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"Driving Innovation through Federal Investments"
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Chairwoman Mikulski, Ranking Member Shelby, and distinguished members of the Senate Committee on Appropriations,

Thank you for the opportunity to provide this statement to the Senate Appropriations Committee for their Science and Technology hearing on the topic: *Driving Innovation through Federal Investments*.

MIT Lincoln Laboratory is a Department of Defense (DoD) Federally Funded Research and Development Center (FFRDC) and a DoD Research and Development Laboratory. Operated by the Massachusetts Institute of Technology, the Laboratory conducts research and development pertinent to national security on behalf of the military Services, the Office of the Secretary of Defense, the intelligence community, and other government agencies. Projects undertaken by Lincoln Laboratory focus on the development and prototyping of new technologies and capabilities to meet Government needs that cannot be met as effectively by the Government's existing in-house or contractor resources. Program activities extend from fundamental investigations through design and field testing of prototype systems using new technologies. A strong emphasis is placed on the transition of systems and technology to the private sector. MIT Lincoln Laboratory has been in existence for 63 years. On its 25th and 50th anniversaries, the Laboratory received the Secretary of Defense Medal for Outstanding Public Service in recognition of its distinguished technical innovation and scientific discoveries.

Federal investment in research and development work coupled with technology transfer to industry is a powerful innovation engine, helping the nation sustain its strong position as a technology leader. The manufacture of new or advanced products built from the prototype technologies made possible with Federal S&T investments offers significant potential for economic growth. Below are a few examples of this from our experience as a R&D Laboratory FFRDC.

<u>Federal Investment in S&T is an Innovation Engine</u>

The editors of R&D Magazine sponsor an annual competition that has become known as the "Oscars of Innovation", in which the 100 most innovative technologies of the year are honored. In the four years that MIT Lincoln Laboratory has been submitting our Federally-funded S&T innovations for consideration, 16 of them have won R&D 100 awards.

One example of an innovative technology that won an R&D 100 award is the Airborne Ladar Imaging Research Testbed (ALIRT), which is an airborne laser radar (ladar) imaging system that provides high-resolution, 3-dimensional views of terrain from altitudes of up to 9000 meters. ALIRT can collect this data over areas from 800 to 2200 square kilometers per hour, 7 to 12 times faster than any other commercial or experimental ladar system. The system can obtain data over a wide range of terrain,

including mountains and deep valleys and from distances that permit increased operational security. ALIRT can be used to distinguish terrain features, detect camouflaged objects, build elevation models, and create reference maps. The prototype ALIRT system, developed with DoD funding, was employed to support military operations in Afghanistan, and was also used to support humanitarian relief efforts in post-earthquake Haiti.

Another example of an R&D 100 award winner is the Runway Status Light System (RWSL) which provides automated incursion alerts to pilots and vehicle operators on the airport surface. The RWSL system was developed with funding from the Federal Aviation Administration (FAA). RWSL alerts pilots when a runway is unsafe by illuminating special red lights, embedded in the runway pavement, that are fully visible to pilots and nearby personnel. The lights are controlled by safety logic that automatically processes surveillance information from a preexisting airport surveillance system. An FAA-sponsored study of runway incursions in the United States between 1997 and 2000 at 100 of the busiest airports determined that RWSL might have prevented or mitigated 75% of the 167 identified incursions. The RWSL technology has been transferred to industry and is now operational at a number of major US airports.

Federal Investment in S&T is an Economic Engine

In support of our emphasis on the development and demonstration of technology prototypes, the Federal Government, through MIT Lincoln Laboratory, is responsible for investing more than $400 million annually to the nation' business sector, more than half of which is invested in small businesses. This investment provides direct, near-term economic benefit to industry, but more importantly, the collaboration and technology transition that takes place during the development and prototyping activities themselves provides "hands-on" experience to our industry partners and their employees that benefits them and the nation in the long term.

As of March 31, 2014, 773 U.S. patents on technology developed by Lincoln Laboratory with Federal S&T investment have been licensed for commercial applications, and since the Laboratory's formation in 1951, nearly 100 new businesses were founded on the basis of Laboratory developments.

The National Aeronautics and Space Administration (NASA) sponsored Lincoln Laboratory to design and build a system to help them realize a long-sought-after goal of increasing the amount of data that can be returned from deep-space science probes. The system takes advantage of optical communications technology, with its very narrow beams and wide, unregulated electromagnetic spectrum, to provide a solution for extremely long-distance data transmittal via communication satellites. The innovative Lunar Laser Communication Demonstration (LLCD) system consists of a very small space terminal that flew in orbit around the moon on NASA's Lunar Atmosphere and Dust Environment Explorer (L ADEE) spacecraft which was launched in September 2013. The space terminal transmitted data over the 239,000 miles between the Moon and Earth at a rate of 622 megabits per second, over 5 times the rate of current communications capabilities from lunar orbit. The LLCD technology is being transferred to industry

partners who will provide NASA and other government and commercial space users with this advanced communication capability.

The Laboratory developed the Imaging System for Immersive Surveillance (ISIS), which consists of a custom 240 Megapixel sensor and automated video exploitation algorithms for extremely wide-area, high-resolution, ground-based surveillance. This next-generation video surveillance system was developed with funding from the Science and Technology Directorate of the Department of Homeland Security (DHS) and was recently used to provide Federal, State, and Local law enforcement agencies with video surveillance at key locations for the 2014 Boston Marathon. DHS is currently sponsoring a transfer of the ISIS technology to private industry. This technology transfer will enable industry to directly provide this technology for many Government and commercial applications.

The examples of technology transition above were selected from among the over 60 technology transfers that are actively taking place at MIT Lincoln Laboratory, enabled by Federal S&T investment. Each of these technology transfers will result in one or more industry partners obtaining previously-unavailable technical capability that can be provided for Government or commercial applications.

Summary

For the past 63 years at MIT Lincoln Laboratory, we have witnessed the tremendous potential for innovation that Federal S&T investment enables. When coupled with a strong emphasis on system prototyping, this innovation has been leveraged to create strong economic growth through technology transfer to industry.

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