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Unleashing U.S. Military Drone Dominance

What the United States Can Learn from Ukraine

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Executive Summary

In the wake of Russia's 2022 full-scale invasion, Ukraine's military and political leadership faced the grim reality that its Soviet-inherited defense industrial base was riddled with corruption, institutional inertia, and a closed culture. Yet this legacy sector, despite its dysfunction, remained indispensable to Ukraine's survival in the face of an existential threat.

What followed was not a slow reform but a wartime transformation. In just three years, Ukraine has cultivated a defense technology ecosystem focused on unmanned systems that is agile and competitive. This report, based on dozens of interviews with Ukrainian officials, entrepreneurs, and military officers, tells the story of how this shift occurred under the extreme pressures of war. More importantly, it draws out the central lesson for the United States and its allies: Any serious effort to prepare for the wars of the future must incorporate options for radical decentralization, bottom-up innovation, and competitive dynamism within the defense industrial base. The Ukrainian case is not conclusive, but it is a crucial example of how free societies should adapt their defense sectors to meet modern threats with speed, agility, and technological ingenuity.

KEY FINDINGS

1. **Ukraine institutionalized a distinct "commercial-first" defense market focused primarily on innovative systems—such as unmanned platforms—by carving out a separate and parallel budget within defense spending and radically simplifying and reducing onerous acquisition rules for this market.** Rather than relying on its legacy military-industrial complex for innovative capabilities development, Ukraine turned to the commercial sector. The country allocated a dedicated portion of its defense budget for acquiring new capabilities, originating from commercial sector and established a new regulatory framework to enable rapid acquisition

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and integration of unmanned technologies from nontraditional vendors. This transformation included establishing streamlined electronic procurement procedures and decentralizing procurement authority all the way down to the level of independent military units (discussed further in point 7).

2. **Ukraine's commercial-first market focused on unmanned and software-intensive military technologies.** The commercial-first market was originally focused almost exclusively on commercial drones. This proved to be incredibly effective, and the market's scope has expanded significantly since the full-scale invasion began. The primary scope now includes unmanned systems—such as first-person view (FPV) and long-range strike drones and ground and naval unmanned vehicles—alongside electronic warfare and electronic reconnaissance platforms, advanced sensors, secure communications, and artificial intelligence (AI)–enabled software modules for autonomous navigation and target recognition.
3. **Commercial technology—mostly unmanned systems—now accounts for nearly half of Ukraine's defense procurement spending.** Based on state budget allocations alone, commercial sector acquisitions comprise nearly one-third of total spending on weapon systems. When factoring in reallocated funds from local budgets and volunteer-supported procurement, this share approaches half of all defense acquisition spending—demonstrating that in a modern, high-intensity conflict, commercially developed technologies can play a significant and beneficial role.
4. **Ukraine adapted and aligned its unmanned capability acquisition process to the commercial product development lifecycle.** At every stage of the product development lifecycle, the Ukrainian government worked to remove unnecessary procedures, decision milestones, and oversight mechanisms. It adapted its acquisition processes to more closely align with how drones are developed and acquired in the commercial context. Ukraine adapted regulatory and funding mechanisms to support this model, ensuring that timelines, language, and expectations between government and industry were aligned and grounded in warfighting necessity.
5. **Ukraine ensured military requirements for unmanned systems were defined in terms of real-world problems by end users, not rigid technical specifications coming from top-down planning.** Ukraine's experience shows that frontline-driven problem identification leads to faster, more relevant solutions. Instead of relying on bureaucratic forecasting of requirements, Ukrainian units communicate their needs and experiences directly to engineers through informal channels of personal connections or events such as hackathons and challenges. By framing requirements as operational challenges rather than technical blueprints, the military encourages more creative responses from industry and widens the pool of potential suppliers.
6. **Ukraine fully outsourced early-stage research and development (R&D) to the commercial sector, meaning drone manufacturers independently fund and develop technologies up to the prototype stage—typically reaching status as a minimum viable product (MVP) or technology readiness level (TRL) 6–7—before the military starts to engage with the technology.** In Ukraine, the military does not get involved in the earliest stages of developing new drones. Instead, private companies use their own money to design and build early versions of the technology. By the time the military sees it, the drone is already a working prototype,

ready to be tested in real battlefield conditions. This means the military can focus on testing and using promising technologies, not funding or managing their initial development. This approach shifts the burden of early experimentation and funding to private industry, speeds up innovation through direct feedback from end users, and allows the military to focus its resources on testing, integration, and rapid deployment of promising solutions—ensuring that only mature technologies enter the defense evaluation pipeline.

7. **Ukraine heavily decentralized its defense procurement of unmanned capabilities, including by giving military units procurement authority and budgets to buy systems they need directly from a list approved by the Ministry of Defence (MOD).** These changes allow the units to bypass traditional annual procurement planning, enabling them to use funds available on their accounts—either directly transferred from the state budget or reallocated from local government resources—to acquire urgently needed technologies. This shift enables faster, more responsive acquisition tailored to the real-time needs of frontline operations, enhancing operational adaptability and reducing reliance on centralized bureaucratic processes. By comparison, operational military units in the U.S. Department of Defense (DOD) receive budgets for uses such as paying soldiers and funding operations and maintenance, but not procuring military systems and equipment, a role that is compartmentalized within individual military services or the Office of the Secretary of Defense.
8. **Secure and encrypted digital communication tools transformed military capability development by streamlining the communication of military needs to industry, replacing paperwork with fast digital processes and connecting military end users directly with drone developers.** Building on its success in digital governance, Ukraine has begun applying the same approach to its defense sector. Although a unified digital acquisition system is still evolving, digitization already accelerates prototyping, streamlines evaluation, and brings the military and industry into real-time collaboration. These tools allow the armed forces to quickly and securely communicate battlefield needs, evaluate solutions, and procure technology directly—laying the foundation for a more agile and responsive defense innovation system.

