Testimony of
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on the subject of
"Doing Business with DOD: Getting Innovative Solutions from Concept to the Hands of the Warfighter"
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Chairman Shuster, Congressman Larsen, Honorable Members, thank you for the opportunity to appear before your panel. My name is Stephen Huffman, and I am the Vice President and Chief Technology Officer of The MITRE Corporation. Our company's 53 years of experience, contributions, and accomplishments have given us a perspective that I believe is highly relevant to today's topic of "Getting Innovative Solutions from Concept to the Hands of the Warfighter."

The U.S. military's superior operational capabilities of today were enabled by decades of substantial investment in research and development of advanced technology systems. The current fiscal environment requires the DoD to make significant reductions in spending without jeopardizing national security. To maintain superior military capability, the DoD must explore creative ways of rapidly developing new capabilities in an affordable manner. Achieving this objective will require the best innovative thinking of the DoD, government and private research institutions, and suppliers in the Defense Industrial Base. As a part of this effort, Federally Funded Research and Development Centers (FFRDCs) are well-positioned to contribute to transitioning innovative technologies from concept to fielded capability.

The FFRDC Role

The MITRE Corporation is a not-for-profit organization chartered to work only in the national interest. MITRE manages FFRDCs and applies its expertise in systems engineering, information technology, operational concepts, and enterprise modernization to address our sponsors' critical needs.

An FFRDC is a unique organization that assists the U.S. government with scientific research and analysis, development and acquisition, and/or systems engineering and integration. FFRDCs address problems of considerable complexity, analyze technical questions with a high degree of objectivity, and provide creative and cost-effective solutions to government problems.

FFRDCs operate as long-term strategic partners with their sponsoring government agencies. To ensure the highest levels of objectivity, FFRDCs are organized as independent entities with limitations and restrictions on their activities. This unique standing permits special access to government information and provides a long-term perspective. Since FFRDCs are prohibited from manufacturing products, competing with industry, or working for commercial companies, both industry and government confidently provide them with sensitive information. As private entities, FFRDCs have greater flexibility than the government in recruiting and managing a highly skilled technical workforce. Working in this environment, FFRDCs are able to support their government sponsors across a full spectrum of planning and concept development, research and development, and systems acquisition. Developing long-term relationships with their sponsors enables FFRDCs to achieve a deep understanding of their sponsors' evolving roles, issues, and challenges, as well as to provide an institutional memory.

The role of a systems engineering FFRDC is analogous to that of the traditional building architect whose job is to serve as the client's trusted agent, ensuring that the final structure meets all needs and requirements. It encompasses a wide-ranging set of responsibilities, including translating needs into requirements, defining capabilities sufficiently to enable contractor development, conducting evaluations and cost-capability tradeoffs, and exploring and assessing alternative ways of meeting a difficult objective through prototyping. The ultimate goal is to ensure the sponsor's highest-priority needs are met within the constraints imposed by available technology, funding, and time.

In addition to directly supporting our sponsors, MITRE also conducts an independent research and development (R&D) program that develops new technologies and innovative uses for old technologies to solve our sponsors' problems in the near-term and in the future. The objectives of MITRE's R&D program are to:

- Focus creative minds on tough technical challenges,
- Encourage ground-breaking thinking about future potentially transformational technologies,
- Prove that solutions work through rigorous modeling, simulation, prototyping and testing.

As a not-for-profit corporation working in the public and national interest, our R&D model differs from those of most for-profit companies. Our program serves as a resource for our sponsors, and our R&D strategy directly reflects their needs. Some of our internal R&D projects address current operational problems while others advance the understanding of a particular field. Additionally, we investigate emerging technologies—some so new their parameters remain undefined. Our metric of success rests not on creating shareholder value but on helping the government achieve its mission objectives. This gives us the freedom to explore technologies that may become game-changers in the future but that also carry a high risk of failure.

Because it is our mission to create value for the government and the public, we disseminate our findings as widely as possible—when there are no security restrictions—through technical

society conferences, publication in peer-reviewed journals, participation in standards bodies, and symposia sponsorship. We also actively seek opportunities to transfer the technology we develop to commercial companies so they can turn our discoveries into supported, affordable products for the government.

Rapid Capability Development

MITRE has supported numerous rapid capability development programs that address urgent operational needs. In our experience, there are three keys to success:

1. Work closely with operational users to understand their needs,
2. Adapt mature technology and build operational prototypes to prove the concept and get user feedback,
3. Acquire operational capability through an agile acquisition strategy.

Operational users have the best understanding of the capabilities they need. However, they rarely have the in-depth technical knowledge necessary to conceive a solution. FFRDCs are well-equipped to bring technical knowledge to the end users and work closely with them to solve problems.

Whenever possible, MITRE deploys staff to the field to study firsthand the special challenges our end users, including warfighters, face. For example, a group of MITRE "ship riders" lived aboard the USS PELELIU in mid-2010 to learn about the Navy's unique command, control and communications issues. The team became immersed in the workflow and systems of entities such as Landing Force Operations Centers, gaining knowledge for future research and design efforts. For the Army, MITRE engineers frequently visit Afghanistan to contribute their technical expertise to intelligence, surveillance, and reconnaissance system challenges faced by U.S. and coalition troops.

