S. Department of Homeland Security Strategic Plan. 2004. See, objective 1.2, p. 11.

vulnerability of 150 priority sites have been assessed so far. The report also stated that the Committee expects another 400 to be assessed in FY2005.

After assessing the priority sites, the Protection Services Division works with the stakeholders to develop protections plans. These plans focus on working with state and local officials to provide security “outside” the fence, creating buffer zones.

Issues

Cyber vs. Physical Vulnerabilities and Protection. Both the President’s Commission on Critical Infrastructure Protection and PDD-63 addressed both the physical and cyber vulnerabilities of the nation’s critical infrastructures. However, in the recommendations made, the organizational structures developed, and the early planning required, emphasis was given to cyber vulnerabilities and protection. This was because, at the time, there was a consensus that the cyber area was a new vector of vulnerability and one that was not being adequately addressed. Many spoke of critical infrastructure protection and cyber protection synonymously. While physical threats and protections were not dismissed, it was stated that these were better understood and processes already in place to address them. This changed after September 11, 2001, when the physical threat of and vulnerability to physical attacks was made apparent.

E.O. 13228 and E.O. 13231, both released in October 2001, split the responsibilities for physical protection and cyber protection of the nation’s critical infrastructure. The Office of Homeland Security, the Assistant to the President for Homeland Security, and the Homeland Security Council were given responsibility for physical protection. The President’s Board on Critical Infrastructure Protection and the Assistant to the President for Cybersecurity were given cyber protection (including the physical protection of information network assets). Each developed a National Strategy to cover their area of responsibility.

When the Bush Administration decided to support the establishment of a Department of Homeland Security, in June 2002, it retained this split organizationally by proposing that the office responsible for Infrastructure Protection be further divided with someone responsible for Physical Assets and someone responsible for Telecommunications and Cybersecurity. The National Strategy for Homeland Security, released in July 2002, stated that “securing cyberspace poses unique challenges...” and that “the Department of Homeland Security will place an especially high priority on protecting our cyber infrastructure.”

However, in February 2003, while working to stand up the Department of Homeland Security, the Bush Administration released E.O. 13286, which amended E.O. 13231 and effectively abolished both the President’s Board on Critical Infrastructure and the position of Assistant to the President for Cybersecurity. This had some in the cyber security community concerned that cyber security would be buried too deep within the organization and not receive the special attention they

think it requires.³⁶ H.R. 285 introduced early in the 109th Congress would elevate cybersecurity within the Department of Homeland Security by creating an Assistant Secretary for Cybersecurity who would report to the Undersecretary for Information Analysis and Infrastructure Protection, on par with the existing two Assistant Secretaries.³⁷

The Department announced the formation of a National Cyber Security Division (NCSD), reporting to the Assistant Secretary for Infrastructure Protection. The Division integrates many of the resources and activities transferred over to the Directorate from other agencies (i.e. CIAO, NIPC, FedCIRC, and NCS). Administration officials take the position that one cannot fully dissociate cyber security from physical security when assessing vulnerabilities and taking protective actions. The Administration states that the Cyber Security Division works closely with other Directorate activities that identify critical assets, assess their vulnerabilities, and in developing protection strategies.

Is cyber security a special case of infrastructure protection, or is it just one of a number of threat vectors? Some have said that the extent to which computer networks have penetrated other infrastructures make it different. However, electricity and energy can make similar claims, and there is a mutual interdependence among all the infrastructures. Cyber attacks, however, are different from physical attacks since they can be launched from anywhere in the world and be routed through numerous intermediate computers. Cyber attacks require a different skill set to counter.

While differences in the threat may point to the need for a separate focus on cyber security, it also expands the threat envelope that the Department must monitor. Cyber security, as it has been discussed nationally, goes beyond the threat posed by terrorists and includes threats posed by criminals and hackers. These latter culprits are already attacking the information infrastructure or using it to steal information and extort money. Attacks by terrorist groups (or other politically motivated groups) have been limited and fairly targeted and have not resulted in wide-spread damage or inconvenience. Motivation and the desired impact are likely to be different between terrorists and criminals or hackers. Including “regular” criminals and hackers as intelligence targets for those focused on terrorists may require a different allocation of, or perhaps result in competition for, intelligence resources?