Introduction

When Russia launched its full-scale invasion of Ukraine in February 2022, the most immediate and visible crisis was the existential military threat—**tanks rolling** across the border and a possibility of immediate occupation of the whole country. Yet beneath this emergency lay a deeper, more protracted crisis that both predated the invasion and critically shaped Ukraine's ability to respond to it: decades of horrific mismanagement of Ukraine's defense industrial base.

Once a cornerstone of mighty Soviet military production, Ukraine's defense industry had, by the time of the invasion, become a **shell of its former self**—plagued by corruption, outdated technologies, incompetent management, inefficient corporate governance, and severe technological gaps. Some of the attempted solutions to these problems—such as extensive regulatory rules and oversight to reduce corruption and mismanagement—had exacerbated other problems, such as cultural insularity and institutional sclerosis. These structural deficiencies posed a huge obstacle to producing weapons

and innovative military technologies at scale. In effect, Ukraine faced the near-impossible task of overhauling its deeply troubled defense industrial system amid a full-scale war.

Remarkably, Ukraine managed to do just that.

Three years out from the invasion, Ukraine **now boasts** an innovative defense technology sector that is in many ways the envy of Western countries with far larger military budgets and digital technology industries. A growing body of analysis has explored how Ukraine's defense ecosystem evolved in wartime conditions by turning to commercial- and startup-driven innovation and leveraging decentralized acquisition strategies. Researchers have **examined** how Ukraine adapts to constantly evolving strategic and operational challenge faster than many traditional militaries, **citing** successes like the use of maritime drones to eliminate Russia's Black Sea naval blockade. Others have focused on how Ukraine's iterative approach to testing and deployment, **showcased** in technologies like the situational awareness system Delta, offers lessons in accelerating defense innovation and absorbing battlefield feedback in real time.

This report—the result of dozens of interviews with Ukrainian government officials, corporate executives, and military personnel—seeks to tell the still mostly unknown story of how Ukraine accomplished this remarkable turnaround and provide lessons learned for the U.S. Department of Defense in unleashing drone dominance.

So, how did Ukraine do it?

Somewhat surprisingly, the main arc of Ukraine's story is not one of rapid transformation of legacy defense companies (though some of this **did occur**). Rather, Ukraine's leaders sidestepped many reform challenges by creating two parallel defense budget and acquisition systems that operated separately and simultaneously: one for traditional companies and traditional systems, and another for commercially derived capabilities, mostly for unmanned systems. At the time, demand for all kinds of equipment and capabilities—both traditional military kit and commercial technology—was soaring amid the largest war in Europe since World War II.

Ukraine's leaders correctly concluded that the traditional defense industrial base could not be relied upon to rapidly acquire or develop **drones**. Major defense contractors, such as Ukroboronprom, **lacked** the capabilities, knowhow, and talent pool to scale production of attritable drones even remotely approaching the quality and **quantity** of what was readily available on the commercial market. At the same time, however, the commercial sector could not, in a realistic timeframe, emerge as a viable alternative for traditional military production of materiel such as tanks, missiles, aircraft, and artillery. These complex, capital-intensive systems require long-term investment, certified production facilities, and specialized engineering talent—capabilities the commercial sector simply could not deliver at scale or speed in the midst of full-scale war.

Literature Review

Recent analytical work casts Ukraine as a model of agile industrial governance and commercial-sector mobilization. The U.S. Naval Institute wrote that Ukraine's use of commercial drones **underscores the strategic value of agility** in adopting new technologies, and field researchers from the Royal United Services Institute documented **two-month loops** from frontline need to mass-produced FPV

drones. The Atlantic Council has further emphasized Ukraine's ability to **outpace more established militaries** in adopting and fielding emerging technologies, crediting its vibrant tech sector and unusually fast procurement cycles and suggesting that Ukraine offers NATO allies important lessons in twenty-first-century warfare. Importantly, this research treats Ukraine's wartime mobilization not as an anomaly born of desperation, but as a controlled experiment in modern defense acquisition.

These reports and broader literature point to transformative efforts across three dimensions: (1) budgetary changes, (2) transformation of processes across capability development lifecycle, and (3) digital communication channels. On the fiscal front, the Center for European Policy Analysis (CEPA) documented the dramatic growth of Ukraine's defense industrial output **from $1 billion in 2022 to an expected $15 billion in 2025**, and the Stockholm International Peace Research Institute highlighted Kyiv's decision to allocate **34 percent of its GDP** to defense in 2024. In parallel, the U.S. Naval Institute and Atlantic Council both pointed to a **transformed development lifecycle**, where frontline demand drives rapid iteration and **mass production** of military systems. Finally, **CEPA** and **VoxUkraine** each discussed how digital platforms such as Brave1 demonstrate how Ukraine has embedded transparency and cross-sector coordination into its acquisition ecosystem.

This growing body of research provides the conceptual and empirical foundation for this report's analytical approach.

