RECORD VERSION

STATEMENT BY

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DEPUTY ASSISTANT SECRETARY OF THE ARMY
FOR RESEARCH AND TECHNOLOGY

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Chairman Wilson, Ranking Member Langevin, and distinguished members of the Subcommittee, thank you for the opportunity to discuss the Army's Science and Technology (S&T) Program for fiscal year (FY) 2017. I greatly appreciate the support this committee has shown Army S&T over the years. You remain important partners in our mission to identify, develop and demonstrate technology options that inform and enable affordable capabilities for the Soldier.

The coming years will see important shifts in the strategic environment in which the U.S. Army operates. Geopolitical changes are coupled with equally profound global technological and economic changes. The United States has traditionally been able to produce the equipment and technology necessary to dominate. However, we are seeing technology evolving at an exponential rate along with an increased rate of technology proliferation, which has become much more affordable to weaponize. Our enemies' access to this advanced technology has closed the gap in our overmatch. The technological world is becoming ever flatter and more dynamic, and we are in a race with our adversaries to harness and field the best military applications of product innovation.

"We will do what it takes to build an agile, adaptive Army of the future. We need to listen and learn - first from the Army itself, from other Services, from our interagency partners, but also from the private sector, and even from our critics. Developing a lethal, professional and technically competent force requires an openness to new ideas and new ways of doing things in an increasingly complex world. We will change and adapt."

- GEN Milley, *Chief of Staff, Army*

The Army S&T Enterprise cannot predict with certainty what challenges and threats the future holds, but it can organize itself to help prepare for the future, mitigating the possibility of technical surprise and ensuring that we remain dominant in any environment. Transparency, efficiency and flexibility help us invest our limited resources where they have the greatest payoff. This framework allows us to adjust our approach in response to changing circumstances, while providing the stability needed for long-range S&T. The U.S. Army's nearly 12,000 scientists and engineers are innovative change agents committed to developing the science and technologies that provide America's Soldiers with the capabilities to overcome adversaries, both today and tomorrow. I am proud to represent them here today before you.

Strategic Environment

The United States finds itself facing a declining defense budget and challenges from new adversaries everywhere. A new generation of threats and opportunities has emerged that will continue to evolve in unprecedented ways. As our current large-scale military campaign ends, the United States faces a complex and growing array of security challenges across the globe. Future conflicts could range from hybrid contingencies[1] against proxy groups using asymmetric approaches, to a high-end conflict against a state power armed with weapons of mass destruction or technologically advanced anti-access and area-denial (A2/AD) capabilities.[2]

"Our fundamental task is like no other – it is to win in the unforgiving crucible of ground combat. We must ensure the Army remains ready as the world's premier combat force. Readiness for ground combat is – and will remain – the U.S. Army's #1 priority. Developing a lethal, professional and technically competent force requires an openness to new ideas and new ways of doing things in an increasingly complex world."

- GEN Milley, *Chief of Staff, Army*

[1] Hybrid warfare is a military strategy that blends conventional warfare, irregular warfare and cyberwarfare often used to mask the identification of the aggressor in order to avoid attribution or retribution.

[2] 2014 Quadrennial Defense Review, March 2014, 12.

The future Army will be smaller and increasingly based in the continental United States. Yet it must remain capable of conducting the full range of operations on land, including prompt and sustained land combat as part of large, multiphase joint and multinational operations.

While the future force will become smaller and leaner, its great strength will lie in its increased agility, flexibility and ability to deploy quickly, while remaining technologically advanced. To prevent enemy overmatch, the Army must develop new capabilities while anticipating enemy efforts to emulate or disrupt those capabilities.

