CONCLUSION

In July 2011, the Department of Energy's Blue Ribbon Commission on America's Nuclear Future is scheduled to deliver its draft conclusions on the best strategies for U.S. nuclear waste management. This report, along with the proposal by the Obama administration to create a clean energy standard, should serve as the opening for a new national conversation on nuclear energy and nuclear waste management policy. Certainly, there are many concerns that must be addressed. However, advances in nuclear technology have significantly altered the cost-benefit equation that led the United States to interrupt its significant investment in nuclear power three decades ago.

National consumption of electricity is large and growing, and the majority of usage in homes, schools, hospitals, and businesses requires a steady, reliable, around-the-clock power supply.[20] At present, solar and wind energy provide intermittent energy, and we must rely on nuclear- or coal-generated power to provide base load electricity when the sun isn't shining and the wind isn't blowing. Although widespread use of electricity generated by renewable sources remains an important goal, it may take up to 20 years to develop cost-effective, scalable energy storage and grid technology that would make that goal a reality.

U.S. Energy Secretary Chu has stated: "Nuclear energy provides clean, safe, reliable power and has an important role to play as we build a low-carbon future." As the nation's current and future energy options come under review, a new generation of nuclear power technologies can restart America's nuclear industry and assure an adequate, environmentally sound source of electricity for the decades to come. ■

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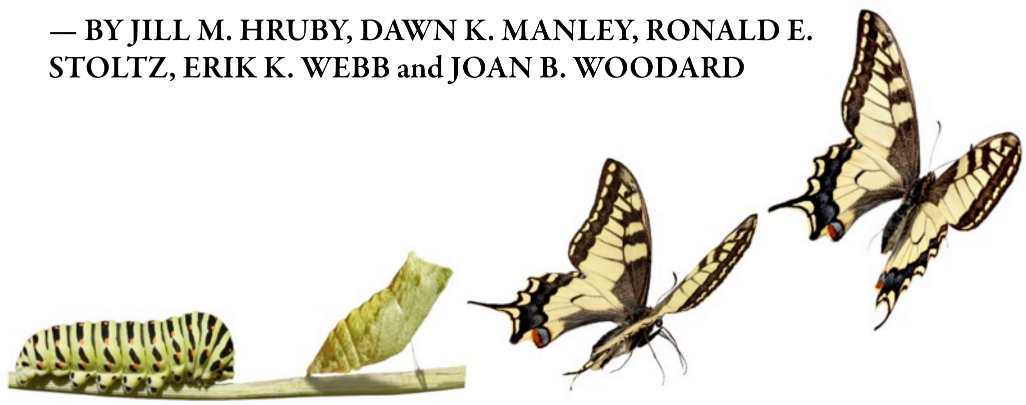
[20] "Myths and Facts About Nuclear Energy Supply," Nuclear Energy Institute: http://www.nei.org/newsandevents/nei-backgrounders/myths--facts-about-nuclear-energy/myths--facts-about-energy-supply

