



December 1, 2015

Testimony before the Senate Armed Services Committee Acquisition Reform: Next Steps

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It is a generally held article of faith today that the locus of technological innovation is now firmly rooted outside of the United States Department of Defense (DOD) in the global private sector.

This testimony seeks to unpack this bumper sticker statement to establish its historic context, frame the impact it has on the DOD and, most importantly, explore the implications for necessary reforms to our research and development (R&D) and acquisition systems.

The democratization of technology to a global user base is not new and has been underway since global R&D spending outgrew DOD spending in the early 1980s. There is little the U.S. can do to arrest this trend and this is not an issue of declining spending on the part of the DOD. In fact, the Department's R&D budget is higher today, in constant dollars, than it was in the early 1970s when many of the investments that underpin our current technological advantage were made. Rather, this trend is a function of the global economy and, indeed, there are many benefits to the U.S. in terms of global prosperity.

Our challenge today is that, despite the efforts of this committee and others across the defense establishment, our implicit strategy and organizational methods for developing military capability remain optimized for a bygone era and cling to the methods of past success in ways that unnecessarily disadvantage us.

Strategic Alignment and Misalignment

It is helpful to think about this challenge in terms of the alignment between our strategic needs, the technological environment, and underlying models of doing business. Considering this alignment in the context of the Second Offset Strategy offers a case study in a positive relationship between these factors.

During the 1970s and 1980s the U.S. faced a clear and singular threat from the Soviet Union in the context of the Cold War. In an era of mutually assured destruction, the U.S. required a qualitative technological advantage to 'offset' the numerical superiority of Warsaw Pact forces. Concomitant with this strategic imperative, the U.S. possessed privileged access to the technical components that would enable so called 'information based force multipliers' that would manifest themselves in

Bold.

Innovative.

Bipartisan.

precision munitions, intelligence, surveillance, and reconnaissance (ISR) networks, and command and control systems. During this period the DOD was the overwhelmingly dominant provider of funding for technology including: microprocessors, computer networking, data compression, global positions system (GPS), and the software required to tie these elements together.

The positive alignment of these various factors meant that the DOD could establish a conventional deterrent to the Soviet Union, develop the most capable fighting force in human history, and lock in its privileged access to the enabling technology through a series of export controls. As if this was not enough, these investments helped establish U.S. businesses that came to dominate entire global industries. We would not have Intel, Cisco or Apple or the following generation of internet businesses like Google and Facebook without these early investments.

In contrast, today we face a range of rapidly evolving threats and competitors from so called near peer powers to non-state actors and terrorists. We also face many more technological options to which we might apply our finite resources: artificial intelligence and automation, big data, additive manufacturing, hypersonics, and directed energy weapons to name a few. The U.S. no longer holds a monopoly on emerging technologies with military relevance. And, while the DOD budget is still significant and influential, it is no longer compelling in the way that it used to be. Samsung corporation's R&D budget is larger than that of DARPA. Apple Corp. currently has \$203b cash on hand, enough to buy Lockheed Martin (\$70b), General Dynamics, (\$45b) Raytheon (\$38b) Northrop Grumman (\$34b) and BAE Systems (\$16b).

But despite the many differences in our strategic and technological environments the DOD largely operates today as though the conditions of the early 1970s still prevail – especially regarding the acquisition of major weapons systems. We establish formal requirements, competitively select a contractor from a relatively small number of businesses, develop and test it over a period of years or decades, and then control access to that technology through a regime of export controls.

This committee is well aware of the myriad implications of this lack of adaptation. I will offer a short example from the world of drones. We are currently unable to sell armed Predator drones to our ally Jordan due to the provisions of the Missile Technology Control Regime – with China now seeking to take our natural place and sell their drones to Jordan instead. In a prior era, keeping this technology in the hands of the U.S. alone may have prevented proliferation but today, many nations compete in the global drone market.¹ In fact, Israel has supplied over 60% of the world's drones since 1985, with the U.S. only supplying 24%.² This policy decision does not just adversely impact the revenue of U.S. businesses, it makes us less competitive technologically. This was seen in July of this year when the Indian Army rejected the U.S. Raven drone, currently in use by the Army and Marine Corps, as being insufficiently 'futuristic' for its needs.³

Yet, the U.S. military and defense industry have been pioneers in the use of drones – no other nation has a stealth drone that can land on an aircraft carrier. This is clearly a problem of law and

¹ George Arnett, "The numbers behind the worldwide trade in drones," *The Guardian*, March 16, 2015.

² Rania Khalek, "Sixty percent of global drone exports come from Israel – new data," *electronicintifada.net*, March 24, 2015.

³ Rajat Pandit, "Army rejects US offer of Raven mini-drones for its foot-soldiers," *The Times of India*, July 18, 2015.

policy not of military, technical, or business acumen. In a world of rapidly proliferating drones other nations have many avenues by which they can acquire these systems. By choosing not to sell drones to our allies we risk making U.S. businesses less competitive, allowing strategic competitors to establish arms sales relationships with our allies, diminish interoperability, and have less influence over how drone technology is used by others.