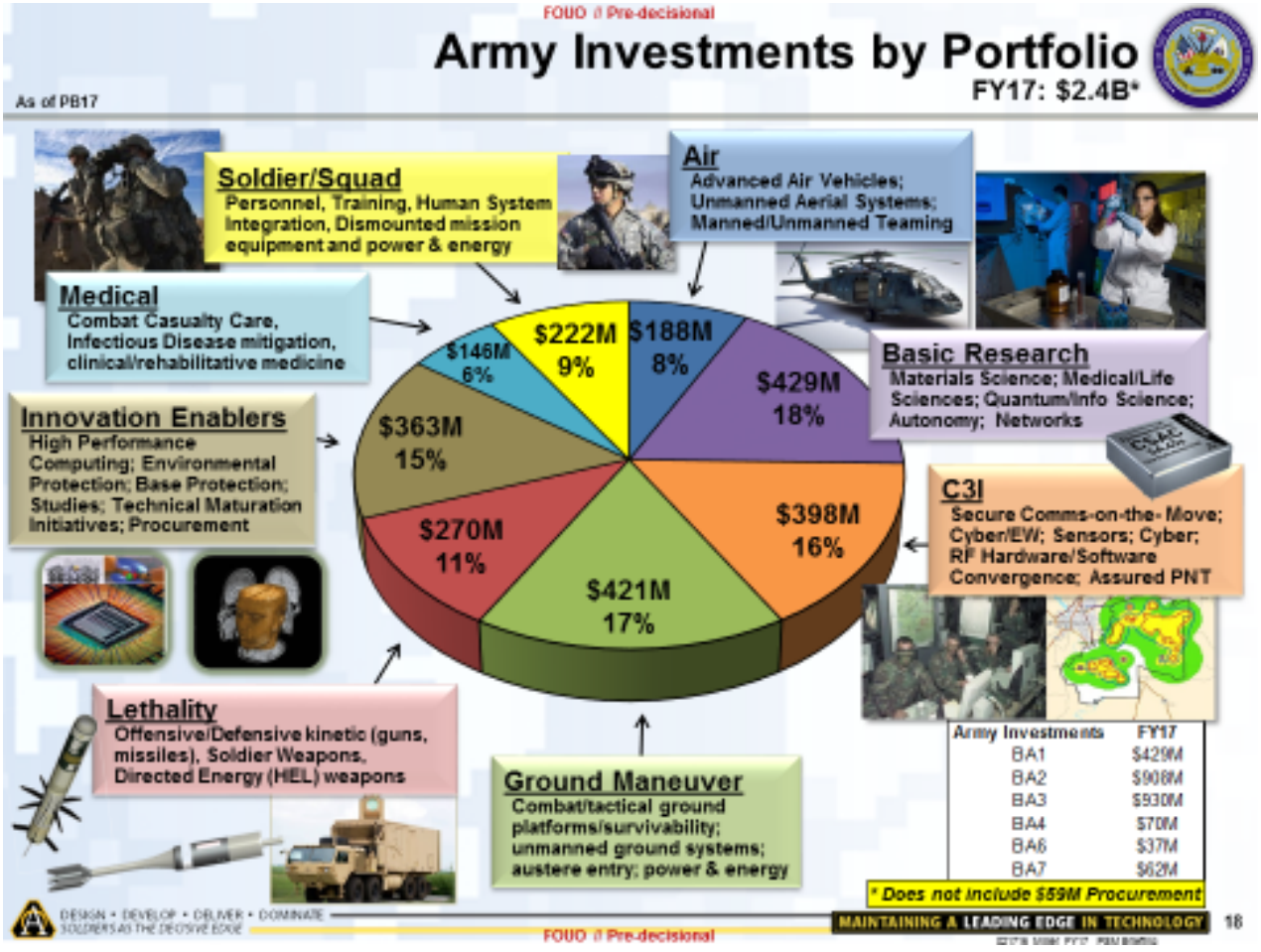
Army S&T is actively involved with the Office of the Secretary of Defense (OSD)-led Long Range Research and Development Planning Program for Ground Combat (LRRDPP-GC). Chartered in September 2015, the LRRDPP-GC is a follow-on to the original LRRDPP, which was focused on A2/AD concepts. This new study is a six-month effort tasked with identifying high-payoff enabling technology investments to provide U.S. forces with a decisive advantage in land-associated operations in the 2030 timeframe. The LRRDPP-GC is modeled after a similar effort that was conducted in the 1970s which led to the accelerated maturation of a suite of capabilities that the U.S. relies on today and leverages the LRRDPP #1 study conducted earlier this year with the focus on A2/AD. The LRRDPP-GC focuses on ground combat technologies that can be incorporated into developmental programs over the next five years and acquired and fielded in quantity within 15 years.

