

NOT FOR PUBLICATION UNTIL RELEASED BY THE COMMITTEE

STATEMENT OF
THE HONORABLE HEIDI SHYU
UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING

BEFORE THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON CYBER, INFORMATION TECHNOLOGIES, AND INNOVATION

MARCH 23, 2023

Chairman Gallagher, Ranking Member Khanna, members of the committee, thank you for the opportunity today to discuss the work of the Department of Defense (DoD) research and engineering enterprise, and for your ongoing support of the work we do. I am proud to discuss the work of thousands of service members, DoD civilians, contractors, academics, and others whose task is to defend the United States, its people, allies, and interests through the power of science and engineering.

We are, as President Biden and Secretary Austin have both said, in a “decisive decade” for our country and our national security, one in which the Department must make the right investments in the right solutions to ensure our continued, enduring advantage over any potential adversary. From my office in the Pentagon, to the chief technology and innovation officials in the Military Departments, to our defense laboratories, to U.S. industry and academia, to an unmatched list of allies around the world, all of us in the defense innovation ecosystem are keenly aware of what is at stake. We know that in the Department’s pacing challenge – the People’s Republic of China (PRC) – we have a strategic competitor with the economic and technological resources and the will to challenge the rules-based international order. To rise to this challenge, we must develop new technologies and deliver new capabilities that respond to the critical needs of the Joint Force, today and in the future, quickly, and at greater scale.

In terms of the current state of this strategic competition, it is important for the committee, the Congress, and the American people to know two things: first, that we understand the challenges we face and the need to move with speed and determination. Second, that the United States has an undeniable advantage over any potential adversary. The foundation of that advantage is the bravery and skill of our service members. But thanks to innovative American science and engineering, and to the work of Dr. LaPlante and our Acquisition and Sustainment

colleagues, our forces enjoy the most technologically advanced systems in the history of warfare, technology unrivaled among the world's militaries, technology that, thanks to the planners in the Joint Staff, Combatant Commands, and Military Services, is wedded to the joint warfighting concepts. Our pacing challenge, the PRC, is making progress in modernizing its forces and clearly seeks to erase our technological advantage. But it has not succeeded in doing so. Any potential aggressor that chooses to challenge the United States today would do so at a significant cost to its forces and economy. Our task in the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) and the broader innovation enterprise is to ensure that we will maintain our enduring advantage.

And we are approaching that task with urgency. The soon to be released National Defense Science and Technology Strategy, or NDSTS, outlines how we will fulfill our obligation to preserve and extend our technological edge. The President's Fiscal Year (FY) 2024 budget request puts the dollars behind that strategy. The NDSTS lays out three lines of effort for rising to this challenge:

- First, we will focus on the Joint Mission. Our responsibility is to provide our forces with technology to deter, fight, and win. That requires close partnership with the Joint Staff, the Combatant Commands, and the Military Services to establish processes for rigorous analysis that drives our investments toward science and engineering to deter conflict and, if deterrence fails, prevail.
- Second, we aim to create and field these capabilities at speed and scale. We must accelerate the transition of new technology into the field to remain ahead of our strategic competitors.

- Third, we will ensure a strong future foundation by cultivating talent, strengthening our physical and digital infrastructure, pursuing basic research, and growing collaborative connections that reinforce our work. This is the seed corn that will grow into tomorrow's capabilities.

Our strategy recognizes the unique responsibility of my office to harness science and technology in the service of national security. It emphasizes that my office is uniquely positioned to draw together research and engineering communities across the Department and connect their work to the Joint Staff and the Combatant Commands. And it highlights the critical contributions of industry, academic institutions, and Federal partners in accomplishing our mission.

We are implementing this strategy in the President's FY 2024 budget request. The budget President Biden has submitted continues historic levels of investment into research and development. It prioritizes investments that will yield near-term capabilities at speed and scale; that directly support joint warfighting concepts; and that build upon today's technology edge to extend it tomorrow.

Focus on the Joint Mission

I am privileged to lead one of the premier science and engineering enterprises in the world. And we all recognize that our pursuit of knowledge and innovation must drive toward one goal: protecting the American people, our interests, and our allies around the world.

Thus, our relationships with the Military Services, with the Joint Staff, and with the Combatant Commanders must be robust and tightly connected. We must function as a focal point for operational commanders who need urgent solutions to warfighting problems; for scientists and engineers in the public, private, and academic sectors who have novel approaches that could help solve those problems; for the Military Services that organize, train, and equip forces to

employ those solutions; and for the industry that will build these solutions, as well as Dr. LaPlante and the acquisition professionals who will procure them.

