US Innovation Summit Prepared Remarks

June 20, 2012 ~ Honorable Zachary Lemnios

Good morning and thank you for this opportunity to share with you how the Department of Defense is using this magic ingredient we call innovation to develop new concepts for national defense.

We see the results of innovation when we assemble a creative team with the right mix of technical skills, imagination, acceptance of risk and the challenge to be first. Innovation is often preceded by discovery and followed by disciplined engineering. We know it when we see it and we aspire to have more of it. We call upon innovation to bring us new ideas, change the way we approach a challenge and deliver new capabilities in remarkably short time. Quite simply, innovation is that special sauce that has accelerated the delivery of new concepts from decades to months and is as critical to our nation.

A Rich History of Innovation

The Department of Defense has a rich legacy of seeding early stage innovation that has resulted in remarkable new capabilities that not only supported national security, but has also had a fundamental impact on society.

For example, the Department's goal in the 1960s to develop reliable and robust command and control systems led to packet switching technology that made the internet possible, which today the military relies upon as much for operations as we all do in our daily lives.

The powerful mobile smart-phone technology that leverages the internet was also enabled by Department of Defense investments in materials, microelectronics and signal processing technologies.

Similarly, GPS, a Department innovation, enables ubiquitous navigation capabilities and many other commercial businesses, but few realize it provides the timing signal that underpins all mobile communications technology.

And now, we're at the cusp of another revolution in unmanned air vehicles and autonomous ground vehicles, all enabled by Department investments and the latitude to encourage innovation at the systems and operational level.

In each of these areas, the Department attracted leading talent, funded early-stage innovation and was the first customer for many of the emerging products.

These innovations were born when the United States in general and the Department of Defense in particular, were THE major sources for science and technology investments.

Today's environment is quite different.

Today America's overall share of global R&D is decreasing as GDP growth in China, India, Brazil, enable them to increase investments in basic and applied R&D projects and invest in high-tech companies.

An example is the Chinese National Medium to Long-Term Plan for the Development of Science and Technology (2005-2020) which is sponsoring 16 goal-oriented basic research "megaprojects" and is striving to make a China an "indigenous innovator" by 2020.[1]

And, barriers that have traditionally limited the pace of technology are fast eroding. Proliferation of multi-national joint ventures, the ability to purchase problem-solving know-how from other countries, and the emerging possibility of accessing capabilities of RDT&E facilities abroad are increasing the number of performers in R&D.

We're also seeing the rise of "innovation centers" in Europe, Russia, and China that bring together companies and individuals from multiple countries.

These trends are leading to a greater global two-way flow of information, knowledge, and technology, and we see this in more international co-authorship, more trans-national projects, and increased exchange of knowledge via the Internet.

And that makes possible even more models to promote and accelerate innovation.

For example, we're now seeing a rush to post challenges on the web and incentivize crowd-sourced solutions.

We're also seeing a growth in contests that offer cash prizes and stature as incentives --- the successful model DARPA used in its series of Grand Challenge Prize competitions to accelerate autonomous ground vehicle technology has demonstrated the payoff contests can deliver.

All of these trends have important implications for the Department's interest to maintain and advance U.S. defense technological innovation and superiority.

At its core, globalization means countermeasures to U.S. weapons systems are likely to appear very quickly.

It also means we should no longer expect that all, or perhaps even most, future "game-changing" technologies to come from domestic sources.

In the face of these realities we are re-shaping the Department's research and engineering enterprise business models.

We are strategically shaping this enterprise to adapt to new realities in national security, global research and development, fiscal realities, and talent.

Simply put, we need the best and the brightest and need to deliver new capabilities at the same tempo as we see in commercial markets.

Our enterprise is strong today, but we must take action to keep it strong in the future.

What is the Department's S&T enterprise?

[1] http://www.uschamber.com/sites/default/files/reports/100728chinareport_0.pdf

The enterprise encompasses a remarkable pool of talent and resources spread across universities, defense labs, industry, and federally funded research centers

Academia

Universities are a vital component of U.S. science and technology development for defense. Fundamental research has fueled America's dominance in science and technology for many decades.

The Department of Defense budget for basic research has grown in real terms over the past few years,[2] to $2.1 billion.

This President has maintained basic research investments as a priority even in the current difficult fiscal environment.

We have taken steps to improve the efficiency with which we conduct basic research, and have encouraged collaborations among institutions, across disciplines, and with other components of the S&T enterprise.