What is Critical and Needs Protection and How Do We Decide? The term critical infrastructure has been broadly defined in most of the official documents

³⁶ Testimony of Michael Vatis before the Committee on Government Reform, Subcommittee on Technology, Information Policy, Intergovernmental Relations and the Census. April 8, 2003. See page 4 of his testimony.

³⁷ An identical bill was introduced in the 108th Congress. It was also attached to the House version of the Intelligence Reform and Terrorism Prevention Act, but was dropped in conference.

mentioned in this report. The definition has changed somewhat over time.³⁸ The USA PATRIOT Act provided the following definition:

The term “critical infrastructure” means systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health and safety, or any combination of those matters.

In addition, the National Strategy for Homeland Security raised the issues of key assets and national morale. Key assets are those “whose destruction would not endanger vital systems, but could create local disaster or profoundly damage our Nation’s morale.” These could include prominent national, state, or local monuments and icons. These could also include nuclear power plants or other “localized” facilities that deserve protection because of their destructive potential or their value to the local community.

The National Strategy for Homeland Security also commits the federal government to work closely with state and local governments to develop and apply compatible approaches to ensure protection for critical assets...at all levels of society. For example, schools, courthouses, and bridges are critical to the communities they serve.

However, it is not practical to try and protect all of these assets to the same degree. So how will priorities be set and protective measures allocated? According to the National Strategy for Homeland Security, a consistent methodology will be developed and applied to focus the federal government’s efforts. The National Strategy for the Physical Protection of Critical Infrastructures and Key Assets makes mention of developing a uniform methodology for identifying facilities, systems and functions with national-level criticality to help establish federal, state, local, and private sector protection priorities. Such a methodology has not yet been articulated. Nor has a methodology been described for setting priorities.

The 9/11 Commission’s report reiterated the need to set priorities and to use risk assessment and risk management techniques to set those priorities and to allocate resources. It also specifically mentioned the need to do so, both within the transportation sector where, the Commission noted, 90% of the federal resources directed at transportation security is going to commercial aviation, and in federal assistance to states and localities, where some funds are currently being allocated based on an equal distribution of funds per state (and not based on any risk systematic risk assessment).

Typically, risk is considered a function of threat, vulnerability, and impact. How the Directorate plans to assess this raises many questions. How will threat be characterized? Will specific modes of attack be considered? Will more than one threat scenario be considered? Will these differ depending on sector or asset? How will intent, capability, and target value to the attacker be integrated into the analysis?

³⁸ For a discussion of how the definition has changed slightly over time, see CRS Report RL32631, *Critical Infrastructures and Key Assets: Definition and Identification*.

How will vulnerability be characterized? How will impact be characterized? How will loss of life be valued and compared with economic impact or national morale? How iterative will the analysis be (recognizing that taking protective action in one area may change the target value and vulnerability of other assets)? How will uncertainty be handled in the analysis? How will the Directorate reconcile any differences in criticality and priorities based on a national-level analysis with those based on more parochial analyses by the private sector or states and localities?

How Much Will It Cost and Who Pays? An estimate of the amount of money the Federal government spends on Critical Infrastructure Protection is now included as a crosscutting analysis in the Presidents Budget.³⁹ (see Table A.1. in the **Appendix**).

It is not known how much money states and localities are spending on what they consider to be critical infrastructure protection. According to the National Strategy on Homeland Security, the National Governors Association estimated that states had spent \$6 billion between September 11, 2001 and the end of 2002 on all homeland security-related activities. According to GAO, improving security in the 22 largest mass transit systems would cost over \$700 million.⁴⁰ In testimony before the House Transportation and Infrastructure's Subcommittee on Water Resources and the Environment (November 3, 2003), the Executive Vice President of the American Association of Port Authorities, federal security requirements at the nation's ports will cost over \$5 billion over the next 10 years.⁴¹ While some transit systems and ports are privately owned and operated, many are owned and operated by local or regional government or semi-government entities.

