STATEMENT OF

MICHAEL BROWN

DIRECTOR, DEFENSE INNOVATION UNIT

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ON ACCELERATING INNOVATION FOR THE WARFIGHTER

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Chairman Kelly, Ranking Member Ernst, and distinguished members of this subcommittee, thank you for inviting me to testify on behalf of the Defense Innovation Unit (DIU). I'm Michael Brown, and I have been Director of DIU since September 2018. I appreciate the opportunity to speak about the urgent necessity of accelerating innovation—and specifically commercial technology—for our warfighters.

Introduction

The Department now acknowledges the People's Republic of China (PRC) as a pacing challenge. In previous eras, the United States maintained decisive military advantage over its adversaries due, in large part, to superior technology capability. The Department of Defense (DoD) harnessed technical resources across the spectrum of American industry, national laboratories, and universities and used its purchasing power to shape technical specifications and standards for resulting technologies. This strategy ultimately conferred the U.S. military with superior advantages in the first offset (nuclear weapons and nuclear deterrence technology) and second offset (night vision, laser-guided bombs, stealth and jamming technologies as well as space-based military communications and navigation).

The threat matrix the United States faces today is significantly more diverse and acute than in previous eras. While the DoD continues to develop offensive and defensive capabilities around nuclear weapons and conventional military platforms, as the NDS highlights, dual-use emerging technologies will change the character of warfare going forward. The private sector is pioneering the development of most of these advanced dual-use technologies by leveraging software, open source data sets, and advanced processing speed—all primarily for commercial use. Many technologies that were previously only available to nation-states have now become democratized and available to any consumer or adversary.

Background

I came to the Defense Innovation Unit (then Defense Innovation Unit Experimental) nearly six years ago as a Presidential Innovation Fellow charged with understanding the character, quantity, and quality of PRC investments in the U.S. technology ecosystem. At that time, largely ungoverned by the Committee on Foreign Investment in the United States (CFIUS) or existing export controls—investments into U.S. startups were fair game for adversarial nation-states. In fact, we discovered that the PRC is pursuing a deliberate and robust technology transfer strategy, which still includes investing in early stage dual-use technologies, gathering intellectual property, and strategically identifying and poaching talent from U.S. companies and academic institutions. The key finding of our work was that PRC-backed investment firms in 2016-2018 were investing at a level approaching 20% of all U.S. venture-backed deals. By sponsoring investments in emerging technologies—from artificial intelligence and machine learning to additive manufacturing, biotechnology, and quantum sciences—the PRC is learning at the same pace, if not faster, than the U.S. national security apparatus. From an economic competitiveness perspective, this is obviously worrying; however, there are now well documented reports[1] pointing to an even more troubling fact: the People's Liberation Army (PLA) is rapidly integrating dual-use technologies developed in the commercial sector into warfighting concepts to achieve asymmetric advantage over the United States.

In response, the United States' first actions were defensive—to close loopholes and strengthen our defenses. Congress made that possible by passing the Foreign Investment Risk Review Modernization Act (FIRRMA) and the Export Control Reform Act (ECRA) in 2018. Even implementation of these new authorities has not fully prevented the illegal transfer of critical technologies. The United States must continue whole-of-government efforts to protect critical U.S. technology, know-how, and talent, and to raise awareness regarding the PRC's leveraging of foreign investment to enable its military capabilities.

[1] Military and Security Developments Involving The People's Republic of China (2020), Office of Secretary of Defense, Department of Defense, pg. 25; Military and Security Developments Involving The People's Republic of China (2021), Office of Secretary of Defense, Department of Defense 24-29.

My focus today is to discuss the progress we are making on offense in running faster. Overarching and foundational investments, such as the CHIPS Act as well as the broader Bipartisan Innovation Act, are necessary to maintain long-term U.S. leadership in the technologies that will be the drivers of innovation in the coming decades. However, by themselves these measures will also be insufficient to ensure the United States can translate technological leadership into national security advantage. **The Department of Defense (DoD) needs to outpace our adversaries in identifying, integrating, and deploying commercial technologies into current warfighting concepts and creating new concepts**. In an era where the PRC has stolen plans for our exquisite weapons platforms and carefully studied our way of fighting, advances in commercial technology offer a unique opportunity to achieve surprise *rapidly*. Despite its importance, DoD does *not* currently have a systematic or effective approach to rapidly access and leverage commercial technologies at scale. My first boss at DIU, Michael Griffin, the first Under Secretary for Research and Engineering, developed a list of 10 critical technologies for national security: 8 of those 10 were commercial. My current boss, Heidi Shyu, just released her own list of 14 critical technologies for national security: 11 of the 14 technologies are commercial. **Not having an effective approach to rapidly adopt commercial technology is a glaring weakness in modernizing DoD.** Technologies such as advanced communications, AI software, small drones, synthetic aperture radar (SAR) satellite imagery and many others can be rapidly purchased from credible commercial vendors to deliver novel capabilities at a fraction of the cost today. However, the Pentagon does *not* deliver these capabilities at scale or at the speed of relevance to our warfighters on the ground *today.*