The Evolution of Federally Funded Research & Development Centers

— BY JILL M. HRUBY, DAWN K. MANLEY, RONALD E. STOLTZ, ERIK K. WEBB and JOAN B. WOODARD

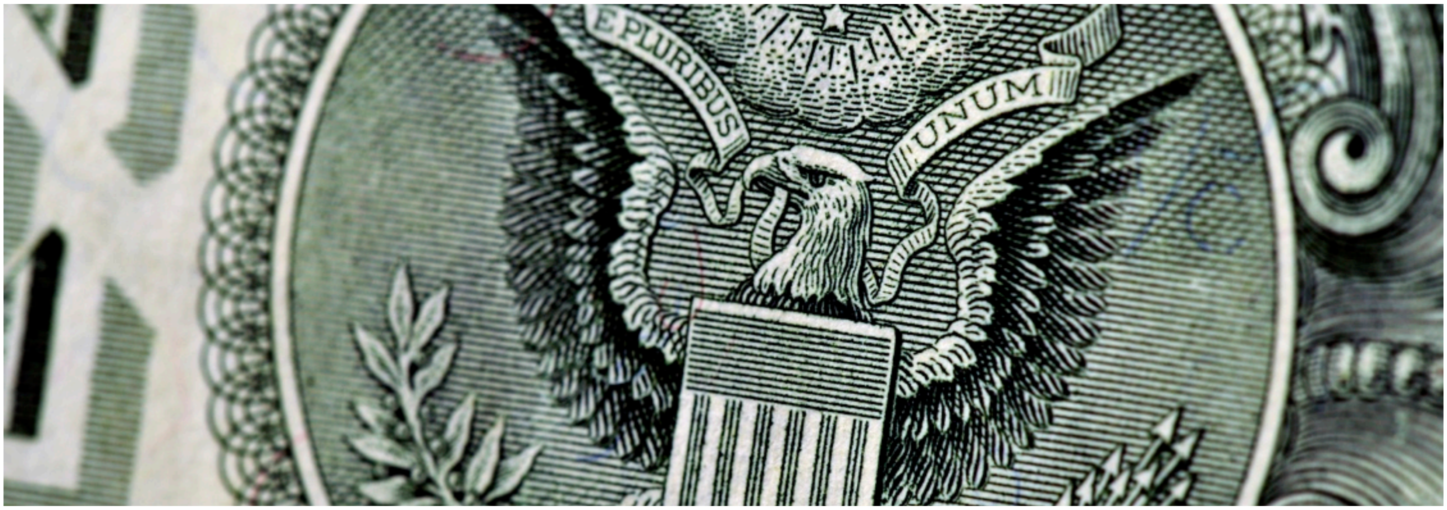


INTRODUCTION

Federally Funded Research and Development Centers (FFRDCs) have thrived, struggled, and evolved to tackle national security missions for more than 70 years. FFRDCs were instituted in the early 1940s to mobilize the country's scientific and engineering talent. They came into national prominence during World War II and again during the Cold War as a mechanism to focus scientific and engineering expertise on pressing national security challenges that demanded intense, sophisticated, and sustained technical talent. Because of the urgency and complexity of their missions, creating and maintaining this body of top technical capability required flexibility and practices not available in the government.

Over the decades since their inception, FFRDCs have become more diverse both individually and collectively in response to expanding national security needs. The government has examined and reexamined their existence, charters, and mission. Today, the FFRDC system finds itself at a crossroad. The national security environment is more dynamic than ever, while simultaneously the budgetary pressures, government accountability, and federal workforce initiatives are forcing reviews of government contracting including FFRDCs.

This article reviews the characteristics of FFRDCS and describes how they have adapted to shifting national security needs and during intense periods of government scrutiny. Two recent incidents, the attempted airline bombing on Christmas Day 2009 and the Gulf of Mexico oil spill in 2010, serve as examples of challenges that relied on the technical expertise of the nation's FFRDCs. Each FFRDC should be held to high standards, and the collection of FFRDCs should be considered systemically, in order for the nation to be prepared to meet 21st century security challenges.



FFRDC HISTORY

Formally established under Federal Acquisition Regulation 35.017, FFRDCs are federally constituted research and development (R&D) organizations that meet special, long-term needs that cannot be met by existing government or contractor resources.[1] Although RAND was established in 1947 as the first FFRDC,[2] its origins date back to World War II when U.S. defense organizations required a rapid and focused R&D capability to apply advanced technologies to the war fighting effort. In 1942, the Office of Scientific Research and Development (OSRD) established the first of these institutions—the Applied Physics Laboratory (APL)— to direct an association of universities and industrial contractors building conventional weapon systems. The APL at the Johns Hopkins University was closely followed by additional hybrid organizations operated by non-federal organizations that supported the war effort like Harvard's Underwater Sound Laboratory, which focused on developing detection equipment for underwater sound; the Radiation Laboratory at the Massachusetts Institute of Technology, which developed microwave radars; and the Jet Propulsion Laboratory at the California Institute of Technology, which developed rocket propulsion systems.