States have made it clear that their budgets, especially in the current economic environment, make these expenditures difficult. The National Strategy for Homeland Security and the National Strategy for the Physical Protection of Critical Infrastructures and Key Assets recognize that while the federal government must focus on protecting assets that have a national importance, states may need help in protecting their assets as well. Much of the federal assistance to states so far have been for preparedness activities focused mostly on first responders and dealing with weapons of mass destruction. The USA PATRIOT Act established a federal grant program specifically for this purpose. The grant program, called the State Homeland Security Grant Program is managed by the Office for State and Local Government Coordination and Preparedness (OSLGCP).⁴² The grant will support, among many

³⁹ Prior to appearing in the President's Budget, OMB was required to submit similar data in an *Annual Report to Congress on Combating Terrorism*. Comparison between these older reports and the current figures cannot be compared, however, as OMB has refined the criteria by which agencies determine their figures. Also, as mentioned earlier, prior to September 11, the emphasis was on cybersecurity.

⁴⁰ Government Accountability Office, *Mass Transit*, GAO-03-263. December 2002.

⁴¹ This testimony did reveal how that figure was determined.

⁴² This grant program was initially managed by the Office of Domestic Preparedness, which was transferred from the Department of Justice to DHS. The ODP is now merged with the
(continued...)

other items, the purchase of equipment, including equipment used for enhancing the physical protection of critical infrastructure. For more information on this and other grant programs related to homeland security, see CRS Report RL32348, *Selected Homeland Security Assistance Programs : A Summary*.

Potential private sector costs are unknown at this time.⁴³ Some sectors are already at the forefront in both physical and computer security and are sufficiently protected or need only marginal investments. Others are not and will have to devote more resources. The ability of certain sectors to raise the necessary capital may be limited, such as metropolitan water authorities which may be limited by regulation, or emergency fire which may function in a small community with a limited resources. Even sectors made up of large well capitalized firms are likely to make additional expenditures only if they can identify a net positive return on investment.

Issues of liability may also determine private sector costs. The airline industry was protected after September 11. It is not clear if this would continue in any future attacks. In the case of computer security, there is also the potential for downstream liability, or third party liability. In the denial-of-service attacks that occurred in early 2000, the attacks were launched from “zombie” computers; computers upon which had been placed malicious code that was subsequently activated. What responsibility do the owners of those “zombie” computers have to protect their systems from being used to launch attacks elsewhere? What responsibility do service providers have to protect their customers? According to some, it is only a matter of time before the courts will hear cases on these questions.⁴⁴

Costs to the private sector may also depend on the extent to which the private sector is compelled to protect their critical infrastructure versus their ability to set their own security standards. The current thinking is the private sector should voluntarily join the effort. However, given the events of September 11, the private sector may be compelled politically, if not legally, to increase physical protections. But, what happens if a sector does not take actions the federal government feels are necessary? The National Strategy for Homeland Security stated that private firms will still bear the primary responsibility for addressing public safety risks posed by their industries. The Strategy goes on to state that in some cases, the federal government may have to offer incentives for the private sector to adopt security measures. In other cases, the federal government may need to rely on regulation.

⁴² (...continued)

Office of State and Local Government Coordination to form the Office of State and Local Government Coordination and Preparedness (OSLGCP). The OSLGCP now manages the State Homeland Security Grants, the Urban Areas Security Grants, and the Port Security Grants, formerly managed by the Transportation Security Administration.

⁴³ The cyber security market alone is estimated at \$10 billion in products and services (see “Picking the Locks on the Internet Security Market.” Redherring.com. July 24, 2001). This probably includes, however, some government expenditures. It also does not include physical security measures.

⁴⁴ See, “IT Security Destined for the Courtroom.” Computer World.. May 21,2001. Vol 35. No. 21.

Information Sharing. The information sharing—internal to the federal government, between the federal government and the private sector, and between private firms—considered necessary for critical infrastructure protection raises a number of issues.