The Army's differential advantage over enemies derives, in part, from the integration of advanced technologies with skilled Soldiers and well-trained teams.

—The U.S. Army Operating Concept

Army S&T Portfolios

For coordination and oversight across the Army S&T Enterprise, the Office of the Deputy Assistant Secretary of the Army for Research and Technology (ODASA(R&T)), organizes the S&T budget and programs into eight S&T Portfolios. Each Portfolio is overseen by a Portfolio Director within the ODASA(R&T) who coordinates the Planning, Programming, Budgeting and Execution process inputs and other oversight actions specific to that Portfolio. The Army S&T portfolios address challenges across six Army-wide capability areas: Ground Maneuver, Soldier/Squad, Air, Command, Control, Communications and Intelligence (C3I), Lethality and Medical portfolios. There are also two S&T enabling portfolios: Innovation Enablers and Basic Research.



Army S&T Enterprise Program Funding % Breakdown by Portfolio

In Fiscal Year 2017 (FY17), the Army will maintain the 2016 President's Budget level of S&T funding and will sustain or increase resources supporting OSD areas in fundamental sciences, such as advanced materials and synthetic biology, research in the areas of human performance, robotics and autonomous systems and advancing capabilities such as defense against ballistic and cruise missile and air threats, electronic warfare and network defense.

Army S&T investment portfolios support Army modernization goals to develop and field affordable equipment in a rapidly changing technological and economic environment. The S&T Enterprise addresses this need by fostering technology invention, innovation, demonstration and maturation for the current and future fight.

Army S&T Strategic Initiatives

In past years, I have detailed to the Committee our enduring Army challenges and how they influence the S&T portfolios. Today, I would like to take the opportunity to instead describe some newer strategic initiatives that cut across our portfolios and are instrumental in helping us realize our objectives – Technology Wargaming, S&T Red Teaming, and Prototyping/Technology Maturation Initiatives (TMI).

Technology Wargaming

Technology Wargaming is a reconnaissance effort focused on scouting for S&T trends that could provide innovative capabilities for operations in the deep future. It leverages scientists and engineers, experts in military operations, and creative thinkers from academia, industry, federally funded research and development centers, and other hubs of innovation to analyze S&T trends and identify future technology concepts that are feasible and bounded by the laws of physics. Technology Wargaming is used to inform strategic conversations on technologies that could deliver leap-ahead capabilities for the future force, and how best to align resources and organizations to pursue those

opportunities. It serves as part of a broader Army effort to break down communication barriers that have hindered innovation and facilitates Army S&T's ability to capture innovative ideas from nontraditional partners.

Technology Wargaming helps provide background technical underpinning for the Training and Doctrine Command (TRADOC) annual Unified Quest (UQ) Wargame, encourages innovative thinking and strategic dialogue within the Army S&T community, and informs future capabilities/needs/concepts and the potential for innovative, cutting-edge technologies to address them.

Some of the key milestones for Technology Wargaming include scouting open source information for U.S. and foreign S&T trends. These trends are analyzed by Subject Matter Experts (SMEs) within the Army S&T and Intelligence communities and added to crowd-sourcing ideas from scientists, engineers, thought leaders and creative thinkers inside and outside the Government. These exercises contemplate how S&T may influence the world and military capabilities in the deep future, and combine results from trend scouting, SME surveys and crowd-sourcing to create a set of future technology concepts and roadmaps. These concepts represent conceivable technologies that could affect capabilities available to the U.S. Army and potential adversaries within the next 30 years.