Research Design

This report advances the argument that two distinct acquisition systems—one focused on traditional hardware-intensive platforms and another oriented toward commercial-first software-centric capabilities—can and should coexist within modern defense acquisition systems. Ukraine's wartime experience with drone acquisition provides empirical evidence that a dual-track model is not only viable but necessary to meet the diverse demands of contemporary military operations.

While conventional defense industrial bases (DIBs) may eventually be forced to adapt to the tempo and innovation cycles of commercial technology development, Ukraine demonstrates that new acquisition systems for commercial technologies, such as unmanned systems, can function effectively in parallel with traditional acquisition pathways even during existential conflict. This parallel structure enables military organizations to exploit the advantages of both legacy and agile ecosystems.

> *Ukraine's wartime adaptation provides a rare real-world laboratory to observe institutional transformation under extreme conditions.*

To explore this argument, the report uses Ukraine as a crucial case study for drawing broader lessons for the United States and its allies. Ukraine's wartime adaptation provides a rare real-world laboratory to observe institutional transformation under extreme conditions. Unlike theoretical models or peacetime pilots, Ukraine's innovations in defense acquisition are battlefield tested. The insights presented here are based on over 50 in-depth interviews conducted in 2024 and 2025 with Ukrainian Armed Forces personnel, MOD officials, defense startup founders, commercial drone manufacturers, and U.S.

stakeholders, including members of combatant commands, program executive offices (PEOs), and commercial defense companies and venture capital funds. This dual perspective grounds the analysis in both practitioner experience and comparative institutional context.

This report analyzes the drivers of Ukraine's transformation across three analytical dimensions:

1. **Budgetary Changes:** Ukraine's innovation model is rooted in structural shifts to its defense budget. By creating a dedicated funding stream for unmanned systems acquisition outside the traditional defense acquisition system—managed by an alternative agency—Ukraine enabled faster, more flexible procurement of commercial technologies. This budgetary dualism allowed the government to reorient priorities away from an inefficient legacy defense-industrial base and toward battlefield-driven innovation.
2. **Transformation of Processes Across the Capability Development Lifecycle:** Ukraine departed from the rigid, linear acquisition model common to many militaries and instead adopted a product development framework aligned with commercial practices. This transformation included decentralizing procurement authority, enabling unit-level purchases, accelerating prototyping and field testing, and integrating frontline feedback into procurement cycles. In doing so, Ukraine replaced paper-based, multiyear bureaucracies with a nimble and iterative approach suited to the fast-evolving battlefield environment.
3. **Digital Communication Channels:** A crucial enabler of Ukraine's transformation was the digitization of the defense innovation ecosystem. Ukraine constructed real-time digital interfaces connecting warfighters, engineers, and government institutions, such as the Brave1 coordination platform, the DOT-Chain weapons marketplace, and Army+ app feedback tools. These interfaces provided visibility into operational needs and technological performance, helping to reduce corruption, improve responsiveness, and maintain alignment between end users and producers.

Each of these three dimensions is examined in depth in the report, using Ukraine as an empirical test case for assessing the feasibility and utility of commercial-first innovation pathways in defense. Based on this analysis, the report distills lessons learned from Ukraine and offers policy recommendations for the U.S. Department of Defense as it seeks to modernize its own acquisition system. The Ukrainian case is not a one-to-one template, but a source of tested insights that can help shape reforms in a more deliberate, scalable, and institutionally integrated manner.

The Three Dimensions of Commercial Defense Acquisition

DIMENSION 1: BUDGETARY CHANGES

Lessons Learned from Ukraine

1. **To institutionalize commercial drone acquisition, Ukraine created a dedicated budget outside of the MOD's acquisition and procurement budget.** In 2023, the government allocated separate funding specifically for procuring unmanned systems from the commercial sector and empowered the State Service of Special Communications and Information Protection (SSSCIP) to oversee it. This step was supported by a distinct set of procurement rules established by the cabinet of ministers to accelerate purchasing drones from the commercial market. This shift ensured that military customers had direct access to funding and could engage flexibly with nontraditional suppliers.

2. **As of 2025, nearly one-third of all defense procurement spending is directed toward commercial innovation, with major portion allocated to unmanned systems.** With over 165 billion UAH allocated for capabilities developed outside the traditional defense-industrial base (see Dimension 1 analysis below), Ukraine has fundamentally reoriented its acquisition strategy toward a more agile, decentralized, and innovation-driven model.
3. **Procurement authority has been decentralized to the unit level, enabling faster and more localized procurement and adoption of unmanned systems.** The MOD tests and evaluates the systems, then adopts them into service, making them available for purchase by military units. Almost 700 frontline units are now authorized to purchase critical systems directly from commercial vendors, using funds drawn from both central government allocations and flexible transfers from local authorities. This structure allows for responsive bottom-up acquisition based on operational needs.
4. **As a result, private companies fully fund early-stage R&D, while the government incentivizes success through fast-track procurement.** Without access to public funding, firms take on the risk of developing drone prototypes on their own. Once a solution proves viable, the military adopts it rapidly—often purchasing it at market price before final refinements—creating a strong feedback loop that rewards speed, effectiveness, and adaptation.

When Ukraine urgently needed to acquire innovative capabilities from domestic commercial firms, startups, and select foreign vendors, it became immediately clear to government officials that traditional defense budgeting mechanisms were an obstacle. Existing **budgeting processes** relied on multiyear planning cycles, where even the most basic procurement could take **one or two years** to materialize. The country needed a system capable of mobilizing funds quickly and ensuring their flexible usage.