When the war concluded, a critical need remained for the continued development of independent, highly technical capabilities for national security missions such as defense systems and nuclear weapon development. FFRDCs flourished in the 1940s, 1950s, and early 1960s, attracting top talent and expanding missions and sponsoring agencies. By 1969, the number of FFRDCs peaked at 74 with a diversity of federal sponsoring agencies, including the National Science Foundation (NSF), the Atomic Energy Commission (AEC), the Department of Defense (DOD), and the National Aeronautics and Space Administration (NASA).[3]

With federal R&D funding for FFRDCs growing from 0.4 percent in 1960 to 1.2 percent in 1970, the decade brought on a wave of grim analyses from Congress, industry, academia, and the military. This contributed to a precipitous drop in the number of FFRDCs, as illustrated in Figure 1. Prominent critics questioned the very characteristics and freedoms that made FFRDCs successful in their work. Detractors argued there was too little Congressional control, too much influence over policy, higher costs relative to other government and contractor organizations, unfair advantage in obtaining R&D work, and sponsor-biased R&D.

Critics also argued that FFRDCs had outlived their original purpose. Many government and private R&D organizations had expanded and matured in ways that made them capable of undertaking missions associated with FFRDCs. University-affiliated FFRDCs were pressured by campus anti-war sentiment and the armed services were dissatisfied with several aspects of FFRDC performance. The services believed that the work was too academic and not responsive to military needs. Congressional critics wanted DoD to reduce its presence on American campuses. The 1969 Mansfield Amendment to the Military Authorization Act, which prohibited the DoD from using funds for research that did not have an explicit military purpose, contributed to a 45 percent drop in DoD's basic research portfolio from 1967 to 1975. By 1976, only eight DoD-sponsored FFRDCs remained from the peak of 39 in the early 1960s.[4] While some FFRDCs were terminated, others were maintained in other forms, such as private sector or not-for-profit organizations. For example, the Applied Physics Lab changed status to a University Affiliated Research Center (UARC). UARCs share characteristics with FFRDCs with the exceptions that they have a university affiliation, have education as part of their mission, and have more flexibility to compete for work than DoD FFRDCs.

[1] https://www.acquisition.gov/far/html/Subpart 35_0.html#wp10851, accessed on August 24, 2010.
[2] Bruce L. R. Smith, *The RAND Corporation: A Case Study of a Nonprofit Advisory Corporation* (Cambridge, MA: Harvard University Press, 1966).
[3] U.S. Congress, Office of Technology Assessment, *A History of the Department of Defense Federally Funded Research and Development Centers*, OTA-BP-ISS-157 (Washington DC: U.S. Government Printing Office, June 1995).

In 1984, the Office of Federal Procurement Policy issued a statement that codified the requirements for the creation of FFRDCs. These requirements were reiterated in the 1990 Federal Acquisition Regulation.[5-8] Despite the clarity of the 1990 FAR, the 1990s saw a second wave of pressures on FFRDCs. Several studies on DoD FFRDCs emphasized that these institutions should adhere to their core mission rather than diversifying their programs. For example, the DoD Inspector General recommended that, "DoD strengthen controls over the screening and assignment of work to FFRDCs, to include ensuring the performance of market surveys."[9] The 1997 Defense Science Board Task Force Report further supported the focus on core mission by stating that the DoD "must carefully define those limited special R&D activities that demand the attributes of an FFRDC."[10] The Task Force emphasized that outside institutions could conduct much of the work. Then Undersecretary of Defense for Acquisition and Technology, Paul G. Kaminski, instituted principles that today are reflected in the FAR.[11]

Currently, specific FAR requirements include that FFRDCs should:

- Meet a special long-term government R&D need that cannot be met as effectively by the government or the private sector.
- Work in the public interest with objectivity and independence, and with full disclosure to the sponsoring agency.
- Operate as an autonomous organization or identifiable operating unit of a parent organization.
- Preserve familiarity with the needs of its sponsor(s) and retain a long-term relationship that attracts high quality personnel.
- Maintain currency in field(s) of expertise and provide a quick response capability.