Last year we identified 14 Critical Technology Areas that will underpin our technological advantage now and in the future. The President's FY 2024 budget request makes critical investments in each of these Areas. The budget request would increase our investment in quantum sciences technology to begin the challenging development of critical components and supply chains related to quantum science. It would boost our commitment to developing fifth generation (5G) and FutureG wireless technologies to accelerate the transition of laboratory-based developments into demonstration and fielded capabilities. And it would strengthen our investments in advanced microelectronics to accelerate access to the availability of state-of-the-art chips that will enable key military capabilities.

We have developed a variety of tools to help us move promising innovations through the pipeline to the field, some of which I'll discuss in more detail. From time-tested innovation programs such as SBIR/STTR, to acceleration programs to field capabilities more quickly, to commercial partnerships via the Defense Innovation Unit, to new capabilities such as the Office of Strategic Capital, each of these tools is designed to address specific needs in the innovation ecosystem, just as operational commanders use a variety of tools to accomplish their battlefield missions.

Further, we are harnessing the analytic power of modeling and simulation and the unparalleled advantages of joint experimentation to rigorously evaluate innovations that merit advancing from idea on paper to prototype and on to fielded capability. Our task is to identify promising technologies, incubate prototype capabilities for joint experimentation, and transition the best capabilities to rapid fielding or to programs of record overseen by our acquisition

colleagues in the OSD and the Military Services. One of our tools for enhancing our mission focus is the Rapid Defense Experimentation Reserve, or RDER. RDER is a set of joint experiments designed to identify promising advanced capabilities that are directly responsive to Combatant Commander needs. We are designing experiments that generate data about the performance of these capabilities that will help inform Department senior-level decision-making bodies such as the Joint Requirements Oversight Council and the Deputies Management Action Group for rapid transition of the most promising capabilities into fielded systems. Our first experiments, which are responsive to pressing Combatant Commander needs, will launch in late Spring.

Lastly, as the Committee knows, we are investing in a number of technologies that have the potential for extending our technological edge and promise asymmetric advantages over potential competitors. While we cannot discuss those efforts in detail in this setting, I mention them in this public setting so the American people can know that, just as has been the case for decades, we are aggressively looking to the future and ensuring that when it arrives, America's service members retain their technological edge.

Operating at Speed and Scale

Innovative technologies cannot provide us a competitive advantage if they arrive on the battlefield too late to have an effect. That is why we have launched a series of efforts to ensure that national security innovations can surmount the many hurdles between brilliant ideas and fielded capabilities and can do so more quickly.

Already, we are seeing benefits from the Department's efforts to accelerate critical capabilities. For example, over the last 12 months a series of successful tests have paved the way for directed energy systems to rapidly field capabilities in 2023 to the Navy and the Army. We

are launching hypersonic and ballistic tracking space sensors this year and have transitioned deep space early indications and warnings capabilities using ground-based telescopes to the field. We have delivered new artificial intelligence tools that will help extend U.S. dominance in undersea warfare. These are just a few examples of our efforts to rapidly field technologies that meet the needs of our troops in the field.

The President's FY 2024 budget request also continues our investment in the Small Business Innovation Research and Small Business Technology Transfer, or SBIR/STTR, programs. I want to thank all of those on the Committee and the Congress who supported last year's SBIR/STTR reauthorization, because these programs are essential to supporting the work of small and nontraditional businesses that can provide new ideas to the Department. We also recognize the need to perform extensive due diligence and other efforts to protect sensitive technology developed under SBIR/STTR from falling into the hands of competitors, and we are on track to establish those processes by the June as directed by Congress.

The President's FY 2024 budget request also supports the critical work of the Defense Innovation Unit (DIU), which works with industry and especially nontraditional defense innovators to accelerate the adoption of commercial technologies. In FY 2022, DIU set new highs in the number of both transition and prototyping contracts it awarded. Its work with innovative private companies has delivered prototypes that will help us better track hypersonic missile trajectories, counter enemy unmanned aerial systems, and augment our satellite imagery capabilities.

While research grants and acquisition contracts are critical in speeding innovation to the Joint Force, they are not the only tools we need. Increasingly, American innovation is driven by private capital investment. That is a great American strength, but it can lead to situations in

which R&D investment doesn't align with national security needs. In December, Secretary Austin announced the establishment of the Office of Strategic Capital (OSC) to address this issue. OSC will work to identify gaps in private capital investment that could hamper our access to critical technologies and then partner with private capital to fill those gaps. One way it will do so is by working with other Federal agencies that have more experience and existing authorities to execute Federal credit programs. An example is the partnership the Secretary announced with Small Business Administration (SBA) Administrator Isabella Casillas Guzman to use SBA's longstanding Small Business Investment Company program to help meet national security needs. OSC will help the Department accelerate innovations in critical national security technologies, especially in foundational technologies that the Department does not often procure directly.