Another example of S&T forecasting is conducted by the Army Research Laboratory (ARL). This forecasting is guided by the principle that actors in future conflict will seek to persuade in three realms: physical, the domain of activities defined in space and time by the laws of physics; informational, the domain of activities defined by thought and perception; and cultural, the domain of activities defined by the interaction of people and societies. Workshops between government, industry, and academic experts probe the potential of these areas to provide new military capabilities. Among other topics considered this past year, these workshops examined the technologies necessary to

enable expeditionary on-demand manufacturing and integrated teaming between Soldiers and intelligent systems[3].

S&T Red Teaming

A key component of the S&T strategy is broadening and deepening our ability to identify, understand and eliminate potential vulnerabilities in emerging technologies and future systems that could threaten their success upon deployment in Army operational settings. To achieve this, the S&T Red Teaming investment provides in-depth, independent assessments of emerging technologies across laboratory, table-top, and live field environments. These assessments seek to uncover potential vulnerabilities of future Army systems when employed in a system of systems context and against an evolving and responsive threat.

In FY14, building from the success of our Deployable Force Protection efforts, my office initiated an innovative program to identify, understand and eliminate potential vulnerabilities in emerging defense technologies and systems that could threaten their success upon deployment and use in Army operational settings. The core components of this program are Technology Red Teaming, which provides in-depth, laboratory-based vulnerability assessments and Adaptive Red Teaming, which seeks to uncover potential vulnerabilities of emerging technologies when employed in a systems context against an evolving and responsive threat.

S&T Red Teaming embraces a philosophy of leveraging independent and multidisciplinary perspectives across a broad range of future employment factors and scenarios to purposely introduce novel, nontraditional thinking into technology development. It seeks to extend solution design considerations in a way that avoids ingrained biases and practices that can unintentionally introduce vulnerabilities when employed. Moreover, by identifying technology vulnerabilities early in the development

[3] A collective of physical or software agents acting independently but under human supervision to conduct military relevant missions.

life cycle, the Army encourages adaptation and mitigation at times where changes can be economically accommodated with the highest likelihood of equipping Army Warfighters with operationally robust systems.

Technology Red Teaming applies state-of-the-art engineering and scientific approaches to identify and assess potential vulnerabilities in developing technologies and materials specific to system design choices, and to ascertain their potential robustness once implemented into Army systems. These efforts independently assess technologies in ways that complement, yet extend beyond typical material testing. These assessments consider current, emerging and future threats, emerging disruptive technologies, and cutting-edge materials science developments in ways that effectively address potential future scenarios and yield engineering tradeoffs that may not have been considered previously. Ultimately, Technology Red Teaming seeks to proactively identify and mitigate unforeseen risks and vulnerabilities as new technologies are adopted by the Army and promote the development of S&T products that are "threat ready."

Adaptive Red Teaming applies state-of-the-art and time-proven Red Teaming methods within a series of multidimensional, multi-organizational, in-depth activities to identify and assess potential system and/or system-of-systems vulnerabilities. While the Technology Red Teaming activities pursue within-system robustness, the Adaptive Red Team (ART) activities look to the seams of system-of-systems interaction to provide a full consideration of successful integration. The crown jewel of our ART activities is our Technical Support and Operational Analysis (TSOA) effort. TSOA exercises provide technologists and systems developers with realistic and challenging multi-day experiments to employ and assess their solutions prior to entering acquisition programs. Collaborative, non-punitive experiments take emerging systems and prototypes out of the lab and into “messy” environments, incorporating varied operational and increasingly complex scenarios against capable adversaries, using experienced warfighters and security forces that provide real-time user feedback on both design and performance. In these settings, technology solutions are examined from multiple perspectives – including systems integration, logistics, training and adaptability risks –

in order to expose potential employment vulnerabilities and identify needed improvements early on. TSOAs are conducted quarterly in a variety of different environments, from the desert to the marshlands to urban environments.