Nowhere was this disconnect more apparent than with novel unmanned systems. For example, a commercial FPV drone, despite its widespread use on the battlefield and **growing lethality**, could not be purchased through official channels because it had no name in military nomenclature. The bureaucratic machinery, bound by legacy classification and documentation systems, lacked even the vocabulary to describe what the frontlines urgently demanded.

Initially, to solve the problem of **urgently supplying drones** to the frontline, diverse and mostly ad hoc groups of volunteers organized grassroots crowdfunding campaigns, both domestically and internationally. While these efforts played an essential role during the early stages of the war, they were stopgap measures, not a long-term solution.

What is more important for this analysis is the institutional solution Ukraine ultimately adopted to create **an agile acquisition process** of unmanned capabilities from the commercial sector: the creation of a **separate budget**, distinct from the conventional defense acquisition funding and procurement system, governed by its own rules and procedures. While this section of the report focuses on the structure of the wartime defense budget changes, the new procedural approach will be explored in greater detail later on.

Analysis of the budgetary shifts first requires an understanding of Ukraine's defense acquisition budget structure. Currently, it consists of three major budget programs through which defense spending is

conducted for new capabilities acquisition. Each **budget program** functions as a separate budget, administered by a distinct agency operating under its own regulations and procedures.

It is important to acknowledge that the spending figures and categories provided in this report are taken from the Ukrainian **state budget**, but do not precisely reflect all nuances of military spending. This is due to two primary factors. First, a significant portion of military expenditures remain classified, making it exceptionally difficult to determine which specific line items fall within each budget program. Second, the unpredictable nature of wartime operations requires the government to frequently reallocate funds or **initiate new spending** outside the original budget approved by the parliament.

Despite these limitations, a broad conceptual mapping remains both possible and useful for understanding the deeper budgetary shifts that have occurred, and how they have enabled Ukraine to respond with speed and flexibility to the challenges of wartime acquisition.

Table 1: Comparing the Three Budget Programs for Defense Acquisition Funding

	Budget Program 1	Budget Program 2	Budget Program 3
Controlling Agency	Ministry of Defence	Ministry of Strategic Industries	State Service of Special Communications and Information Protection
Purpose	▪ Weapons and military equipment procurement from state-owned, foreign, and commercial companies ▪ Maintenance and repair of defense systems	▪ Reforming and developing state-owned defense-industrial base ▪ R&D for new capabilities ▪ Expanding production capacities	▪ Procurement of innovative commercial technologies (initially only drones)
Procurement process	▪ Both classified (negotiation procedure) and public (negotiation procedure or closed auctions)	▪ Classified negotiation procedure	▪ Electronic auction or electronic marketplace of the Defence Procurement Agency (under MOD)

Source: CSIS analysis.

Before 2020, the MOD was the only government body **defining** operational requirements, since it was the sole acquisition authority for the armed forces. This centralized structure positioned the MOD as the only customer and interlocutor with the state-owned defense-industrial complex, which was organized under the umbrella of the Ukrainian Defense Industry, or **Ukroboronprom** (UOP)—a state-owned defense conglomerate uniting financially interdependent Soviet-era enterprises under centralized management.

The Ministry of Defence owned the first acquisition budget and conducted acquisition efforts using a single **budget program** titled "Development, procurement, modernization, and repair of weapons, military equipment, means, and systems." This program **functioned** as the principal vehicle for the R&D, procurement, operations, and sustainment of arms and materiel, all from one funding source. Despite institutional reforms initiated in the years that followed, this budget program remains the primary mechanism through which the military executes defense procurement.

However, Ukraine has been in a protracted state of war **since 2014**. For almost a decade of the ongoing war, the Soviet-legacy military industrial base proved to be not only **deeply corrupt** but also fundamentally incapable of generating innovative, particularly unmanned and software-centric, defense technologies to fight and deter Russia. The Ukrainian government tried to address this problem by creating a dedicated body to boost defense-industrial modernization, and in 2020, the cabinet of ministers **established** the Ministry of Strategic Industries (MSI). The **mandate** of this newly formed ministry was to oversee and complete the restructuring of the UOP—which had long been plagued by inefficiency and opacity—and to address the systemic dysfunctions of the military-industrial base.

This institutional shift created a second acquisition budget dedicated to the development of advanced defense technologies and the modernization of the military-industrial base. **Allocations** to the MSI started in 2021 and became a mechanism through which the government aimed to invest in innovation—outside the legacy channels of the MOD and UOP that had failed to deliver results. However, despite this effort, both the MSI and the restructured Ukroboronprom—**transformed** into a **joint-stock company** in 2023, where the single shareholder is still the government, and rebranded as the Ukrainian Defense Industry (UDI)—continued to face constant **leadership changes** and **failed to deliver** new capabilities. Therefore, on the brink of the full-scale Russian invasion, Ukraine found itself **incapable** of developing and producing innovative weapon systems, and its defense-industrial base remained largely outdated and inefficient.

The 2022 full-scale invasion was a major pivot point. Ukraine had to change its defense acquisition strategy to **integrate innovations** from the commercial sector into military operations. The Ukrainian Armed Forces began rapidly **adopting** readily available solutions—from DJI's Mavic drones to commercial satellite imagery provided by companies such as Maxar and Planet Labs. However, this surge in demand for innovative commercial products quickly exposed the rigidity of existing procurement system, which lacked both the speed and flexibility required in wartime conditions.