The DOE National Laboratory system, a subset of FFRDC institutions, faced similar scrutiny. In 1995, the Secretary of Energy Advisory Board examined alternative futures for the laboratory complex.[12] They observed the laboratories as "having clear areas of expertise, yet limited to their traditional mission areas of national security,

Despite the pressures of the 1990s, the system has expanded with three new FFRDCs for the Department of Homeland Security, and one each for the IRS and Department of Veterans Affairs. This reflects a trend of creating new laboratories for new challenges.

Spring 2010:

In spring 2010, the *Deepwater Horizon* oil spill in the Gulf of Mexico was one of the largest offshore environmental incidents in U.S. history. In late April 2010, at the request of President Obama, DOE Secretary Steven Chu convened a small group of national laboratory executives, senior university professors and government advisors to serve as his scientific advisory team. More than 200 scientists and engineers from the DOE and National Nuclear Security Agency (NNSA) laboratories (Sandia, Lawrence Livermore, and Los Alamos National Laboratories) provided real time analysis, technical input and oversight.[1] For five months, a group of laboratory technical experts rotated through Houston to provide on-site support in addition to support at the laboratories.

[4] Presentation: "History of Federally Funded Research and Development Centers (FFRDC): Contributors to national security, science, and engineering through a turbulent history", Clifford Jacobs, 2010, NSF
[5] http://www.nsf.gov/statistics/ffrdclist/archive_ffrdc.cfm. Accessed 10/19/2010.
[6] Developing a Sustainable Future for Federally Funded Research and Development Centers, Master of Science Thesis, S.B. Bowling, Massachusetts Institute of Technology, 1997.
[7] National Science Foundations, Federal Funds for Research and Development: Fiscal Years 1990, 1991, and 1992, vol. XL, NSF92-322, 1992.
[8] Office of Federal procurement Policy, Office of Management and Budget, OFPP Policy Letter 84-1, Federally Funded Research and Development Centers, April 4, 1984.
[9] Contracting Practices for the Use and Operations of DoD-Sponsored Federally Funded Research and Development Centers, Audit Report No. 95-048, Office of the Inspector General, December 2, 1994.
[10] Report of the Defense Science Board Task Force on Federally Funded Research and Development Centers (FFRDC) and University Affiliated Research Centers (UARC) Independent Advisory Task Force, January 1997.
[11] Presentation: "History of Federally Funded Research and Development Centers (FFRDC): Contributors to national security, science, and engineering through a turbulent history", Clifford Jacobs, 2010, NSF
[12] Alternative Futures for the Department of Energy National Laboratories, Secretary of Energy Advisory Board Task Force on Alternative Futures for the Department of Energy National Laboratories, February 1995.

Deepwater Horizon Oil Spill

The earliest phase was characterized by a steep learning curve on the part of both the government scientists and the oil industry production engineers. While the industry experts had specific domain knowledge of the subsea equipment and geology, the federal team provided extensive technical expertise in stress analysis, fluid flow, advanced diagnostics, and geologic modeling.

Over the intervening weeks, the federal team shifted from providing strict analysis to giving recommendations and alternative approaches to safely capping and eventually killing the leaking well. Once the incident response leadership transitioned from an industry to a government-led effort, the laboratory support team worked closely with government agency representatives.

