

“Fielding Technology and Innovation: Industry Views on Department of Defense Acquisition”  
Hearing before the House Committee on Armed Services

Statement of Mr. Peter Ludwig  
Co-Founder and Chief Technology Officer, Applied Intuition

### **Introduction**

Thank you Chairman Rogers, Ranking Member Smith, and the distinguished Members of this Committee for holding this important hearing, and thank you for the opportunity to testify. As co-founder and chief technology officer of Applied Intuition (Applied), I am thrilled to welcome you to Silicon Valley. We are grateful for your steadfast leadership on defense acquisition reform and your willingness to highlight the important national security work occurring right here in the technology capital of the world. The Committee may recall that it was funding from the Department of Defense (DOD) and the National Aeronautics and Space Administration during the Cold War era that created this special fount of innovation.

I am honored to testify before this prestigious Committee. As a third-generation automotive engineer born and raised in Detroit, I know first-hand the importance of American manufacturing and the close ties between our domestic industrial base and national security. Just as the automotive industry mobilized during World War II to lead what President Roosevelt called the “great arsenal of democracy,”<sup>1</sup> we must again “harness the complete capacity of American industry”<sup>2</sup> in the 21st Century. This time however, we must look to combine Silicon Valley software with America’s industrial prowess to build a new software-defined arsenal of democracy to ensure that our service members have the cutting-edge technology they need. Just as trucks, tanks, and planes roll off the assembly lines, so too must lines of code flow into American software.

Part of our ethos at Applied is to provide “radical candor.” In this vein, I would like to emphasize three main points. First, in order to effectively compete with China’s significant military buildup and technological advances, DOD should encourage thoughtful program design that incorporates continuous development and integration of software. Our warfighters and our allies need seamless software updates to create asymmetrical advantages to deter our adversaries. Software is never finished, and it becomes obsolete if it does not evolve at the speed of relevance.<sup>3</sup>

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<sup>1</sup> Franklin D. Roosevelt, “Arsenal of Democracy,” December 29, 1940, Miller Center, University of Virginia, <https://millercenter.org/the-presidency/presidential-speeches/december-29-1940-fireside-chat-16-arsenal-democracy>.

<sup>2</sup> A.J. Baime, *The Arsenal of Democracy: FDR, Detroit, and an Epic Quest to Arm an America at War* (Boston: Houghton Mifflin Harcourt, 2014), xviii.

<sup>3</sup> U.S. Department of Defense, *Summary of the 2018 National Defense Strategy of The United States of America*, January 19, 2018, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

Second, program managers should embrace “buy before build” and pursue commercial solutions to ensure access to the latest software and best practices. Finally, DOD program managers should expand the use of the Software Acquisition Pathway to capture this commercial innovation and enable continuous software updates.

### **Background on Applied Intuition**

Applied is a defense tech success story. Thanks to Congressional reforms and funding support spearheaded by this Committee, Applied is leveraging its commercially-proven artificial intelligence (AI) software and automation technology to help DOD achieve several goals in the 2022 National Defense Strategy (NDS). In fact, the 2022 NDS compels DOD to be a “fast-follower where market forces are driving commercialization of military relevant capabilities in trusted artificial intelligence and autonomy.”<sup>4</sup> Applied’s go-to-market approach in defense provides key insights to the Committee about which policy and funding actions are necessary from Congress to ensure that DOD is a “fast-follower.”

Seven years ago, Qasar Younis and I founded Applied as a high-growth, venture-backed startup with the goal of accelerating the adoption of safe and intelligent machines. Applied’s solutions include a software development and test and evaluation toolchain, an off-road ground autonomy stack, as well as the vehicle architecture to enable rapid updates. In other words, we write the software that supports seamless updates for autonomous vehicles (AVs), similar to the way that Apple provides seamless software updates for your iPhone.

Since our founding in 2017, Applied’s efforts have led to significant commercial success. We started in the automotive industry, and we are proud to work with eighteen of the top twenty global, non-Chinese automotive companies as customers. From these automotive beginnings, we rapidly expanded to other use cases like agriculture, mining, construction, aerospace, trucking, off-road, and defense. We quickly realized that our software has critical applications, particularly for national security consumers including the Army and defense primes.

### **Engagement with DOD**

Beginning in 2021, as a part of our initial direct DOD engagements, Applied competed for and won three Small Business Innovation Research (SBIR) contracts in 2022<sup>5</sup> and 2023,<sup>6,7</sup> along with a Tactical Funding Increase (TACFI) in 2024. These awards gave us the necessary signal to adapt our commercial tech to better suit military applications. They helped us develop a relationship

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<sup>4</sup> U.S. Department of Defense, *2022 National Defense Strategy, Nuclear Posture Review, and Missile Defense Review*, October 27, 2022, <https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF>.