The TSOA methodology has proven to be successful and has spawned a number of successes. For example, based on TSOA assessments and feedback resulting in system improvements, SOCOM purchased over twenty five Frontier Tag, Track and Locate devices for use in low visibility operations. Additionally, the Prowl radar-based ground sensor participated in several TSOAs and used the feedback to make system improvements and fix identified vulnerabilities. As a result, it passed Army Test and Evaluation (ATEC) testing and is now part of a USSOCOM PEO-Special Reconnaissance, Surveillance, and Exploitation Program of Record.

The vulnerability assessments we are doing are also bringing interesting and useful results for technologists and system developers. For example, we have an ongoing effort to look at individual blade control (IBC) technologies that can offer substantial improvements in flight control and performance of rotorcraft systems. An in-going hypothesis for these technologies, however, is that flight control capabilities would be significantly reduced if the blades were to receive ballistic damage in a combat environment. This is seen as a major hurdle to the adoption of IBC technologies for military rotorcraft. In recent live-fire red teaming intended to better understand IBC's ballistic vulnerabilities, a rotor blade test article continued to function properly following each of three shots, with an apparent minimal reduction in control authority. While we have much more analysis to conduct in order to understand the overall feasibility of IBC technologies, this is an example of how knowledge generated under early, technical red teaming assessments are helping to reduce the risk of adopting high-payoff technologies into future platform designs.

Overall, the results of the Technology Red Teaming and Adaptive Red Teaming activities enable the Army S&T and acquisition communities to become stronger by determining early in the lifecycle how well technologies and integrated systems can

perform in hostile environments, most notably against near-peer threats and against exploitation by adaptive, adversarial forces.

Prototyping and Technology Maturation Initiatives

A number of years ago the Army entrusted my office to initiate what amounted to a pilot initiative. They established a Budget Activity 4 (Advanced Component Development and Prototypes (ACD&P)) funding line under the authorities of the DASA(R&T) with the intent to enable the Army to better transition across the often cited "Valley of Death". This pilot began with a small amount of dollars but with a large vision -- a vision that included a collaborative partnership with the acquisition and requirements community and a multi-pronged approach to improved transition: 1) to work with the Program Executive Offices (PEOs) on technology maturation for pre-Milestone (MS) A or B activities that would lead directly into a Program of Record (PoR) and 2) work with the requirements community to prototype new capabilities and provide them to operators to allow real and candid feedback. These activities help to better inform requirements for new systems, as well as drive down the risk of integrating new technologies, by demonstrating mature solutions that are technically achievable and affordable. In conducting maturation and prototyping earlier in the acquisition lifecycle, we can identify and address areas of risk before the government commits more significant levels of funding to a PoR. Ultimately, it is much more cost-effective to prove out innovative concepts and capabilities in the S&T program than it is under formal program acquisition.

The Army's Technology Maturation Initiative (TMI) is our 6.4 line, which established a strategic partnership between the S&T Enterprise and acquisition communities to enable the transition of priority technologies at reduced cost and risk. A current priority under the TMI is the set of efforts focused on driving down cost and technical risk for technologies that provide dismounted and mounted Soldiers with trusted Position, Navigation and Timing (PNT) information, while operating in conditions that impede or deny access to the Global Positioning System (GPS). The S&T Enterprise is

addressing risk in four thrust areas: (1) Pseudolites (pseudo-satellites) that augment or replace military GPS signals by developing a terrestrial/aerial based GPS-like signal, enabling signal acquisition/tracking, navigation and timing in degraded or denied environments (this transitioned at a MS A to the Assured PNT PoR in June 2015); (2) a PNT hub for vehicular applications that develops a robust system to support all PNT needs on the platform and maintain PNT capability during operations in GPS-denied environments; (3) a PNT hub for dismounted Soldiers systems that has low SWaP and can provide assured PNT signals for all Soldier equipment; and (4) Anti-Jam Antennas that enable GPS signal acquisition and tracking in degraded or denied environments. These PNT efforts leverage both traditional S&T and TMI investments, and have a direct tie into the Assured PNT PoR. By further developing these technologies to a relatively high maturity level, we are driving down the risk to the PoR, accelerating capability, and ensuring that our troops will be able to operate in a contested environment.