The federal response highlighted a number of features of the FFRDC system. First, while national laboratory personnel are contractor employees, not federal staff, the Secretary of Energy authorized them to marshal resources and solve time-critical national problems. Second, the NNSA laboratories provide a great depth and breadth of technical expertise. While the DOE/NNSA team in Houston did not have specific knowledge of the oil extraction business, their technical expertise helped complement the industry sector's operational knowledge. Third, because the well containment effort rose to an "all government" response, the DOE scientists supported a domain outside of their agency mission space. Although regulation of petroleum exploration and development is officially a Department of Interior function, close collaboration between Secretary Chu and DOI Secretary Ken Salazar enabled this cross-agency and cross-mission collaboration.

The Gulf oil spill revealed gaps in how the FFRDC system's expertise can be best used. The system for government and industry experts to solve problems of critical and national importance remains a work in progress. The oil spill involved infrastructure that was owned by the private sector. Despite private ownership, there is an expectation of government involvement, either through regulation or because of national security.

The role of FFRDCs in support of national incident command responses has not been fully institutionalized, especially since multiple cabinet agencies may be involved. For events like those in the Gulf, establishing hybrid organizations, with sustained industry and government involvement, may provide a new construct. The outcome would be to embed and sustain a core of government expertise to assist in potential future oil spills or other problems at the intersection between public agencies and private industry.

ENDNOTE:
http://www.energy.gov/open/oil_spill_updates.htm. Accessed 1/7/11.

energy, and environmental science and technology, as well as in the fields of fundamental science which underpin these missions and in basic science associated with high energy, nuclear, and condensed matter physics." The advisory board also urged the labs to "provide more disciplined focus on the new research needs within the traditional set of mission areas."

Despite the pressures of the 1990s, the system has expanded in recent years with three new FFRDCs established for the Department of Homeland Security (DHS), and one each for the IRS and Department of Veterans Affairs. This reflects a trend of creating new laboratories for new challenges. Today, there are 26 R&D FFRDCs, nine Systems Analysis FFRDCs, and five Systems Engineering FFRDCs, ranging in size from about $6 million to $2,200 million.

ENDURING INSTITUTIONAL CHARACTERISTICS

Although the required characteristics are legislated, there is substantial diversity in mission and operating modes in practice amongst FFRDCs. Those institutions that have endured and thrived exhibit the following characteristics:

- A commitment to their prime sponsor and the FFRDC charter – Successful institutions demonstrate commitment to the original intent of their charter as an FFRDC and to the objectives of their prime sponsoring agency. The mission success of their prime sponsor remains their highest priority. Thriving FFRDCs have also instituted processes to ensure objectivity and independence in their technical and engineering advice to their sponsoring agency and to all other government agencies with which they contract or interact.
- Continuity of expertise – Thriving FFRDCs have maintained technical excellence in critical technical areas, sometimes attracting new or additional sponsors in order to maintain this expertise. In addition to providing successful missions, this continuity fosters an environment that attracts and retains a loyal and highly technical workforce. This "patient intellectual capital"[13] is able to rapidly respond to government needs by providing a depth of understanding of the technological needs for evolving national problems.

• An anticipation of national needs – Successful FFRDC executives anticipate and respond to new developments, especially in the area of national security. While maintaining their core missions, vibrant FFRDCs actively seek 21st century national challenges. This has resulted in a significant diversification of their sponsorship base.

• Facilities to address long-term, large-scale problems – Successful FFRDCs address complex technical challenges that often require high risk experiments and large facilities, such as supercomputers or light sources, which are beyond the scale or role of purely academic or commercial entities. They provide a resource for, and partner with, academia and industry. Moreover, these institutions maintain infrastructure and personnel to work with sensitive or classified national security information. Broad, interdisciplinary teams tackle problems that are beyond the scope of university professors or departments.

• Independent evaluation – Successful FFRDCs invite independent external evaluation of their capabilities, R&D activities, organizational approaches, and business practices. This occurs through external review boards and the use of nationally recognized standards and metrics for research institutions. This has lead to a culture of continuous improvement, both in the programmatic impact of their work and in the management and operations of their facilities.