<sup>5</sup> U.S. Small Business Administration, “SBIR Award: 198258,” SBIR.gov, 2024, <https://www.sbir.gov/awards/198258>.

<sup>6</sup> U.S. Small Business Administration, “SBIR Award: 204599,” SBIR.gov, 2024, <https://www.sbir.gov/awards/204599>.

<sup>7</sup> U.S. Small Business Administration, “SBIR Award: 206049,” SBIR.gov, 2024, <https://www.sbir.gov/awards/206049>.

with operationally focused program offices in both the Army and Air Force who are able to test our commercial technology at low risk.

A good example of this symbiotic partnership is our SBIR contract with the Air Force to provide synthetic datasets for aerial autonomy development. Synthetic data mimics real-world, physics-based scenarios, but it is artificially generated instead of captured via sensors. As the Committee may know, DOD lacks access to and management of quality test and operational data, including synthetic datasets.<sup>8</sup> This lack of data creates significant gaps between operational needs and developmental environments – think of the inability to artificially simulate different amounts of snow on a mountain road. Unlike DOD, the commercial industry has made significant advances to enhance autonomy models through synthetic data. Thankfully, Applied’s SBIR has allowed DOD to catch up by giving it access to this critical technology which will reduce costs and allow DOD to field systems faster. The contract will also allow DOD to rapidly assess the safety and lethality of various capabilities.

While SBIRs are a good entry point for startup companies, the key measuring stick of Congress’ acquisition reform is how quickly the DOD enterprise adopts and scales proven transformational technologies. The Defense Innovation Unit (DIU), led by Director Doug Beck, has played a critical role aligning commercial technology to programs of record. Through a DIU “Other Transaction” contract and the Software Acquisition Pathway, the Army’s Robotic Combat Vehicles program is leveraging Applied’s test and evaluation modeling and simulation toolchain to evaluate the performance of AV software stacks. This program has been a pioneer in its use of the Agile Acquisition Frameworks—using the Software Acquisition Pathway to acquire software and Middle Tier Acquisition for the hardware. Thankfully, Congress established the Software Acquisition Pathway framework in the 2020 National Defense Authorization Act (P.L. 116-92, Section 800), and the Middle Tier Acquisition authority in the 2016 National Defense Authorization Act (P.L. 114-92, Section 804).

### **Non-Traditional Observations**

China is poised to leapfrog the United States and Europe in autonomy in both the commercial and defense sectors.<sup>9</sup> Their commercial autonomous vehicle sector currently produces connected electric vehicles, sold for as low as \$10,000,<sup>10</sup> around a third of the price of comparable American vehicles. We assume that any commercial, best-in-class technology in civilian China is subsidized and supported by the Chinese Communist Party, and could be adopted into military operations by the People’s Liberation Army. In response to these challenges, traditional

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<sup>8</sup> Sydney J. Freedberg Jr., “Becoming Data Fluent: Navy Rolls Out Updated Information Superiority Vision,” *Breaking Defense*, August 15, 2024,

<https://breakingdefense.com/2024/08/becoming-data-fluent-navy-rolls-out-updated-information-superiority-vision/>.

<sup>9</sup> Graham Webster et al., “Full Translation: China’s ‘New Generation Artificial Intelligence Development Plan (2017),’” *New America*, August 1, 2017,

<https://www.newamerica.org/cybersecurity-initiative/digichina/blog/full-translation-chinas-new-generation-artificial-intelligence-development-plan-2017/>.

<sup>10</sup> Tom Krisher and Ken Moritsugu, “Small, Well-Built Chinese EV Called the Seagull Poses a Big Threat to the US Auto Industry,” *Associated Press*, September 7, 2024,

<https://apnews.com/article/china-byd-auto-seagull-auto-ev-cae20c92432b74e95c234d93ec1df400>.

American and European automotive industries, leveraging Silicon Valley software companies like Applied, are sprinting to catch up with China's pace of innovation. While automakers are surely making progress, DOD must double-down on its efforts in automation in order to capture and build on the commercial innovation from Silicon Valley and in the automotive sector.

In the future, any high-end fight with a near-peer adversary will involve a rapidly changing battlespace, a vast number of targets, and new, never-before-seen autonomous platforms with software deployed to the edge.<sup>11</sup> Many cutting-edge autonomy technologies can greatly benefit the warfighter; whether its capabilities such as Automatic or Aided Target Recognition, multi-modal sensor fusion, or collaborative autonomy. A key example of software's current impact is the war in Ukraine. Russian forces placed tires on their aircraft in an attempt to spoof loitering munitions.<sup>12</sup> Without a rapid retraining pipeline, Ukraine's perception software would be unable to recognize and destroy Russian assets.