DIU Mission and Results

DIU is the singular OSD entity embedded in U.S. innovation hubs regularly engaging with U.S. technologists, entrepreneurs, academics and investors. The PRC has already copied us with its own Defense Innovation Unit and also compels PRC companies to support the PLA through its military-civil fusion strategy. Rather than compel suppliers to work with the military, in the United States, DIU must streamline working with the Pentagon, so we can access more suppliers than the traditional defense

contractors, whose business it is to accommodate whatever process and timespan DoD dictates. One-third of the DIU suppliers on contract are first-time vendors, representing 100 new companies that DoD can now access. While DIU has achieved notable successes, the Department and the Services must allocate orders of magnitude more of their budgets to non-traditional vendors in the startup technology ecosystem in order to solidify national security as a priority for entrepreneurs, technologists and investors.

DIU is a joint DoD organization focused on accelerating the adoption of commercial technology throughout the Services, Combatant Commands (CCMDs), defense agencies, and other components and growing the national security innovation base. DIU partners with organizations across the DoD and the interagency to rapidly prototype, field, and scale commercial solutions that can save lives, lead to new operational concepts, increase efficiencies, and save taxpayer dollars. Through DIU's core operations and its components — the National Security Innovation Network (NSIN) and the National Security Innovation Capital Initiative (NSIC) — DIU cultivates talent, invests in emerging technology companies, and connects military challenges with existing commercial solutions. As just one example, DIU's work with SAR satellites, which can see through clouds and at night, are now providing commercial imagery of Russian forces on the Ukrainian border. This capability enabled the United States to predict the invasion, share with the world what was happening without revealing classified sources, and expose the Russian lies about de-escalation.

The investment DoD made in DIU 6 ½ years ago is bearing fruit. Since 2015, DIU transitioned 35 successfully-prototyped commercial solutions to Service partners. A successful transition means the prototype demonstrated success in a military environment, a production contract is in place, and a budget exists to scale capability to warfighters. DIU achieves this through follow-on, multi-year contracts—Production-Other Transaction (OT), Indefinite Delivery / Indefinite Quantity (IDIQ), FAR-based contract, and listings on the GSA schedule.

The 35 transitions represent $3.5B in contract ceiling (~$100M average contract ceiling per transition) and led to additional DoD revenue opportunities for these new vendors via contracts not led by DIU. The largest example is the vendor Anduril with a $1 billion follow-on contract from U.S. Special Operations Command (USSOCOM). This momentum in production contracts is accelerating, with contract ceiling totals growing substantially year-over-year. In FY21 alone, DIU's eight transitions represented $1.75B in contract ceiling—four times more than FY20 and 50% of the cumulative total contract ceiling awarded since 2015. The $218M average in contract ceiling per transition in FY21 is six times that of the prior year. In the first five months of FY22, DIU facilitated the successful transition of an additional four capabilities.

The ability to convert a successful prototype into a production contract is generating greater demand from DoD mission partners to initiate more projects. For example, in FY21, DIU started a record 37 new projects, which is 50% of the total projects underway and double DIU's six-year average. Meaningful revenue outcomes and an increasing number of projects encourages more private companies to participate in solicitations—FY21 saw a 40% increase in the average number of companies competing for a DIU contract. DIU has seen companies from 47 states, D.C. and more than a dozen countries compete for contracts. Growing DIU's capacity to lead projects will increase successful transitions and open up avenues to more contracts across DoD—all providing the positive economic incentive to sustain continued investment from venture capitalists and other private capital sources.

This past year, NSIN expanded DoD's reach as it integrated 4,566 individuals and 180 early-stage ventures into DoD through programs with its 71 university partners and directly supported the launch of 20 dual-use ventures from DoD labs.

NSIC, which addresses the shortfall of trusted private capital for dual-use *hardware* startups, received its first appropriation from Congress of $15M. With those funds, NSIC supported nine companies including products involving new battery chemistries and form factors, quantum sensors, and hypersonic engines.