CURRENT PRESSURES AND DRIVERS

The nation is again re-evaluating the FFRDC system, driven in part by the expansion of multi-program portfolios. For example, the budget for nuclear weapons work at Sandia is 43 percent of the overall operation revenue. The remainder encompasses a diverse program that includes projects for the Departments of Defense, Homeland Security and State among others. This gradual diversification at Sandia and other FFRDCs has attracted criticism that suggests the FFRDCs should focus on their core missions.[14]

The current federal budget crisis provides additional pressure on these R&D institutions. Other commercial and academic providers of R&D expertise and services feel the need to compete with the FFRDC system. This is especially true for the defense contracting community and the nation's research universities.

Lastly, there is a concerted move by the federal government to "in-source" more functions and to re-scope the size of the federal workforce while reducing the size of the contractor base. Section 852 of the National Defense Authorization Act FY08 created the Defense Acquisition Workforce Development Fund (DAWDF) to help recruit and retain a highly skilled set of program managers, engineers, and contracting officials that are hard to find and retain.[15] "Qualifications need to include a much higher percentage of acquisition professionals who also have scientific, mathematic and engineering backgrounds… it is also important to ensure that they [contracting professionals] have the technical skills to understand what a best value solution is and why one technology or solution is better than another."[16] At the same time, there is a vigorous discussion regarding "inherently governmental functions" and the legitimate boundaries of work by the federal workforce and by those outside of government. FFRDCs are positioned at this intersection.

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FFRDCs AT A CROSSROADS: THE EVOLUTION OF THE SYSTEM

The leadership of each FFRDC is charged with maintaining and improving the health and vitality of their respective institutions. Below are suggestions for how the government may increase the value of the FFRDC system.

Encourage diversification for emerging, broadly-defined national security needs. In response to growing national security threats, the FFRDC laboratories have diversified their customer base. FFRDCs attract and retain talent to achieve the highest national impact. The Stimson Task Force, "Leveraging Science for Security," validated this approach,[17] suggesting that in addition to retaining core weapons competencies, the nuclear weapon laboratories should expand their capabilities to address a broader range of 21st century national security needs. This diversification will result in cost savings and allow the best minds to tackle daunting national security challenges.

Recognize the special ability of FFRDCs to work at the public/private interface where some of the nation's most vexing problems develop. The federal government faces a number of problems that are neither fully governmental nor private concerns. For example, cyber threats to U.S. infrastructure, attacks against aviation, and large deep-sea oil leaks require the shared response of government and industry. Whether incorporated within the FFRDC framework or with quasi-governmental organizations that capitalize on FFRDC capabilities, these threats suggest that the nation needs to develop new options for engaging FFRDCs. [see oil spill side bar]

13 *A History of the Department of Defense Federally Funded Research and Development Centers,"* OTA-BP-ISS-157, U.S. Congress, Office of Technology Assessment, Washington, DC: U.S. Government Printing Office, June 1995.
14 *Alternative Futures for the Department of Energy National Laboratories*, Secretary of Energy Advisory Board Task Force on Alternative Futures for the Department of Energy National Laboratories, February 1995.
15 *The Big Picture on the Defense Acquisition Workforce Development Fund,* Defense AT&L: Special Edition 2009, F.J. Anderson, Jr.
16 Testimony to Defense Acquisition Reform Panel, House Committee on Armed Services, Lawrence P. Farrell, 2009.
17 *Leveraging Science for Security: A Strategy for the Nuclear Weapons Laboratories in the 21st Century,* Task Force on Leveraging the Nuclear Weapons Laboratories for 21st Century Security, F.F. Townsend, D. Kerrick, and E. Turpen, March 2009.

Maintain program FFRDC core competencies that uniquely serve national needs. The Applied Physics Lab (APL)[18] underwent a self-initiated, multi-year process to determine its critical capabilities and matched those to evolving mission areas. The APL approach could be used as a guide to other FFRDCs as they plan for the future. One key metric is the alignment of each organization's strategic plan to meet agency missions and evolving national needs. Public recognition of "best in class" among the FFRDC would help all institutions to improve.