One of the most effective ways to engage users in the rapid development of solutions is to provide them with an operational prototype whose design can be rapidly iterated in response to their feedback. Often, readily available technology can be adapted to quickly deploy and evolve capabilities. This approach can be combined with an agile acquisition strategy to deliver needed capabilities in months, rather than years.

Agile acquisition is a strategy for providing multiple, rapid deliveries of incremental capabilities to the user for operational use and evaluation. The incremental deliveries can be made every few weeks or every few months, and each iteration is built with continuous user participation and feedback. Even when the final system requirements aren't clear, an agile acquisition strategy can quickly deliver some capabilities to the users rather than making them wait for the final system.

The advantages of this strategy are that: 1) development can begin immediately, without the time and expense needed for development, refinement, and approval of functional requirements; and

2) significant user involvement during development guarantees that the capabilities delivered will meet the users' needs and will be used effectively.

An example of the successful application of an agile acquisition strategy is the Battlefield Airborne Communications Node (BACN), an innovative solution that uses commercially available components to provide communications gateways in the air where warfighters need them most. MITRE serves as the lead systems engineer on BACN for the Airborne Networking Division at the Air Force's Electronic Systems Center. These airborne gateways significantly shorten command and control response times by enabling machine-to-machine transactions, data-link translation, and voice bridging. By the end of 2010, the BACN team had deployed five aircraft carrying the new node to the operations theater. The aircraft provide continuous, uninterrupted coverage over a wide area.

FFRDC Interaction with Innovation Sources

In addition to directly supporting government capability development and conducting their own R&D, FFRDCs play a valuable role in interacting with other sources of innovation and channeling them toward government needs.

FFRDCs often serve as brokers for interactions between government and industry on technical issues. For example, in the not-too-distant future, soldiers will routinely use smart phones with situation-specific mobile applications—ones that may save their lives. It is not difficult to imagine the existence of a robust industry ecosystem supplying the DoD with various mobile applications through the DoD's own "app store." To bring that moment closer, MITRE created the Government Mobile Application Group, which includes participants from commercial companies (such as Apple and Google) and a number of government agencies to discuss how industry can help the government. Dozens of representatives from government and industry meet quarterly to discuss the DoD's special needs (e.g., for security) and how to lower barriers to quickly fielding products.

FFRDCs also interact with industry to transfer the practical results of FFRDC work to the commercial sector through such methods as cooperative research and development agreements, technology licensing, open source participation, and contributions to industry standards. In addition to contributing to the nation's economy, the transition of technology to the commercial sector often provides a direct benefit to the FFRDCs' sponsors.

For example, taking advantage of the latest in situational-awareness technology for civil aviation can be challenging for small-aircraft owners. Equipment compatible with the Federal Aviation Administration's (FAA's) new Automatic Dependent Surveillance-Broadcast (ADS-B) system is larger and more expensive than many owners need or can afford. To solve the problem, MITRE developed the Universal Access Transceiver (UAT) Beacon Radio, which allows low-altitude aircraft to maintain air-traffic awareness using smaller and less-expensive equipment. The UAT Beacon Radio, which was the product of collaboration between MITRE's aviation and defense

FFRDCs, started as a research project in 2007. The portable, battery-powered system is about the size of two decks of cards and supports multiple broadcast data services. It also has potential applications for emergency management operations and search-and-rescue missions. Because it transmits messages compatible with ADS-B, it fits the FAA's blueprint for the NextGen Air Transportation System and will be valuable in the integration of unmanned systems into civil airspace. MITRE successfully transferred the radio technology to commercial manufacturers, which are developing production systems based on our design.

In addition to working closely with government laboratories, academia, and industry to develop and transfer technology, FFRDCs can help expand their sponsors' sources of innovation by providing new mechanisms to discover and connect nontraditional suppliers to government needs. For example, MITRE created a series of open competitions called The MITRE Challenge™. The challenge was developed to encourage innovation in technologies of interest to the federal government. Open to academic institutions, commercial companies, government laboratories, and individuals, the first challenge focused on multicultural name matching. This technology is a key component of identity matching, which involves measuring the similarity of database records referring to people. Uses include verifying eligibility for Social Security or medical benefits, identifying and uniting families in disaster relief operations, vetting persons against a travel watchlist, and merging or eliminating duplicate records in databases.

During the nine months of the competition, 140 people registered from across the globe. In total, 40 teams submitted results to the challenge. One of our main goals was to foster a spirit of collegial competition. This happened throughout the challenge as teams saw how well their competition was doing and improved their own scores over time.

MITRE believes that approaches such as the MITRE Challenge offer exciting and inventive ways to rapidly provide a broad set of ideas and solutions to the government. We think that using this type of real-time experimentation venue can dramatically reduce the time from development to application in product development.

Conclusion

The current fiscal environment requires significant reduction in DoD spending without jeopardizing national security. I believe that with the best innovative thinking of the DoD, government and private research institutions, and suppliers in the Defense Industrial Base, the DoD can maintain its superior operational capabilities even in an austere fiscal environment. Federally Funded Research and Development Centers play a unique role in addressing this challenge, working with government, academia, and industry to transition innovative technologies from concept to fielded capability.