Given the importance of software in the modern battlefield, it is critical that DOD not treat software the same as hardware. Software is never finished. It continues to live and grow as conditions rapidly change. Unlike hardware, its evolutions occur in weeks, not years, and if the software does not evolve at this speed of relevance, it becomes obsolete. DOD recognizes this fact in its Software Modernization Strategy, which states: "fighting and winning on the next battlefield will depend on DOD's proficiency to rapidly and securely deliver resilient software capabilities."<sup>13</sup> Meanwhile, many of DOD's largest legacy investments are dependent on a single vendor. As a result of past issues with "vendor-lock," DOD often seeks to own the software it procures. This overreaction is counterproductive because the agency lacks the incentive to continuously improve and innovate the software it owns and thus relies on outdated software.

Finally, DOD's prolonged contract timelines are not compatible with capturing the rapid innovation in the commercial industry and delivering this capability to the warfighter. A recent Government Accountability Office report highlights that DOD is struggling to capture innovation through the Agile Acquisition Pathways.<sup>14</sup> At Applied, we operate on a five-week release cycle – we are constantly releasing new products, capabilities, and features that program offices can leverage through agile acquisition methodologies. We save money by moving quickly. Bureaucratic delays consume time and lead to increased costs, including opportunity costs yielded to one's competitors. The same is true for DOD, its programs, and those of our adversaries. The success of DOD programs should be measured by the speed at which they are able to bring capability onto contract.

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<sup>11</sup> U.S. Department of Defense, *2022 National Defense Strategy, Nuclear Posture Review, and Missile Defense Review*, 4.

<sup>12</sup> Helen Regan and Irene Nasser, "Russia Is Putting Car Tires on Aircraft to Protect Them from Ukrainian Drone Attacks," *CNN*, September 6, 2023, <https://www.cnn.com/2023/09/06/europe/russia-aircraft-car-tires-ukraine-drones-intl-hnk/index.html>.

<sup>13</sup> U.S. Department of Defense. *Department of Defense Software Modernization Strategy*. February 3, 2022. <https://media.defense.gov/2022/Feb/03/2002932833/-1/-1/1/DEPARTMENT-OF-DEFENSE-SOFTWARE-MODERNIZATION-STRATEGY.PDF>.

<sup>14</sup> U.S. Government Accountability Office, "Weapon Systems Annual Assessment: DOD Is Not Yet Well-Positioned to Field Systems with Speed," GAO-24-106831, June 17, 2024, <https://www.gao.gov/products/gao-24-106831>.

## **Recommendations:**

1. **Thoughtful Program Design:** Programs must be designed in a thoughtful way that incorporates rapid updates and improvements in the future. While it may be too late for some programs that are already in production, Congress can ensure that current signature initiatives like Collaborative Combat Aircraft or Replicator fully leverage commercial best practices such as the continuous integration of hardware and software while performing test and evaluation.
  - a. **Avoid Waterfall Autonomy Requirements:** DOD must also change its mindset and move away from a waterfall approach to autonomy requirements. In other words, program managers must set up their programs that enable continual, cyclical improvements rather than linear production milestones with sequential block upgrades. The autonomy requirements that drive program development should encourage continuous test and evaluation of software rather than solely evaluating inputs and outputs. Some DOD autonomy programs fail to deliver the results they promise because they depend on static government-off-the-shelf solutions or their program design fails to account for commercial best practices that have been refined over a decade. The key objective for DOD is to more rapidly deploy autonomous systems that the warfighter, DOD, Congress, and the public can trust.
2. **Encourage Commercial Collaboration and “Buy Before Build”:** While the law clearly states DOD should maintain a commercial preference (10 U.S.C. 3453), implementation continues to be a challenge. Too often, DOD programs would rather build and own their own software rather than conduct the commercial research needed to fully understand technology. While the government can create internal reference models in its Science and Technology portfolio to better understand technology, programs should leverage these lessons-learned through commercial engagement. The Committee should continue to reinforce commercial preference in their oversight of key modernization programs.
  - a. **Enhance SBIRs:** The Strategic Funding Increase/Tactical Funding Increase (STRATFI/TACFI) program is a key mechanism to scale SBIRs and should be expanded. A core element of SBIR success is the ability to align the capability with the requirement owner and program office. Increased resourcing for STRATFI/TACFI can serve as an incentive for both government and small business participants to align technology with longer-term operational priorities and budget planning. While the Air Force has pioneered the use of this funding mechanism, these efforts should be expanded across services. Further, the Other Transactions Authority for prototypes (under 10 U.S.C. 4022) has been used extensively and successfully by DOD to bring in technology that originates from “non-traditional” defense contractors and small businesses. We recommend that Congress continue to encourage the use of Other Transactions.
  - b. **Empower and Provide Increased Resources to DIU:** This Committee, along with the Appropriations Committees, has been a champion for DIU. DIU is a key

enabler for the commercial industry to work with DOD. Increased resources and enhanced authorities in last year and this year’s National Defense Authorization Act leveled up what DIU will hopefully be able to do in the future. Additionally, the DIU hedge fund is a critical step forward to de-risk and scale technologies originating in the commercial market. The fund will enable rapid transformation of this technology into programs of record and into the hands of operators at combatant commands. We applaud this Congressional support for DIU and hope it continues.