DIU Challenges and Relevance of Commercial Technologies

DIU's successes represent well less than 1% of the overall DoD procurement budget. To modernize faster, DoD requires an order of magnitude increase in its adoption of commercial technologies. DoD is not leveraging the commercial sector broadly enough or fast enough in its modernization efforts. Commercial technologies have non-trivial differences from strictly defense-technologies. First, commercial technologies are supplied in massive unit volumes—sometimes in the millions—often led by the consumer as is the case with small drones. Second, in addition to larger volumes, commercial technologies evolve at a much faster speed than defense technologies with products refreshed on 12-18 month cycles instead of decades. As a result, DoD needs to move much faster in assessing and fielding these technologies. Third, commercial technologies such as AI software or commercial satellite imagery are not Service-specific. We do not need special versions for the Navy or the Air Force (even though at DoD we often try to create these) and, in fact, creating special versions by Service makes it more difficult and costly for commercial suppliers to do business with DoD. Fourth, since DoD does not control the global diffusion of these technologies, our lack of adopting these quickly creates an asymmetric disadvantage if our adversaries adopt them more rapidly.

These differences are extremely relevant for conflicts we may face in the next decade where our adversaries effectively employ commercial technologies. For example, when U.S. troops were stationed in Iraq, ISIS sent small drones, which can be purchased on e-commerce platforms like Amazon, with grenades to kill American soldiers in Mosul. Countries such as Azerbaijan and Ukraine are quickly adapting commercial technology in new ways to gain an edge on the battlefield. Azerbaijan saw significant battlefield success in the 2020 fighting in and around Nagorno-Karabakh due, in part, to its use of commercial drones. **The DoD must add new capabilities like these in 1-2 years rather than 1-2 decades. However, this** will not happen if we apply the same processes designed to cultivate defense-specific technologies such as hypersonics and directed energy—technologies with no existing commercial market—to dual-use technologies that are rapidly evolving in the commercial sector. DoD

must reform its sequential requirements, acquisition and budgeting methods to adapt to an environment where industry leads technology development and which prioritizes speed. The current sequential process lags commercial product cycles and delivers technology several generations behind which would be the equivalent of supplying flip-phones and fax machines to our warfighters today. While the Pentagon prides itself on following voluminous and well-specified DoD processes, the result is that in commercially advanced technologies such as advanced communications, artificial intelligence and machine learning, cyber and autonomous systems, we will be placing outdated, overpriced technology in the hands of our warfighters.

Fast Follower Strategy

For commercial technologies that DoD does not invent, DoD must become a "Fast Follower" to gain rapid access to these technologies to maintain at least technological parity with adversaries. This requires a re-think of the 3 elements of how DoD operates:

- **Requirements**, where commercial technology *negates* the need for the time-consuming process of detailed specification of solutions;
- **Acquisition**, where some of the new adaptive acquisition frameworks (for urgent capability or middle tier) can be adapted for commercial technology and simplify the buying process;
- **Budgeting**, where new commercial solutions enter the market on a faster cycle than the 2 ½ year defense budget cycle and much faster than the refresh rate of traditional defense technologies, which can be 40 years or more for major platforms.

There has been so much reform of acquisition practices in the past few decades but almost no reform of either the *requirements* or the *budgeting* processes; we are encouraged by the establishment of the Commission on Planning, Programming, Budgeting, and Execution Reform in the FY 2022 NDAA and hope the Commissioners will take on the requirements and budgeting processes, which are the greatest

obstacles to increased use of commercial technology to modernize DoD. Key tenets of a Fast Follower Strategy include:

1. **Dedicate Organizations for Commercial Capabilities and Supply Them with a Consistent Budget.** DoD needs to establish dedicated organizations for each of the commercial technologies (e.g., drones and counter-drones, digital wearables and satellite imagery) which are not and do not need to be Service-specific. Today, it is not clear where in DoD these non-Service-specific technologies like small drones should be assessed and procured. With clarity of where the technology can be assessed and purchased, these dedicated organizations also need a stable budget for that capability. This is different from a program of record, which reflects a rigid requirement and often a single vendor. This is a "capability of record" where the need for the capability is ongoing such as for small drones. With that ongoing budget, DoD can assess capability on a more continuous basis, choose the best vendor at a point in time and refresh that capability with a frequency that matches commercial product cycles. Assigning an ongoing capability budget to these assigned organizations also signals demand to private industry and avoids duplication across DoD. In fact, this allows DoD to adapt to rapidly evolving threats and procure solutions that were not even available when the DoD budget was created more than 2 years earlier.