For example, we have a program - the Multi-University Research Initiative (MURI) program that incentivizes collaborative research. Just a few months ago we awarded 23 grants to projects affiliated with 63 academic institutions that will total $155 million over five years.[3]

To accelerate innovation, we're now inviting industry to our MURI review meetings. This new model has been successful in facilitating earlier interactions between the teams that are conducting the research and the industry teams that can transform the knowledge into products.

We are now extending this model to other areas with the goal of more tightly coupling our university funded academic research with our defense laboratories and industry.

We will do this while ensuring that the freedom to publish fundamental research is not restricted.[4]

Future university talent is important to future innovation. We're attracting new talent through programs, such our Young Investigator Programs, which recruits exceptional American junior faculty to defense research through targeted grants.

For years, the strength of the Department's innovation engine has been bolstered by our defense labs.

Our defense labs' footprint includes 67 facilities dispersed across 22 states with a total workforce of over 60,000 employees. Of these, 35,400 are degreed scientists and engineers, who conduct DoD-relevant research leading to key technology demonstrations and publish thousands of reports and peer-reviewed technical papers.

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[2] RDT&E Programs (R-1). February 2008. http://comptroller.defense.gov/defbudget/fy2009/fy2009_r1.pdf. RDT&E Programs (R-1). February 2011.

[3] Department of Defense Awards $155 Million in Research Funding. 16 May 2012. http://www.defense.gov/releases/release.aspx?releaseid=15283.

[4] Memorandum for Secretaries of the Military Departments on Fundamental Research, from the Under Secretary of Defense (AT&L). 24 May 2010,. http://www.fas.org/irp/doddir/dod/research.pdf.

In many cases, this community defines a technical field with seminal work and leads the industrial base in their respective areas.

Throughout the years, the Department's laboratories have repeatedly proven themselves to be a vital component to the overall success of the Department's science and technology enterprise.

The labs are uniquely suited to couple basic research concepts to early-use military applications, and, most importantly, they are connected to our warfighters and understand the challenges they face today, and may face in tomorrow's conflicts.

We also leverage 10 Federally Funded Research and Development Centers (FFRDCs), 13 University Affiliated Research Centers (UARCs) and 10 Information Analysis Centers (IACs) across critical disciplines for the Department.

These institutions enable the Department to connect with top technical talent across the Nation in fields ranging from cyber security to ballistic missile defense to advanced microelectronics and more.

We also enjoy a strong relationship with industry and academia through a variety of programs designed to foster collaboration, including the Small Business Innovation Research (SBIR) program; and Cooperative Research and Development Agreements (CRADA).

In fact, in FY2010, the Department issued approximately 2,900 SBIR awards, and we're engaged in approximately 2,500 CRADAs across a broad industrial base.

Each of these is an avenue of innovation and a transition path to bring ideas into the Department and transition concepts developed in DoD Laboratories to commercial use (See: Figure 1).