The Advantages of Commercial Technology

The driving force behind this (not so) new reality is the spread of powerful technologies, particularly information technologies, from a handful of government customers to thousands of business customers and now, most potently, to billions of individual users around the globe. Operating at vast scale has rapidly driven down prices while increasing the capability of systems that were highly classified mere decades ago. The global availability of these technologies creates a number of challenges to the U.S. from highly capable non-state actors to competitor nation-states able to proliferate their own military technologies. However, commercial technology is also fundamental to generating and maintaining our military-technical advantage. Specifically:

- **Efficient resource allocation** - Commercial technology is increasingly able to meet demanding military requirements. For information technology (IT), the Department of Defense frequently seeks commercial solutions, ranging from Apple and Galaxy smartphones to enterprise email, rather than developing proprietary systems for basic functions. This trend is increasingly moving from the back office to the battlefield. The government should enhance this approach beyond IT and think creatively about how to quickly adapt a broader range of technologies to various military environments. While the market will not yield a stealthy, armed drone, commercially available drones may be utilized for tactical applications at a fraction of the cost of military models. An effective division of labor that utilizes cheap and readily available commercial products can save the department time, personnel, and money to devote to more challenging, military specific endeavors.⁴
- **Effectively incorporating commercial components in unique military systems** - The Department of Defense, as a long-time user of commercial components in major platforms, is seeking to better incorporate emergent commercial technologies by designing modular military systems. Designing and fielding exquisite platforms and systems is expensive and time-intensive, as evidenced by the long and costly history of the F-35. To accelerate this process, the Better Buying Power 3.0 procurement initiative will focus on agile development and modular, platform-agnostic technologies. Modular design facilitates modernization and avoids situations like the F-22 processor, where software components are rendered obsolete by the pace of technological advances. Analyzing what components can be developed using existing technology can reduce lifecycle costs and ensure the military is positioned to take advantage of technological developments. These initiatives can be taken further by adopting commercial practices, for example in the areas of user experience design or development practices. Updating DoD procurement practices will be the difference between a U.S. military that benefits from commercial innovation and one that is superseded by it.

⁴ Ben FitzGerald and Katrina Timlin, "Time for a Private-Sector Pivot On Military Technology," WarOnTheRocks.com, May 14, 2015, <http://warontherocks.com/2015/05/time-for-a-private-sector-pivot-on-military-technology/>.

- **Applying military grade engineering to wholly commercial components** - Commercial components are rarely deployed *prima facie* as military hardware, but integrating commercially available technology can produce cost-effective systems and platforms quickly. Integrating commercial technology affords U.S. armed forces with advantages in rapid fielding, adaptation, and more varied force mixes, as well as the ability to easily export weapons systems to allies. The Textron Scorpion fighter jet uses only commercial technology, leading to an inexpensive aircraft, that used no DoD research and development funding but is still appropriate for routine missions. The Air Force has additionally integrated multiple PlayStation 3 consoles to build a supercomputer that is not only cheaper, but more energy efficient. Such approaches allow the department to manage cost, innovate rapidly, and stay connected with allies — especially for contingencies with less technologically advanced adversaries — while preserving exclusivity around unique high-end military systems.
- **Commercial tech as a force multiplier for military systems** - Commercial technology can also be deployed in combination with military systems to expand their scope of use. One program that has adapted commercial technology for military purposes is DARPA's Persistent Close Air Support System (PCAS). Using Android tablets, PCAS enables closer coordination between ground and air troops and provides enhanced situational awareness by integrating various data streams and lines of communication for close air support. While currently deployed on the MV-22, DARPA is looking to expand to other air platforms, which is possible due to the modular, software-based PCAS system. This approach extends the utility and lifespans of existing military systems but also imbues commercial systems with military advantages. Anyone can purchase an Android tablet, but they can't use it to call for precision fires in a secure communications environment. The Qinetiq robotic applique kits are another example of imbuing traditionally commercial platforms, in this case a Bobcat truck, with functionality for military applications and missions. Adapting common applications for a military purpose allows the Department of Defense to leverage a tested, functional product in the private domain and adapt it to a military environment.

DoD's Push for Collaboration

It is in this context that the Secretary of Defense Ash Carter is seeking to improve DOD's relationships with Silicon Valley and other hubs of innovation around the country. This is absolutely the right instinct but for the DOD to benefit in any meaningful way from this collaboration will require policy, legal and ultimately cultural changes in the way we do business. In the period from the 1960s to today, the DOD has gone from being *the* customer for technology to *a* customer for technology and has not adjusted accordingly. With global R&D spending topping \$1 trillion and with abundant venture capital available to startups, the Department's roughly \$60 billion R&D budget remains large but far from the only option available.