- c. **License Software, Own Data:** Instead of owning the software, we recommend that DOD own the “data” it collects from its sensors. This data will enable DOD to develop a common operating picture that can be shared across domains and areas of responsibility. Conversely, DOD should license software from multiple commercial vendors to ensure that DOD gets the best software based on evolving battlefield conditions, while also ensuring interoperability between stacks.
3. **Software-Centric Acquisition Frameworks:** In order to most effectively capture commercial technology, program managers should more aggressively expand the use of the Software Acquisition Pathway. Rather than following traditional linear milestones, cyclical software development is central to this pathway.

a. **Expand the Agile Acquisition**

**Frameworks:** The Agile Acquisition Frameworks, particularly the Software Acquisition Pathway and Middle Tier of Acquisition, reduce cumbersome bureaucracy and are critical to leveraging commercial technology. Unfortunately, adoption of these important acquisition tools is inconsistent across the Department. In fact, according to the August 2024 Innovation Fact Sheet recently unveiled by Deputy Secretary of Defense Kathleen Hicks, DOD

appears to be lagging in utilizing the SWP acquisition framework (Figure 1),<sup>15</sup> only using it half as much as the MTA authority. We urge the Committee to provide political support and greater incentives for programs that use these pathways more creatively.

### MTA & SWP GROWTH

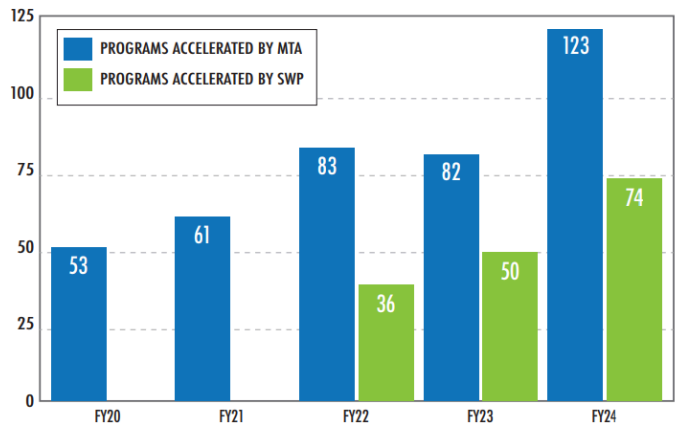


Figure 1: Middle Tier of Acquisition Pathway (MTA) vs. Software Acquisition Pathway (SWP) Programs FY 2020-2024; Source: U.S. Department of Defense

<sup>15</sup> U.S. Department of Defense, *Structuring Change to Last: An Update on Innovation at the Department of Defense*, August 7, 2024, <https://media.defense.gov/2024/Aug/07/2003519333/-1/-1/0/DOD-INNOVATION-FACT-SHEET-AUGUST-2024.PDF>.

- b. Support Firm Fixed-Price Contracts:** The easiest way to adopt commercial software technology is through firm-fixed-price contracts versus service contracts. While service-based contracts seem an easy way to ensure iterative software development, they fail to scale and do not incentivize continuous improvement to software. Rather, they incentivize the contractor to charge more time and materials to the government rather than focus on the quality of the software production. Fixed-priced contracts enable the program to acquire commercially proven software products that are continuously updated and improved based on warfighter and program feedback. These contracts should be outcomes-driven with key deliverables and a roadmap for the development of features in products.

In an increasingly dangerous world where the speed of relevance continues to accelerate, we firmly believe that DOD must fully leverage commercially proven technologies. This approach is the cheapest, quickest, and most effective way to field new capabilities and get them into the hands of our servicemembers, a key priority for “data-driven technologies” within the 2022 National Defense Strategy.<sup>16</sup> These new software-defined capabilities – and the pace at which we deliver them – will be among the most powerful ways to both deter our adversaries and reassure our allies. Deterrence fails when our adversaries believe they can move faster than we can; it succeeds when we remind them of what made Silicon Valley a leader in technology and the United States the leader of the free world.

I thank the Committee for creating opportunities for Applied Intuition to help the U.S. address our most serious national security problems. We are proud to accelerate the software-defined force and ensure our warfighters have the technology they need to protect democracy, liberty, and the rules-based international order.

Thank you again for the opportunity to testify, and I look forward to your questions.

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<sup>16</sup> U.S. Department of Defense, *2022 National Defense Strategy, Nuclear Posture Review, and Missile Defense Review*.