In FY16, we initiated a major, multi-year effort within TMI on Combat Vehicle Prototyping (CVP). The CVP Program is designed to mature technologies to address technical and integration challenges facing the ground combat fleet in the areas of mobility, survivability, lethality and vehicle architecture. CVP focuses on maturation and demonstration of combat vehicle sub-systems such as engines, transmissions, ballistic protection, blast mitigation, lethality subsystems and advanced fire controls. The goal is to mature and demonstrate, by FY19, a series of subsystems that inform current and next-generation combat vehicle designs and requirements. These activities will ensure future acquisition program requirements are informed with what is technically feasible and affordable, while driving down technical risks. Technologies developed under combat vehicle prototyping are scalable and modular to ensure applicability for current and future vehicles across the combat fleet. In FY17, we will expand the combat vehicle prototyping activities by funding the integration of these subsystems to create a full system prototype that can be used by operators to provide performance feedback and design insights before we finalize formal requirements for the Army's next combat system.

Another of our major prototyping activities is the Modular Active Protection System (MAPS). The MAPS program is developing technologies in order to increase vehicle survivability and protection against current and emerging advanced threats. Technologies developed will provide this increased protection while maintaining or reducing vehicle weight by reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection and active countermeasures.

While the S&T Enterprise has developed and demonstrated successful active protection capability in the past, each system was designed for a specific platform and threat set. The MAPS effort is a departure from previous APS efforts in that it establishes an APS Common Architecture (CA) and APS common controller (algorithms and software) applicable across all military vehicles. MAPS is developing the APS CA to have standard interfaces that enable adaptable APS solutions that can be integrated across Army vehicle platforms as required. The APS CA provides the flexibility, potential component commonality and growth capability to enable “Best of Breed” components. This helps alleviate integration and cost challenges across the military vehicle fleet. In order to test and validate MAPS and the APS CA, a soft-kill demonstrator and a hard-kill/soft-kill demonstrator will be developed and tested in FY17 and FY19, respectively. The goal of this effort is the development and demonstration of an effective APS capability and APS CA that establish and document standardized interfaces, subsystem specifications and a verified and validated APS simulation tool.

Experimentation and prototyping activities like those described above are critical to the development of successful acquisition programs. We began to see clear indicators of the value of early prototyping many years ago. The Future Tactical Truck System (FTTS) is a good example of how Army S&T seed corn enabled the Joint Lightweight Tactical Vehicle (JLTV) acquisition program. The FTTS effort started over fifteen years ago at the Tank Automotive Research Development and Engineering Center (TARDEC). TARDEC led the S&T technology development effort that demonstrated mature technologies which ultimately led to realistic and achievable requirements. The FTTS

prototyping model stressed close coordination between the technology, requirements, and acquisition communities.

While 15 years is a long time, it is important to note that the development of JLTV and its S&T predecessors occurred during a time of war, which impacted TARDEC priorities and caused us to learn several new things such as the need for vehicle underbody protection. It was during this same time that the TARDEC team worked with the Army Research Laboratory (ARL) on such major initiatives as designing and implementing Frag Kit armor in response to Operational Needs Statements (ONS) coming out of Iraq and with the Program Executive Office for Combat Support & Combat Service Support (PEO CS/CSS) on the development of the Mine-Resistant Ambush Protected (MRAP) vehicle in response to Joint Urgent Operational Needs Statement (JUONS) coming out of Afghanistan. The S&T technology development, system design, and fabrication and testing drove down the risk for the JLTV MS A decision, and compressed the Technology Development (TD) Phase "preparation" time (e.g., specs, Statement of Work, Contract Data Requirements Lists, etc.). The S&T effort also ensured that there was viable competition for the TD phase by preparing industry to be able to bid and compete. This allowed the Program of Record to conduct a competitive acquisition process and to leverage the different companies' strengths to get the best out of the program as a whole.