In the past, information flow between agencies has been restrained for at least three reasons: a natural bureaucratic reluctance to share, technological difficulties associated with compatibility, and legal restraints to prevent the misuse of information for unintended purposes. However, in the wake of September 11, given the apparent lack of information sharing that was exposed in reviewing events leading up to that day, many of these restraints are being reexamined and there appears to be a general consensus to change them. Some changes have been as a result of the USA PATRIOT Act (including easing the restrictions limiting the sharing of information between national law enforcement agencies and those agencies tasked with gaining intelligence of foreign agents). The legislation establishing the Department of Homeland Security also authorizes efforts to improve the ability of agencies within the federal government to share information.

Since much of what is considered to be critical infrastructure is owned and operated by the private sector, critical infrastructure protection relies to a large extent on the ability of the private sector and the federal government to share information. However, it is unclear how open the private sector and the government will be in sharing information. The private sector primarily wants from the government information on specific threats which the government may want to protect in order not to compromise sources or investigations. In fact, much of the threat assessment done by the federal government is considered classified. For its part, the government wants specific information on vulnerabilities and incidents which companies may want to protect to prevent adverse publicity or revealing company practices. Success will depend on the ability of each side to demonstrate it can hold in confidence the information exchanged.

This issue is made more complex by the question of how the information exchanged will be handled within the context of the Freedom of Information Act (FOIA). The private sector is reluctant to share the kind of information the government wants without an exempting it from public disclosure under the existing FOIA statute.

The Homeland Security Act protects information, defined as critical infrastructure information, voluntarily provided the Department of Homeland Security not only from FOIA, but also prohibits from being used in any civil action against the provider, exempts from any agency rules regarding ex parte communications, and exempts it from following under the requirements of the Federal Advisory Committee Act. It only can be shared with other entities in fulfillment of their responsibilities in homeland security, and any unauthorized disclosure by a federal government official can lead to imprisonment. Also, these disclosure rules take precedent over any State rules.

The act defines critical infrastructure information to include:

- actual, potential, or threatened interference with, attack on, compromise of, or incapacitation of critical infrastructure by either physical or computer-based attack that violates federal or state law, harms interstate commerce, or threatens public health and safety;
- the ability of critical infrastructures to resist such attacks;
- any planned or past operational problem or solution regarding critical infrastructure including repair, recovery, reconstruction, insurance, or continuity to the extent it relates to such interference, compromise, or incapacitation.

The submittal is considered voluntary if it was done in the absence of an agency's exercise of legal authority to compel access to or submission of such information.

The FOIA exemption is not without its critics. The non-government-organizations that actively oppose government secrecy are reluctant to expand the government's ability to hold more information as classified or sensitive. These critics feel that language agreed upon in the final legislation is too broad (covers too much material and offers too many protections) and is unnecessary given current restrictions on the disclosure of information contained in the FOIA statute and case law. More recently, the environmental community has become concerned that the language could allow firms to shield from disclosure information they would otherwise be obliged to disclose to the public, or worse, be able to prevent the information from being used in any legal proceedings, by claiming it to be related to critical infrastructure protection. This has become a particular issue within the right-to-know community concerned with risks associated with toxic releases from plants using or producing toxic chemicals, which are now being considered as a critical infrastructure.⁴⁵ It is not clear if this is the case, since the act also states that other agencies or third parties may receive similar information by other lawful means and may use it any appropriate legal manner.

On April 15, 2003, the Department of Homeland Security released draft procedures for receiving, marking, and handling of critical infrastructure information,⁴⁶ implementing the provisions stated above. The proposed rule states that the Secretary of Homeland Security shall name the Undersecretary of Information Analysis and Infrastructure Protection (IA/IP) as the senior official responsible for directing and administering a Critical Infrastructure Information (CII) Program. The Undersecretary is to appoint a CII Program Manager. Only the CII Program Manager may acknowledge the receipt of, validate, and mark information received as CII. Such information may be submitted directly to CII Program Manager or it may be forwarded to the CII Program Manager by other agencies. While the submitter of the information may designate it as CII, it is up to the CII Program Manager to validate it as such. The information, however, shall be protected, until the Manager has had a chance to rule. The Manager has 30 days to

⁴⁵ For more discussion of these issues, see CRS Report RL31547, *Critical Infrastructure Information Disclosure and Homeland Security*, by John D. Moteff and Gina Stevens.