In an era with ready access to capital, doing business with the Department of Defense often represents too great an opportunity cost for many new and innovative businesses. The Pentagon's investment and purchasing model operates on sales cycles measured in years. Contracts run even

longer - the F-22 fighter took more than two decades to develop - with some engineers working their entire careers on a single project. Rigid requirements and testing regimes designed to mitigate risk also mitigate innovation, often to the extent that a company's product would not be competitive or desired by non-DOD users. Worse, these businesses would then have to suffer through prescriptive accounting and compliance requirements, frequent audits and arcane contract vehicles that lock in prices and even profit margins. It is therefore natural for commercial businesses, including startups, to focus on other markets despite the DOD's, and particularly military professionals', burning desire for collaboration.

Without realigning the incentive structures for collaboration the DOD will be unable to take advantage of partnerships with innovative commercial businesses. Worse, the Pentagon's early investments and new technology opportunities will continue to be acquired by Silicon Valley companies, denying DOD the chance to fully capitalize on its own investments. Boston Dynamics, DARPA's leading robotics provider; Skybox, a provider of micro satellites and data analytics; and much of the driverless car technology generated by DARPA's Grand Challenge have all found a more welcoming and sustainable home at Google.

Despite this gloomy outlook, significant potential remains for healthy collaboration between the DOD and commercial businesses. Indeed, smart businesses should want to collaborate because the DOD:

- Remains on the leading edge of technical challenges and has early access to compelling problems. Businesses able to help solve those problems will find themselves in advantageous technical and market positions.
- Is willing to invest in and experiment with immature technology that commercial investors would be unwilling to consider.
- Can provide access to a large, singular user base, particularly active duty military personnel, comfortable with testing and adapting to new technology.
- Owns significant testing facilities and ranges that can provide rare and discreet opportunities to test new technologies.
- Is willing to pay above commercial rates for new technology.
- Can provide capital to startup and small businesses that does not dilute their equity in the ways that seed or venture capital would.
- Provides a sense of purpose, mission and meaning greater than most other industries.

However, for commercial businesses to invest their time and capital into collaboration with DOD they will need to be able to transition their product from a national security context to a commercial one. If we look to aerospace, a related field experiencing similar dynamics, companies like Space X and Blue Horizon are applying innovative practices to the business of private space launch. There are a number of national security benefits to their work but the end game for these businesses is commercial space flight not military satellite launches. If we stifle their ambitions, that capital and innovation will go elsewhere, leaving the U.S. with insufficient launches to justify a robust domestic market for rocket engines and an ongoing need to purchase these engines from Russia.

Without reforming our current laws, policies and acquisition culture create many impediments for commercial businesses that might otherwise wish to capitalize on the natural advantages of collaboration with the Department of Defense.

Beyond Commercial Technology

Accessing technology from commercial markets will be vital to providing our military with advanced capabilities today and in the future. However, commercial technology is widely available and therefore cannot provide the U.S. with unique military advantage. In this context, our challenge is not simply how to better acquire commercially available technology but rather how to generate and maintain technical advantage in a global marketplace driven by demand for powerful commercial technologies. This will require an acquisition system that can integrate a mix of military and commercial technologies in compelling ways.

Achieving this objective will require a more nuanced and variegated approach than we have in our current system, which operates on similar principles regardless of whether you are developing an aircraft carrier or a micro-drone. We cannot expect the same market conditions, product lifecycles, export controls, or business models to create optimal outcomes for the full range of capabilities we require in our arsenal.

Additionally, in seeking to take advantage of commercial technology, we must not overlook the important role of defense industry. DOD reforms to compete more effectively in commercial marketplaces is just as important for defense businesses to enable them to innovate and reorient their organizations to focus on growth and technology investment. Defense industry will also continue to play an important role integrating technologies – commercial and military – into capabilities that our services can use. Accessing non-traditional sources of defense technology will be good for traditional defense industry as well.

Left unchanged, our current regime will continue to provide the DOD with strong control over the technology acquired for its own personnel but will make it almost impossible to build technology compelling to a global user base – the key area of focus for the best technology companies.

Ultimately, our acquisition and R&D challenges are strategic, organizational, and cultural in nature and we do not have a strong track record of updating these factors over the last thirty years. That said, I commend this committee for its work on the National Defense Authorization Act of 2016, particularly for the contributions made in providing additional authorities to the DOD for purchasing commercial technologies. These authorities, should the DOD choose to make use of them, provide an excellent basis for purchasing commercial off the shelf technology, a critical aspect of maintaining our technical advantage.

However, to truly and effectively compete in the global market for technology, talent, and capital will require further action. This committee can provide the legal basis and strong incentives for the DOD to adapt appropriately. Most significant will be updated approaches to intellectual property, export control, as well as our requirements regime and contracting methods.

Conclusion

Improving our acquisition system will never have the same urgency as the daily crises we face or garner the same interest as decisions on new weapons systems. And yet, our ability to respond effectively to the crises of today and tomorrow, to create compelling options for weapons systems, and support healthy industries for defense require us to improve our methods for developing military capability.

While our recent history does not provide much hope for our ability to change, we have a small window within which we might make significant progress. The leadership of this committee and your colleagues on the House Armed Services Committee combined with the leadership from Secretary of Defense Carter, Deputy Secretary Work, and Undersecretary Kendall are uniquely qualified and willing to take action. I encourage you to do so.