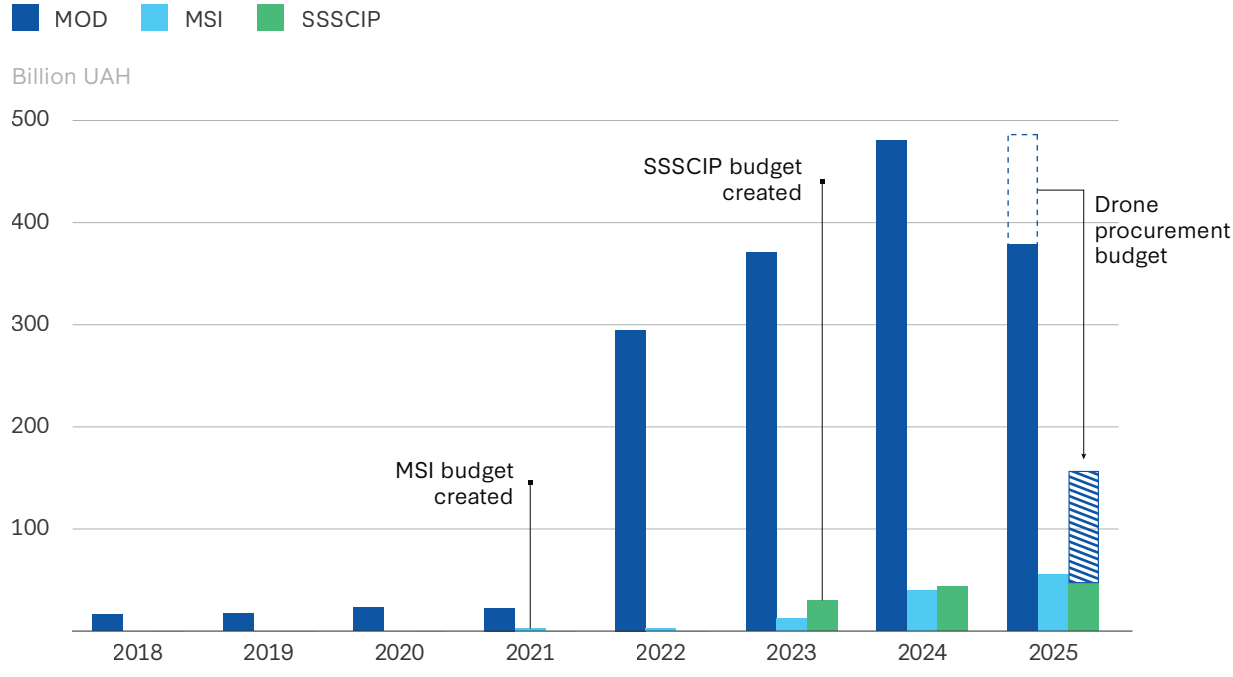
In response, the Ukrainian government introduced a **parallel acquisition mechanism** for unmanned capabilities. Initially focused on addressing operational constraints and acquiring off-the-shelf commercial drones, this approach soon evolved to include **direct contracting** with startups and commercial companies emerging within Ukraine's defense tech ecosystem.

To support this effort, a third acquisition budget was **established** alongside a simplified acquisition process, administered by a third agency. This budget was earmarked specifically for **nontraditional capabilities**—primarily unmanned systems across all domains, electronic warfare tools, and later, advanced sensors and AI-enabled technologies. To institutionalize this new pathway, the SSSCIP was **granted** a dedicated procurement authority, formalizing its role as a central actor in acquiring next-generation unmanned and autonomous systems.

Spending data across the three principal defense budget programs show how priorities have changed since 2018. As illustrated in Figure 2, the MSI's budget program first appeared in 2021, amounting to just 3 billion UAH (around 75 million USD), a negligible figure in the context of defense industrial base development. This figure shows that modernizing the legacy defense industry and acquiring new capabilities received little attention at the time.

The landscape shifted dramatically following the full-scale invasion, as the Ukrainian government prioritized **large-scale procurement** of weapon systems and military equipment through the MOD. However, in 2023, another strategic pivot became evident—for the first time, 30 billion UAH was **directed** toward the procurement of unmanned systems from the commercial sector—signaling a commitment to leveraging and outsourcing R&D to nontraditional defense suppliers. For comparison, this figure is almost twice the investment into new capability acquisition from the state-owned legacy industry that year.

Figure 1: Three Major Budgets Within Ukrainian Defense Spending Designated for New Capabilities Acquisition



Note: The amount of funding reflected here is the funding allocated within the mentioned in Figure 1 budget programs held by MOD, MSI and SSSCIP.

Source: CSIS analysis; Ministry of Finance Ukraine. Open Budget Database.

This new model proved highly effective. Therefore, in 2025, the MOD **announced** plans to allocate 110 billion UAH—out of a its total acquisition budget of nearly 500 billion UAH—specifically for drone procurement. Although this process will be administered through the MOD's **Defense Procurement Agency**, it will follow the same principles established for unmanned technology acquisition: reliance on a military-commercial technology online marketplace, authorization for direct unit-level procurement, and accelerated procurement cycles.