2. **Eliminate the Requirements Process for these Commercial Technologies** and replace this with a much more rapid validation of needs. Again, we do not need to develop detailed requirements for products the commercial market already builds and, in fact, these requirements limit both creative problem solving from the commercial sector *and* the number of competitors.

3. **Apply the Best Practices of Commercial Procurement:** More widely apply non-consortia Other Transaction Authority (OTA) through Commercial Solutions Openings (CSOs), which maximizes competition while minimizing the opportunity costs of vendors to participate. DIU exclusively uses this method and experienced an average of 43 vendors participating in each of 27

competitions last year. Critically, if a vendor successfully prototypes a solution, there is no required re-compete at the end of the prototyping period, and DoD can immediately scale up the solution across the joint force. If Congress approves a budget supporting "capabilities of record" then we eliminate the DoD-unique valley of death which unfolds when we ask successful vendors to wait for the POM cycle to catch up – a process that can take up to 2 years and be death for a small company focused on cash flow.

4. **Coordination with Allies:** Source commercial technology from allies and sell proven solutions to allied militaries. Prevailing in the competition with the PRC requires more collaboration with allies and partners. The easiest form of collaboration is with commercial technologies which are unclassified and are, therefore, easily shareable and present excellent export opportunities for vendors.

This Fast Follower Strategy has several key benefits—*maximizing competition* through open assessments of solutions from multiple vendors; *reducing costs* by leveraging higher volumes of the commercial market; *increasing speed and transparency* of the acquisition process; and *minimizing the opportunity cost for vendors* which encourages participation in future competitions.

Conclusion

After a career as a high tech executive and CEO of two Silicon Valley-based companies, I have now had an in-depth immersion into how the military assesses and fields capability. DIU and similar innovation offices will *not* succeed unless DoD scales these efforts. As Eric Schmidt in his role as the Chair of the Defense Innovation Board said repeatedly, "The DoD does not have an innovation problem, it has an innovation *adoption* problem." DoD has not yet established a complementary process to the one Secretary McNamara put in place in the 1960s for defense technologies. This means we do not have an effective process for the adoption of commercial technology, which represents 11 of the 14 critical

technologies for national security. The Fast Follower Strategy is a common sense adaptation of how technology is adopted in the commercial world.

At DoD, we continue in a "business as usual" fashion at our peril. The PRC and Russia compel their private companies to work together closely with their militaries to gain experience with new technologies and concepts. From drone swarming to anti-satellite weapons programs, Russia and the PRC have studied our capabilities carefully and are rapidly modernizing its own military capabilities with a priority both on asymmetry designed to neutralize U.S. overmatch *and* accessing innovations in its commercial sector. The PLA is currently utilizing commercially-derived AI technologies to power drone swarms and underwater autonomous vehicles; the PLA is drawing from leading private companies for sophisticated ISR, information and electronic warfare solutions, and AR/VR for training, among others[2].

The U.S. military will enjoy neither a time nor technology advantage if the PLA or Russian Armed Forces achieve more agility in adopting commercial technology. Imagine how well our forces will defend against PLA swarms of drones if we have not experimented with this concept. Imagine if we do not support more non-traditional suppliers of satellites or quantum sensors such that these technologies do not remain competitive in the U.S. and go the way of solar panels or small drones—controlled by the PRC.

The industrial base for defense continues to shrink—yet we have the power to change this. Supporting new dual-use technologies can create whole new industries based on biotechnology, resilient and greener energy, or construction of a space superhighway of satellites, space logistics and manufacturing as well as a multi-orbit transportation system. Otherwise, we cede to the PRC not only military advantage but the economic prosperity that comes with these new industries. The high technology economy of the U.S. is the envy of the world and based on technologies like the internet or GPS, which DARPA pioneered decades ago.

[2] Military and Security Developments Involving The People's Republic of China (2021), Office of Secretary of Defense, Department of Defense, pg. 26-27, 148-149.

In my view, we cannot be complacent and must demand that DoD reform its Requirements and Budgeting processes—while more broadly adopting Other Transaction Authority to better assess, procure, and field commercial technology. I would ask for Congress' support by allowing for more flexibility in the appropriations process and providing consistent funding for commercial capabilities we know we need for decades to come. Maintaining our military's technological superiority requires us not only to continue to develop defense technologies like hypersonics or directed energy but equally important to fast follow the innovations of our vibrant commercial technology sector.