Develop mechanisms within the agencies with multiple FFRDCs – DoD, DOE, and DHS – to leverage resources. Most federal agencies develop an annual strategic plan that illustrates their direction and the environment in which they are operating. These plans outline current trends but also reflect a longer-term view. Testing each FFRDC's set of capabilities against these agency strategies is a first step to creating a system that is more effective and efficient. Identifying opportunities to pool resources and to jointly plan is another key step in increasing the value of an agency's system of laboratories. For example, the DOE Office of Science capital investment plan[19] is a 20-year outlook for research mission areas, needed facilities, and priorities for capital investments over time. This document has received wide recognition for its vision and for the value of a published long-range plan.

Encourage FFRDCs to form ad hoc collaborations to rapidly mobilize critical technical skills to address emerging problems. The Joint Improvised Explosive Device Defeat Organization (JIEDDO) was established in 2006 to mitigate the threats from Improvised Explosive Devices (IEDs). In the joint office, talent from across the FFRDCs and private companies is pooled and leveraged through coordination and planning of mitigation activities. This continuing JIEDDO effort provides a sustained intellectual base that is well-suited to respond to evolving adversaries and technological threats. JIEDDO is recognized as a model for addressing new security threats. A collaborative effort like JIEDDO could be used to address other pressing problems.

Attempted Bombing on Christmas Day 2009

On Christmas Day 2009, 23-year-old Umar Farouk Abdulmutallab attempted to bomb Northwest Airlines flight 253 from Amsterdam to Detroit. This act of terrorism scared the public and aviation security community – a community still recovering from the events of September 11, 2001.

The Department of Homeland Security (DHS), the U.S. intelligence community, and the Obama administration needed to address the failures in the security system that allowed Abdulmutallab to walk on a plane with explosives hidden in his clothes. Questions included the chemical identity of the explosive carried onto the aircraft and whether it would have crashed the plane. Also, how could the U.S. further improve airport security to prevent another attempt?

The next day, DHS contacted several Department of Energy (DOE) national laboratories. The DOE labs supplied the technical expertise in explosive science and security to identify the technical issues and provide answers.

The White House convened national security leaders to respond to the event. Secretary Chu, recognizing the science, technology, and explosives expertise in his national labs, pledged support to DHS. As a result, the deputy secretaries at DOE and DHS contacted the laboratory directors to organize activities into four categories to make rapid progress: (1) systems analysis, (2) aviation security, (3) "connecting the dots," and (4) emerging technologies.

The national labs mobilized technology teams, a particular challenge because of the holiday recess, and DOE and DHS held daily conferences for two purposes: (1) to determine threats and identify weaknesses in the current security system, and (2) to propose improvements to security. While the DHS/DOE/Lab leadership met, a group of national security laboratory participants convened with the National Counter Terrorism Center to discuss how the labs could help "connect the dots."

The work done by the labs and DOE/DHS teams brought a focus to the resources and organizations that should be included in the effort. Unfortunately, the resources to pursue many of the needs were not immediately available, and ten months later discussions continue but the urgency has faded. Funding to initiate the systems analysis has commenced and multiple DOE labs and DHS FFRDCs are defining needs and future requirements.

The need for a quasi-government body of expertise devoted to national security that is readily accessible to focus on complex problems was clear. The scientific and technical knowledge within the FFRDC system was critical, as was the ability to independently assess problems.

On Christmas Day 2009, an attempted attack on an international air carrier brought together the DOE, DHS, FAA, the intelligence community, and the airline industry to evaluate the threat and to deploy detection and mitigation technologies. While data mining, threat profiling, and detection technologies were already mature, the analysis and recommendations from this collective group accelerated the deployment of new tools and procedures. This resulted in improved confidence in the safety of air travel and increased deterrence to similar attempts in the future. As with the IED task force, the "Christmas Day" effort demonstrated the power embedded in the FFRDC system. The "Christmas Day" project should be documented and analyzed, with the inter-agency process used to stand up the effort codified as a template for future use. [see Christmas Day side bar]

CONCLUDING OBSERVATIONS

Over the past seven decades, the FFRDC system has undergone transitions and endeavored to meet the rise and fall of pressures as national needs and priorities evolved. This evolution has resulted in stronger and more resilient institutions that are valued as the crown jewels of the nation's science and technology enterprise.