Given that the MOD's approach closely mirrors the model employed in recent years by SSSCIP for commercial drone procurement, this planned budget reallocation can be conceptually added to the 47 billion UAH previously **allocated** under the SSSCIP program. The two programs operate under nearly identical rules, differing primarily in the administrative body overseeing them within the defense sector.

Moreover, the cabinet of ministers retains the authority to supplement this funding through ad hoc decisions. For example, in February 2025, it **authorized** an additional disbursement of 8 billion UAH to SSSCIP for the procurement of unmanned systems as an ad hoc measure. When aggregated, the total funding directed toward the acquisition of unmanned technologies from the commercial sector reaches approximately 165 billion UAH—amounting to nearly one-third of all expenditures on weapons and military equipment by the Ukrainian military. This trend reflects a fundamental reorientation of Ukraine's defense acquisition strategy toward a more agile and innovation-driven model.

In parallel with central budget reforms, Ukraine has **decentralized** procurement authority for capabilities acquired from commercial sector. Nearly **700 military units** are now authorized to make purchases based on a commander-approved list of essential items instead of the traditional dependency on annual procurement plans and lengthy budgeting cycles. This procurement authority **covers** not only unmanned systems, but also electronic warfare, counter-unmanned aerial systems (C-UAS), sensors, parts, transportation, communication systems and other items beyond big expensive weapons systems and platforms.

Military units receive funding from two primary sources: (1) direct transfers from the state budget and (2) reallocated funds from local budgets. In December 2024, the Ukrainian government **authorized** direct budgetary transfers to military units specifically for the procurement of unmanned systems, allocating the equivalent of 27 billion UAH over an 11-month period.

At the same time, local authorities were granted the flexibility to **quickly redirect** part of their own budgets in response to urgent needs of frontline units. This allows local authorities, especially those close to the front line, to either support the units that protect them or simply reallocate their revenues to help equip the armed forces with the latest market technology. In 2023 alone, local authorities **contributed** 16 billion UAH in transfers to military units.

The changes in budgeting process and decentralization in procurement authority show that Ukraine has restructured its defense spending by moving away from long-term, often inefficient capability development programs with the legacy military-industrial base, instead delegating much of the early-stage R&D to the commercial sector. With the exception of limited **grant programs**—where individual awards do **not exceed 8 million UAH**—there are no substantial government-funded programs to support early-stage R&D. As a result, commercial companies carry both the financial risk and the burden of assembling specialized talent in the initial phases of development.

However, once a viable product is developed, the government offsets these early investments by adopting a fast-track procurement model: acquiring technologies at full market price, even when they remain under refinement or are still undergoing operational improvement. This approach allows the government to rapidly field innovative capabilities and create incentives for private sector innovation through rapid military adoption.

Recommendations for the United States

1. **Consolidate budget line items into bigger "pots" for more flexible and rapid resource allocation to procure unmanned systems, with one pot specifically dedicated to unmanned systems.** The DOD's current highly specific budget line items **fragment funding** and slow the department's responsiveness to innovation. Consolidating these lines into broader mission-aligned categories would give the DOD the agility to spend resources on what is needed and already available, reducing administrative complexity and allowing program managers to adapt to changing operational and technological demands without restarting the budgeting process from scratch.
2. **Fund the full product lifecycle across appropriations.** Modern capability development does not have clean boundaries between (1) research, development, test, and evaluation (RDT&E), (2) procurement, and (3) operations and maintenance phases. Military technology **constantly develops and upgrades**. The DOD should revise its financial management regulations to allow a single stream of funding to support the full lifecycle of a system—from prototyping and testing to deployment, troubleshooting, iteration and sustainment. This would eliminate artificial breaks in funding and reflect how technology is actually developed and improved upon today.
3. **Create a dedicated unmanned systems acquisition budget.** Rather than funneling all innovation through rigid acquisition pathways and program-of-record channels, the DOD should carve out a standalone budget for rapid procurement of unmanned technologies at high technology readiness levels. This readily available budget must be governed by flexible rules that allow iterative deployment, unit-level purchasing, and the acquisition of products not yet formalized in military nomenclature.
4. **Establish a structural distinction between acquisition pathways for conventional platforms and a commercial-first track, starting with one for unmanned systems.** The DOD should formally separate the acquisition of large-scale, expensive, hardware-intensive programs—mostly major defense acquisition program (MDAP) and middle tier of acquisition (MTA) portfolios—from software-centric and commercially viable technologies. This structural distinction would allow MDAPs and MTAs to continue under the traditional oversight-heavy framework while enabling a separate, more agile path for procuring capabilities such as drones, AI-powered software, and communication tools from commercial innovators.

To draw lessons from Ukraine and to apply them to the U.S. defense acquisition system, it is first necessary to delineate which categories of systems and technologies should remain within the traditional acquisition pathways and which can be transitioned to more flexible acquisition mechanisms targeted toward the commercial sector.

The **U.S. defense industrial base** is predominantly not commercial in nature. It is dominated by a small group of large prime contractors that operate almost exclusively within the defense sphere and

largely bypass the commercial technology ecosystem. Today, most cutting-edge technologies—whether in software, AI, or unmanned systems—are originally developed in commercial sector, targeted at consumer or B2B markets, and shaped by open competition and rapid iteration, not by traditional defense firms. The true drivers of innovation in unmanned and software-centric technologies lie within the commercial sector, including startups and venture capital firms, which operate outside the rigid, decades-old structures of the traditional defense ecosystem.