The Army S&T Enterprise

The Army owns a vast network of research and development facilities located across the world, with roughly 12,000 scientists and engineers that make up the heart of what we do. The Army relies on its laboratories and centers (collectively referred to as “labs”) to foster innovation; develop and demonstrate new technologies; assess competing technology options; and help transition research as they mature. A flexible and agile workforce is critical to maintaining the Army’s technological superiority now and in the future. Critical to the development of the agile workforce is the ability to recruit new employees, the ability to develop existing employees and the ability to retain these same employees. Recruiting, developing and retaining the best science and

engineering talent into the Army laboratories have become increasingly challenging due to a series of events - the pay freeze instituted in 2010; conference restrictions implemented in 2012; furloughs related to sequestration in 2013; and retirement eligibility for greater than 25 percent of the workforce. The labs have benefitted greatly from authorities provided by Congress to all Science and Technology Reinvention Laboratories (STRL) to implement pay-for-performance systems. The personnel systems they have developed give the labs the flexibility to enhance recruiting (direct hire mechanisms), development (sabbaticals and critical skills training) and retention (retention allowances) of our workforce. With two exceptions[4] (the Army Research Institute for Behavioral and Social Science (ARI) and the Space and Missile Defense Technology Center (SMDTC)), all the Army laboratories have some portion of their workforce rated under a pay-for-performance system. The flexibility available to the laboratory directors allows them to shape their workforce and remain competitive with the private sector.

In order to recruit and retain a world-class workforce, we must also be able to maintain a world-class infrastructure. As I've testified before, our laboratory infrastructure is aging, with an average approximate age of 50 years. Despite this, the S&T Enterprise manages to maximize the sustainment, restoration and modernization funding and the authorities provided by Congress for minor military construction to minimize the impact of aging infrastructure. This is not a long-term solution, however. The Army S&T Enterprise is faced with a highly competitive Army MILCON environment that is focused on investment to build out the critical shortfalls in the following Focus Areas by 2029: Energy/Utilities, Organic Industrial Base, Organizational Vehicle Maintenance, Reserve Component Readiness Facilities, Trainee Barracks and Training Support Systems. Properly maintaining world-class research facilities will be a major challenge for the Army S&T Enterprise in the years to come.

Of course, innovation does not only take place in Army labs. The Army engages industry and academia to identify potential technology solutions to priority problems and

[4] Both ARI and SMDTC were granted authority to become STRLs in the FY15 NDAA and are assessing plans for conversion to the laboratory demonstration system.

capability challenges through stronger partnerships. One example is the Defense Innovation Marketplace, an online portal with two primary purposes: a broad, public-access communication tool used by the Army to communicate its needs directly to industry, and a portal for industry to place/announce its independent research and development (IR&D) technology efforts in a Government-only access environment that protects proprietary information. Through the Marketplace, the Army provides industry with a primary source of information about the Army's investment priorities and technology requirements, giving industry the ability to better align its IR&D projects with the Army's needs.