⁴⁶ Procedures for Handling Critical Infrastructure Information. Federal Register. Vol. 68. No. 72. pp.18524-18529. A final ruling has not yet been released.

inform the submitter that the information does not meet the standards for CII. These standards, however, are not defined beyond the relatively broad definition of CII provided in the act. Furthermore, if the CII Program Manager finds that the information was submitted in bad faith, the Manager is not required to notify the submitter that the information does not qualify.

The draft procedures states that these procedures do not apply to or affect any requirement pertaining to information that must be submitted to a federal agency or pertaining to the obligation of any federal agency to disclose such information under the Freedom of Information Act. The procedure goes on to state that information required to be submitted to satisfy a provision of law may not be marked as CII by the submitter, the Department of Homeland Security, or any other federal agency.

Also, while the act specifies penalties associated with unauthorized disclosure of this information by federal employees, the draft procedures specifies “whistle-blowing” disclosures that are exempt from these penalties.

The draft provisions, in some ways, address some of the concerns expressed by those who opposed this provision of the act, but also raises some more questions. For example, while the procedures allow entities to submit information they think is CII to the CII Program Manager indirectly through other officials or agencies, the information is not validated as CII until the Manager designates as such. However, as pointed out by critics⁴⁷, the presumption is that the information shall be protected until the Manager makes such a ruling. There is no time frame for the Manager to receive the information or to make a ruling. However, the Manager has 30 days to inform the submitter that the information does not qualify as CII. Will the Manager have the time and resources to validate the amount of information coming in?

The information exchanged between private firms within the context of the Sector Coordinators and the ISACS also raises some antitrust concerns, as well as concerns about sharing information that might unduly benefit competitors.

There is also a technical dimension to all of this information sharing that is suppose to occur. Once collected, the information is stored in different databases, utilizing different technologies. Integrating these databases while controlling access will not be a trivial technical and managerial task.

Privacy/Civil Liberties? The PPCIP made a number of recommendations that raised concerns within the privacy and civil liberty communities. These included allowing employers to administer polygraph tests to their computer security personnel, and requiring background checks for computer security personnel. The PPCIP also recommended allowing investigators to get a single trap and trace court order to expedite the tracking of hacker communications across jurisdictions, if possible. Another area of concern is the monitoring network traffic in order to detect intrusions. Traffic monitoring has the potential to collect vast amount of information on who is doing what on the network. What, if any, of that information should be

⁴⁷ See, DHS Broadens CII in Proposed Rule. OMB Watch, published April 21, 2003. [http://www.ombwatch.org/article/articleprint/1475]. This site was last viewed Jan. 6, 2003.

treated as private and subject to privacy laws? While recognizing a need for some of these actions, the privacy and civil liberty communities have questioned whether proper oversight mechanisms can be instituted to insure against abuse.

The USA Patriot Act (i.e. the anti-terrorism bill passed October 26, 2001 as P.L. 107-56), passed in the wake of the September 11 attacks, contained a number of expansions in government surveillance, investigatory, and prosecutorial authority about which the privacy and civil liberties communities have had concern. Most of these issue are beyond the scope of this report.⁴⁸ However, some of the provisions impact directly the ability to track, in real time or after the fact, computer hackers. This includes provisions giving investigators the authority to seek a single court order to authorize the installation and use of a pen register or a trap and trace device anywhere in the country in order to “record or decode electronic or other impulses to the dialing, routing, addressing, or signaling information used in the processing or transmitting of wire or electronic communications...”⁴⁹ The law also defines a “computer trespasser” as one who accesses a “protected computer” without authorization and, thus, has no reasonable expectation to privacy of communications to, through, or from the protected computer.⁵⁰ The law goes on to stipulate the conditions under which someone under the color of law may intercept such communications.