> *The DOD should establish a dedicated budget for the acquisition of mature, high-TRL drone technologies from manufacturers capable of scaling production quickly.*

Drone technology is no exception to the broader shift toward commercially driven innovation. To rapidly address the growing demand for low-cost expendable unmanned systems, the DOD should establish a dedicated budget for the acquisition of mature, high-TRL drone technologies from manufacturers capable of scaling production quickly. This budget must be flexible—unencumbered by rigid funding categories (known within the DOD as "colors of money")—and usable across various stages of the capability lifecycle, including iterative development, testing, fielding, and sustainment.

To empower experimentation and accelerate fielding, this budget should be distributed across the services and down to lower levels of command, including combatant commands, enabling operational units to procure systems they wish to test or deploy. Critically, these funds should be made readily available outside the constraints of the standard budgeting cycle, allowing units to act on emerging needs without delay.

To ensure coherence across the force and manage security concerns, the DOD should maintain a curated list of preapproved systems—something like a much bigger **Blue UAS** list, managed by the Defense Innovation Unit (DIU). This list would serve as a flexible, vetted catalog of options, offering military users a wide selection of drones that meet core requirements, particularly in terms of interoperability with existing networks and software systems.

This initiative should be viewed as a pilot project—an initial experiment in devolving procurement authority and leveraging mature commercial technologies to meet immediate operational needs. If successful, it can serve as a blueprint for a broader shift toward commercial-first acquisition across the department. By expanding this model beyond small drones, the DOD could accelerate the integration of commercially developed technologies that bring new capabilities or upgrade existing ones, ultimately making the U.S. military more agile, responsive, and technologically competitive.

To determine which systems should fall under the new commercial-first acquisition framework, the "watershed" should be along the distinction between conventional, hardware-intensive platforms typically developed by major defense primes and a new generation of software-centric, cost-efficient technologies often enhanced by AI.

Within the context of the U.S. defense acquisition system, the most appropriate structural distinction aligns with separation from portfolios containing **MDAPs** and MTAs. This delineation reflects

fundamental differences in development cycles, complexity, and vendor ecosystems, and provides a logical basis for structuring relative budget allocations between traditional and commercial-first acquisition pathways.

MDAPs and MTAs encompass the DOD's most complex, capital-intensive, and strategically sensitive systems, such as fighter jets, submarines, integrated missile defense architectures, and ships. Reforming this category is a substantial effort that affects entrenched contractual obligations, multiyear budget cycles, and layers of bureaucratic oversight. Therefore, MDAPs and MTAs should continue along established acquisition pathways with prime contractors and long-term programmatic oversight.

The commercial-first acquisition should focus on the vast array of capabilities that fall outside the MDAP and MTA category. These are capabilities that are within the reach of the commercial sector, such as AI-enabled software, unmanned systems, satellite constellations, next-generation communications, and even early-stage hypersonics and humanoid robotics. These technologies are often best developed not through traditional defense contractors but by startups and commercial innovators already working at the technological frontier.

This distinction is not merely conceptual—it has direct and significant implications for budget structuring. Defense budgets should be divided along the same lines as the acquisition pathways. Funding for MDAPs and MTAs can continue to follow the traditional, requirement-driven, **multiyear budget planning process**, suitable for large-scale, complex systems with long development timelines. In contrast, the budget allocated to the commercial-first market must be designed to allow immediate procurement of readily available technologies. This funding should be oriented toward solving problems and meeting the operational needs of end users. Using this budget, commanders should be able to procure novel products that do not yet exist in military nomenclature.

In discussions with CSIS, U.S. commanders and warfighters emphasized this gap. Many reported facing critical operational challenges for which commercial vendors already offer viable, well-suited solutions. However, they were unable to procure these technologies because the solutions do not align with preexisting requirements—**requirements** that were often written more than five years ago and are tied to rigid budget allocations. This disconnect shows the need for restructuring budgeting procedures to make funds more immediately available.

Since the pace of **innovation races** in modern conflict has fundamentally changed the lifecycle of military capabilities, many systems—particularly those based on software and AI—may **never reach** a traditional sustainment phase. Instead, they remain in a state of continuous development, undergoing frequent upgrades and iterations. In such a dynamic environment, military customers must assess not only the deployed solution but also competing alternatives from other vendors on the market each time technology is refreshed. This process reflects the competitive environment of the commercial market and creates opportunities for multiple vendors to compete for awards, rather than locking into a single supplier.

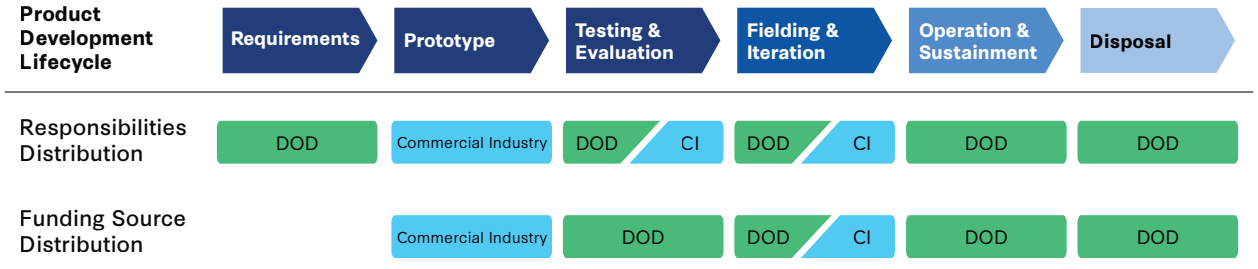
This model would enable nontraditional companies to secure more contracts from various military customers, provided those customers have access to flexible, readily available funding. Military customers should be able to fully cover costs from their available funding for testing and evaluation of commercial prototypes by conducting paid pilots. This will make military customers more responsible

during the selection process as they use their own funds and pay the full price for selected prototypes to reward companies for delivering products with high technological maturity. In doing so, companies are rewarded for their early-stage R&D investments by gaining the opportunity to sell high-maturity prototypes and codevelop them with the military.