However, these institutions have largely evolved independently and today their roles and characteristics are not broadly recognized. By highlighting the historical and possible future of FFRDCs, this paper attempts to spark a dialogue that brings about greater understanding and refines their role in the U.S. research, development, and national security enterprise. ■

Acknowledgements

The authors wish to acknowledge informative and open discussions with many leaders and independent thinkers about FFRDCs, UARCs, and other federal research institutes including Miriam John (VP emeritus, Sandia); James Shields and John Dowdle (Draper Labs); Eric Evans and Anthony Sharon (MIT Lincoln Labs); Richard Roca (Johns Hopkins Applied Physics Laboratory); John Hamre (Center for Strategic and International Studies); Ron Townsend, Barbara Kunz, Steve Kelly, Brian Graham, Erik Pearson, Brett Bosley, and Blake Thompson (Battelle Memorial Institute); Steve Proia (Jet Propulsion Laboratory); Lisa Stevens and Genevieve Medley (National Institutes of Health/National Cancer Institute); John Fischer (Office of Secretary of Defense); William Rees (Los Alamos National Laboratory); Parney Albright (Lawrence Livermore National Laboratory); and Robert Knetl, Tom Horton, Rebecca Caravati, and Dennis Crain (Georgia Tech Research Institute). We gratefully acknowledge critical reviews of the manuscript by Harvey Sapolsky and Holly Dockery.

[18] *A View of Future* APL Science and Technology: Guest Editor's Introduction, J.C. Sommerer, Johns Hopkins APL Technical Digest, Vol 26, Number 4 (2005) http://www.jhuapl.edu/techdigest/TD/td2604/index.htm

[19] *U.S. Department of Energy, Office of Science Strategic Plan and Facilities Outlook: Office of Science Strategic Plan,* Feb. 2004; Facilities for the Future of Science--A Twenty Year Outlook Nov. 2003, Interim Report Oct. 2007 http://www.osti.gov/cgi-bin/scsearch/explhcgi?qry1239520167;sc-05184

[20] Master Government List of Federally Funded R&D Centers, http://www.nsf.gov/statistics/ffrdclist/archive_ffrdc.cfm. Accessed 10/19/2010.

Appendix – Current FFRDCs

Aerospace Federally Funded Research and Development Center[20]
Ames Laboratory
Argonne National Laboratory
Arroyo Center
Brookhaven National Laboratory
C3I Federally Funded Research & Development Center
Center for Advanced Aviation System Development
Center for Enterprise Modernization
Center for Naval Analyses
Center for Nuclear Waste Regulatory Analyses
Centers for Communications and Computing
Fermi National Accelerator Laboratory
Homeland Security Studies and Analysis Institute
Homeland Security Systems Engineering and Development Institute
Idaho National Laboratory
Jet Propulsion Laboratory
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Lincoln Laboratory
Los Alamos National Laboratory
National Astronomy and Ionosphere Center
National Biodefense Analysis and Countermeasures Center
National Cancer Institute at Frederick
National Center for Atmospheric Research
National Defense Research Institute
National Optical Astronomy Observatories
National Radio Astronomy Observatory
National Renewable Energy Laboratory
Oak Ridge National Laboratory
Pacific Northwest National Laboratory
Princeton Plasma Physics Laboratory
Project Air Force
SLAC National Accelerator Laboratory
Sandia National Laboratories
Savannah River National Laboratory
Science and Technology Policy Institute
Software Engineering Institute
Studies and Analyses Center
Thomas Jefferson National Accelerator Facility