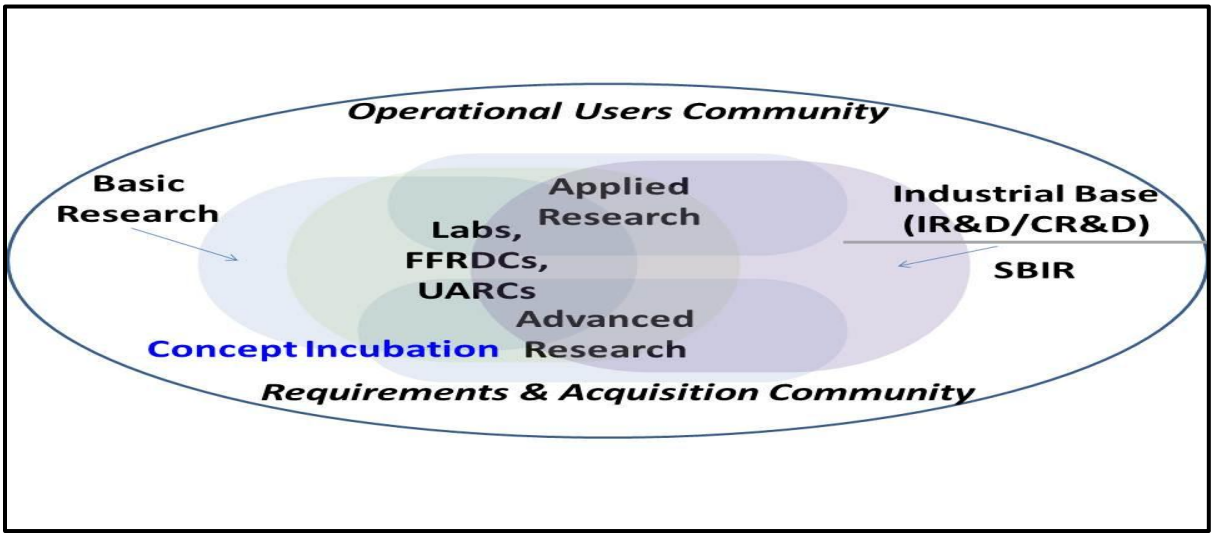

Figure 1: New, Non-Linear Model of the Integrated S&T Enterprise

We are also more taking steps to re-invigorate and leverage the innovation created by our industrial base.

These initiatives include activities to improve communication between industry and DoD and to improve acquisition planning through increased awareness on the part of government program managers of industry's independent research and development (IR&D) investments.

We've created a new web-based portal - The Defense Innovation Marketplace to improve the communication of industry and the Department across a broad set of topics. [5]

For Industry, the Marketplace is the place to learn about Department's investment priorities and capability needs;

For the Government, access to industry IR&D Information (submitted by industry into a secure Marketplace tool) provides new opportunities to discover and leverage IR&D projects into current and future programs (See: Figure 2).

Figure 2: Screenshot of www.defenseinnovationmarketplace.mil

Sustaining Excellence in the Workforce

The success of the Department's research and engineering efforts are made possible by the impressive work of dedicated scientists and engineers, both in the Department of Defense, and in the larger S&T enterprise of academia, industry, federal labs, FFRDCs, and university affiliated research centers.

This nation retains the most impressive collection of technical talent to be found anywhere in the world, and our priority is to keep this enterprise healthy and strong.

But we face a perfect storm of realities: a reduced production of graduates in scientific fields that are important to support defense needs,[6] declines in our current workforce due to retirements,[7] and competition with other national and international opportunities for the best and brightest talent.[8]

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[5] www.defenseinnovationmarketplace.mil

[6] Science and Engineering Indicators 2012. National Science Board. January 2012. http://www.nsf.gov/statistics/seind12/pdf/seind12.pdf.

[7] Assessment of the DOD Laboratory Civilian Science and Engineering Workforce. Institute for Defense Analysus. June 2009. http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA506429.

[8] Measuring the Moment: Innovation, National Security, and Economic Competitiveness. November 2006. The Task Force on the Future of American Innovation.[http://futureofinnovation.org/PDF/BII-FINAL-HighRes-11-14-06_nocover.pdf.](http://futureofinnovation.org/PDF/BII-FINAL-HighRes-11-14-06_nocover.pdf)

For now, the Department remains competitive in its ability to hire talented students and technical professionals.

That's because national security challenges are generally the cutting-edge of technology development.

DoD provides the opportunity to work with a deep technical base across government and industry.

One program that has shown great potential in attracting some of the nation's strongest talent is the Science, Mathematics and Research for Transformation (SMART) Scholarship for Service Program.

The SMART program has increased the number of civilian scientists and engineers in DoD laboratories by supporting undergraduate and graduate students who are pursuing degrees in STEM disciplines and then offering them positions within the labs upon degree completion.

The program pays $25,000 (or more) per year to students for their tuition and related expenses to pursue a STEM degree in a discipline of interest to DOD, and, upon graduation, award recipients are placed in civilian jobs in DOD laboratories and agencies.[9]

SMART scholars work with a laboratory during their studies, further enhancing the mutual benefit. Starting in 2005, the SMART program has transitioned to date more than 700 young scientists and engineers into the Department's workforce. Our efforts have involved some of the best and brightest scholars, initially during their schooling and afterwards, when they begin a career in the Department.[10]

Summary

Research and engineering has been undergoing great changes in the past decade, and this decade is poised to see even greater changes.

Our defense posture requires that we adapt our science and technology research to the new realities of the operating environment and threats confronting the nation.

It is a new environment where innovation is born when an organization focuses on how to leverage complexity, rather than try to control it.

The Department has made considerable progress in responding to new realities of the operational environment and the strategic guidance of the Department of Defense, and will continue to direct the defense science and technology enterprise toward changes that will deliver innovative capabilities to support the defense needs of the future.

From my vantage point, the DoD S&T enterprise' future as an innovation engine looks bright.

[9] Benefits Summary. SMART Scholarship. 2009. http://smart.asee.org/about/benefits.

[10] http://smart.asee.org/