The issue of allowing firms to conduct background checks, polygraph tests, and monitor personnel who have access to critical infrastructure facilities or systems lay dormant during the Clinton Administration. The National Strategy for Homeland Security resurrected it. The Strategy tasked the Attorney General to convene a panel with appropriate representatives from federal, state, and local government, in consultation with the private sector, to examine whether employer liability statutes and privacy concerns hinder necessary precautions. It is not clear if the Administration meant to include in the private sector representation labor and civil liberty groups. The National Strategy for the Physical Protection of Critical Infrastructures and Key Assets also mentioned exploring the possibility of establishing national standards by which to check the backgrounds of personnel with access to critical infrastructures. And, the Transportation Security Administration is planning to develop a certification program for all transportation workers with access to critical infrastructure.

Another issue is to what extent will monitoring and responding to cyber attacks (or any kind of attack against critical assets) permit the government to get involved in the day-to-day operations of private infrastructures? The PCCIP suggested possibly modifying the Defense Production Act (50 USC Appendix, 2061 *et seq*) to provide the federal government with the authority to direct private resources to help reconstitute critical infrastructures suffering from a cyber attack. This authority

⁴⁸ See CRS Report RS21051, *Terrorism Legislation: Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT) Act of 2001*, by Charles Doyle.

⁴⁹ See Section 216 of P.L. 107-56.

⁵⁰ See Section 217 of P.L. 107-56.

exists now regarding the supply and distribution of energy and critical materials in an emergency. Suppose that the computer networks managing the nation's railroads were to "go down" for unknown but suspicious reasons. What role would the federal government play in allocating resources and reconstituting rail service?

Appendix

Federal Funding for Critical Infrastructure Protection

Table A.1. Critical Infrastructure Protection Funding by Department
(\$ in millions)

Department	FY2004 enacted	FY2004 supplemental	FY2005 enacted	FY2006 request
Agriculture	36.9		150.7	129.3
Defense	6543.8		7916.9	8700.8
Energy	1256.4		1456.1	1481.0
HHS	162.8		168.3	170.3
Homeland Security	2128.3		2585.9	2820.0
Justice	409.2	2.5	455.8	566.1
Transportation	180.1		137.0	141.2
Veterans Affairs	239.2		242.9	262.3
NASA	207.0		218.0	205.0
NSF	313.0		315.2	317.2
Postal Service			503.0	
Social Security	142.1		155.0	172.6
Other Agencies	660.4		634.6	666.3
Grand Total	12279.1		14939.4	15632.2

Source: OMB, Budget of the U.S. Government, FY2006. Analytical Perspectives. Chapter 3. Homeland Security Funding Analysis. p. 43.

**Table A.2 Funding for the Information Analysis and
Infrastructure Protection Directorate**
(\$ in millions)

Budget Activity	FY2004 Actual	FY2005 Enacted	FY2006 Request
Management and Administration	103,947	132,064	204,005
Office of Under Secretary	4,599	5,864	6,878
Other Salaries and Expenses	99,348	126,200	197,127
Assessments and Evaluations	650,007	761,644	669,240
Critical Infrastructure Identification and Evaluation	59,077	77,861	72,173
National Infrastructure Simulation and Analysis Center	24,738	20,000	16,000
Biosurveillance	-	11,000	11,147
Protective Actions	176,757	191,647	91,399
Critical Infrastructure Outreach and Partnerships	63,740	106,592	67,177
Cyber Security	60,081	67,380	73,349
NS/EP Telecommunications	139,225	140,754	142,632
Threat Determination and Assessment	13,000	21,943	19,900
Infrastructure Vulnerability and Risk Assessment	48,591	71,080	74,347
Competitive Analysis and Evaluation	783	4,000	-
Evaluations and Studies	41,240	14,387	34,526
Homeland Security Operations Center	22,774	35,000	61,108
Information Sharing and Collaboration	-	-	5,482
Total	753,954	893,708	873,245

Source: IA/IP Directorate F2006 Budget Justification