Another example of how we engage with industry and academia, and one that I believe has been a great success, is the Army Research Laboratory's (ARL) Open Campus. Open Campus forms a global S&T ecosystem to provide long term benefits for our national security, and lays the groundwork for joint teaming through fundamental science and technology. Collaboration partners fund their own efforts and work in research areas of mutual benefit that align with ARL's Technical Strategy. Since last year the number of agreements with academia and industry have doubled, from 60 to over 130. These agreements have leveraged over $16M from the Army's collaborative partners. The total number of open campus participants have also doubled from over 200 to beyond 500 participants collaborating on-site in ARL laboratories. The implementation of enhanced layered security practices have allowed over 54 international collaborators from 19 countries to work alongside Army researchers within the installation. Human resource best practices are being revisited to encourage around 10% ARL's workforce to take assignments at universities, with small business, and with other partners. These assignments could be anything from working with a collaborator for a month on a shared project, going to a University as a professor for a semester or two, or even supporting a small business for several years. For example, ARL scientists and engineers are embedded at the National Institutes of Health researching mechanisms to alter intercellular dynamics for traumatic brain injury protection, and at the University of Massachusetts, Amherst researching fundamental principles of novel low profile antenna concepts. The Army is establishing several research centers to focus large scale collaboration on Army challenges. The Center for

Research in Extreme Batteries has been established with the University of Maryland and the National Institute of Standards and Technology (NIST) to focus on the fundamental science for batteries with extreme properties, operating in extreme environments for defense, space and biomedical applications. This first center has already attracted the interest of hundreds of participants from DoD labs, universities, other government laboratories, and industry.

The majority of DoD Laboratories are concentrated in the eastern United States. This leaves the DoD with minimal exposure to the west coast, where many new ideas and technologies are being generated. ARL West, as an extension of the Open Campus initiative, is an effort to co-locate Army research and development personnel on the West Coast in order to gain access to SMEs, technical centers, and universities not well represented on the East Coast. ARL West draws from existing large regional talent pools and establishes areas for collaborative research in Army-relevant technology sectors. We expect increased collaboration with universities, start-ups and established companies working in simulation and training, electronics, information science, intelligent systems, and human-system interaction that will ultimately benefit the Soldier and ensure our nation's future strength and competitiveness.

ARL has established an agreement with the University of Southern California (USC) to stand up ARL West. USC will provide nearly 22,000 sq. ft. in support of up to 70 Army personnel and focus initially on research between USC's Institute for Creative Technologies (ICT) (an Army University Affiliated Research Center) and ARL. This is the first collaboration center located near Los Angeles (LA) in the so-called Silicon Beach area, which is home to more than 500 tech companies including Google, Yahoo!, YouTube, and many others. In addition, the LA area is one of the largest regions for graduating engineers in the country. Researchers are expected to arrive in early 2016 and will include locally recruited scientists, students, and representatives from other Army organizations. The ARL West campus ribbon cutting ceremony and opening are tentatively scheduled for April 2016. We are hoping that this new venue will help establish a significant link to some of the most cutting-edge, innovative companies in the world.

Conclusion

Our primary goal is to provide capabilities and materiel solutions that empower, unburden and protect our Soldiers in an environment of uncertainty and complexity. Simply put, it's providing Soldiers with the Technology to Win. As the Army S&T program continues to identify and harvest technologies suitable for transition to our force, we aim to remain ever vigilant of potential and emerging threats. We are implementing a strategic approach to modernization that includes an awareness of existing and potential capability gaps, understanding of emerging threats, knowledge and leveraging of state-of-the-art commercial, academic and government research, and understanding the competing needs for limited resources. Ultimately, our focus remains on Soldiers. Army S&T consistently seeks new "ways" to increase the Soldier's capability and ensure their technological superiority today, tomorrow and decades from now. The Army's strong support of the S&T Enterprise and its continued investment in technology ensure that the U.S. Army remains the pre-eminent force in the world. The Army S&T mission is never complete. We will continue working to ensure that our Soldiers are always equipped with the technology to win – our "ends". We owe our Soldiers no less.

"No matter where we are around the world, America's Soldiers are displaying courage, commitment and character. We are demonstrating unparalleled competence and agility. And no matter the challenge, no matter how complex the environment, or how dangerous the situation, our Soldiers fight and win."

- GEN Milley, *Chief of Staff, Army*