We are also working to accelerate the deployment of defense technologies through our international partnerships. The U.S. is collaborating with the United Kingdom to develop high performance bio-fuel. We have collaborated with Norway to develop a solid fuel hypersonics ramjet. And we have collaborated with Australia to develop a hypersonic cruise missile, technology that has transitioned to the Air Force. And U.S. leadership will continue to drive forward NATO's Defense Innovation Accelerator for the North Atlantic (DIANA) innovation initiative.

Strengthening our Foundation

The Department's research and engineering enterprise must be responsive not just to the here and now, but to the needs of the nation in the decades to come, even as we work to speed innovations to the battlefields of the very near future. The FY 2024 budget request includes investments to ensure that the Department's science and technology foundation remain strong enough to maintain our enduring advantage. That foundation begins with people – America's

science and engineering workforce is a strategic advantage, one we must continue to strengthen. The President's FY 2024 budget request includes continued investments in programs such as the Science, Mathematics, and Research for Transformation (SMART) Scholarship program, which covers tuition and other expenses for promising undergraduate and graduate students as a pathway to DoD employment. The President's FY 2024 budget request also continues to support the university affiliated research centers, or UARCs, which provides deep technical expertise and are key hubs for talent development. And we are making sure that we do not leave any potential sources of talent untapped. In particular, I am proud that, with congressional support, Secretary Austin and Air Force Secretary Kendall earlier this year announced our first UARC at a historically black college and university (HBCU), Howard University, which will lead a consortium of HBCUs tackling tough challenges in tactical autonomy for the Air Force. Our continued outreach to groups that are under-represented in defense science and technology is not just important to those groups – it is important to us all, because the challenges before us are simply too great to overlook any pool of talent, and the advantages of maximizing America's innovative potential are too profound to ignore.

Our people can't achieve all they are capable of without the infrastructure to do their work – so the budget request also invests in the infrastructure we need to create 21st century capabilities. The President's FY 2024 budget request includes investments to continue improving our test and evaluation infrastructure and to accelerate our testing programs in areas such as hypersonics and directed energy.

This work also includes strengthening our foundation in fundamental technologies that underlie a wide variety of systems. For example, Congress' support for the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022 has enabled the

Department to launch the Microelectronics Commons, a national network that will create direct pathways to commercialization for U.S. microelectronics researchers and designers, easing the “lab to fab” transition from prototype to fabrication.

Another essential element of our foundation is basic scientific research. Our enduring advantage derives directly from our nation’s relentless exploration of the endless frontiers of scientific knowledge, our invention of technologies from those explorations, and our creation of overwhelming capabilities for our military forces. We must continue to invest in the essential basic scientific research.

These investments – in people, in infrastructure, and in knowledge – are the seed corn that we must plant today to yield future capabilities. Similar investments made in decades past have helped deliver critical capabilities in the hands of today’s Soldiers, Sailors, Airmen, Marines and Guardians, from stealth aircraft and precision-guided munitions to phased-array radars and satellite imagery. Future leaders will thank us for investments we make today.

Conclusion: Sharpening Our Competitive Edge

We are living in a pivotal time where our adversaries are rapidly modernizing and building their warfare capabilities across land, sea, undersea, air, space, and cyberspace. Successful competition against determined adversaries requires envisioning our military capability as all-domain, ever-evolving collective, not a static inventory of weapons. To compete effectively we must pursue creative applications of novel concepts with emerging science and technology that enable the development of warfighting capabilities that will deter and defeat our adversaries.

We will focus on the Joint All-Domain Mission and work in close collaboration with the Combatant Commands, Joint Staff, Joint Forces, our allies and partners to rapidly develop,

prototype, and experiment with new technologies to deliver critical capabilities that will enable new tactics, techniques, and procedures to fulfil the Joint Warfighting Concept.

We will leverage our broad technology ecosystem of academia, Federally Funded Research and Development Centers (FFRDCs) and UARCs; DoD and National Laboratories, commercial and defense industry; other Government departments and agencies, and our allies and partners to create and field capabilities at speed and scale. This era of strategic competition demands collective cooperation beyond just the Department of Defense.

We will build an enduring advantage by developing leap-ahead technologies, cultivating talent across the United States, and build the STEM workforce of the future. We will foster a more vibrant technology ecosystem and leverage teamwork with our allies and partners to accelerate our mutual capability delivery and strengthen interoperability. Together we will be far stronger.

Thank you again for the chance to testify today, and for your ongoing support of defense innovation.