This approach moves the defense innovation ecosystem away from its current dependence on **achieving program-of-record status** as the sole pathway to profitability. Instead, it offers immediate returns to companies and their investors and lowers the barriers to entry for firms, opening this commercial-first market for competition. At the same time, said competition incentivizes continuous, operationally tailored technological progress among companies to keep winning contracts.

The commercial-first market reshapes the product development lifecycle by redistributing responsibilities and funding sources: early-stage innovation driven and funded by private capital, and public investment focused on testing, validation, and fielding. Figure 2 illustrates this realignment across capability development lifecycle.

Figure 2: Redistribution of Responsibilities and Shift in Funding Sources Within Drone Budget



Source: CSIS analysis.

Taken together, these reforms would build a more dynamic, responsive, and innovation-ready budgetary environment within the Department of Defense for non-MDAP acquisitions. By shifting from a static, siloed model to one that reflects the tempo and structure of modern technology development, the Pentagon can unlock access to its 200-billion-dollar market for the commercial sector and bring the most innovative capabilities to the field at the speed of relevance.

DIMENSION 2: TRANSFORMATION OF PROCESSES ACROSS CAPABILITY DEVELOPMENT LIFECYCLE

Lessons Learned from Ukraine

1. **Ukraine successfully adapted its drone acquisition lifecycle by aligning it with the commercial technology development process.** Faced with urgent wartime demands and the failure of legacy procurement systems, Ukrainian authorities abandoned rigid, linear frameworks in favor of an agile, iterative model that mirrors how commercial products are developed—from identifying needs to prototyping, testing, and refinement. This shift enabled faster delivery of frontline-ready capabilities and fostered a closer partnership between government and the commercial sector, proving the value of applying product development principles to defense acquisition.

2. **Ukraine has redefined how military requirements for drones are generated by shifting from top-down forecasting to a bottom-up, problem-driven approach rooted in battlefield realities.** Instead of issuing rigid technical specifications, Ukrainian military authorities now articulate their needs as operational problems communicated directly by end users—either through direct engagement with developers or formats like hackathons and government-run challenges. This method focuses on essential functions over fixed designs, accelerates responsiveness, encourages innovation from a broader pool of suppliers, and ensures that solutions remain relevant and aligned with the evolving demands of the battlefield.
3. **The Ukrainian military outsources early-stage drone R&D to the commercial sector and tests prototypes only at high TRL.** Ukraine has shifted the burden of funding and supporting early R&D and prototyping to private industry, encouraging companies to experiment, self-fund, and iterate until **their concepts reach TRL 7-9**. Instead of selecting a single contractor and waiting for incremental progress, the military now receives prototypes that can move directly into government-led testing, evaluation, and codification into the military arsenal. This approach concentrates public resources on final validation and leverages market capacity for earlier R&D.
4. **Ukrainian forces procure a "good enough" product to complete a mission rather than chasing maximal technical sophistication.** The Ukrainian military selects unmanned systems that meet operational needs instead of buying the best system with "showcase" features whose battlefield value is unclear. This pragmatism saves scarce resources for higher-priority technical needs, while the speed of commercial innovation lets the military pivot quickly to improved models. Often, systems stay at the prototype stage as they undergo constant, sometimes monthly, upgrades in response to enemy countermeasures.
5. **Ukraine has embedded frontline warfighters into the testing and evaluation process of unmanned systems, ensuring that only combat-relevant technologies are adopted.** Soldiers with direct operational experience—including drone operators and users of AI-enhanced systems—participate in evaluation commissions and have a decisive voice in determining whether a system is ready for procurement. This user-centered approach is reinforced by rigorous testing under battlefield-like conditions, including exposure to real electronic warfare threats and variable terrain. Together, these practices ensure that new technologies are validated not just in theory, but through practical, end user–informed assessments that reflect the realities of modern combat.

Before the full-scale invasion, Ukraine, like many other militaries around the world, relied on a traditional multiyear **acquisition framework** with a rigid, linear sequence of stages. The process typically began with a classified requirement development phase, followed by the selection of a designated enterprise within the state-owned military-industrial base to deliver a capability. This was then followed by a lengthy and costly capability development effort, which often failed to result in actual delivery.

Numerous issues plagued this system. Projects frequently stalled **due to** lack of funding, the loss of engineering talent, and excessive bureaucratic oversight, such as repeated inspections by the MOD. Delivery timelines were often extended to secure continued budget allocations. In some cases, collusion between ministry officials, who initiated the capability and requested funding, and enterprise

managers, who produced progress reports justifying further investment, allowed programs to **drag on indefinitely**. While both sides were benefiting from this arrangement, the result was a failure to deliver defense capabilities, ultimately weakening the country's readiness to defend its sovereignty and people.

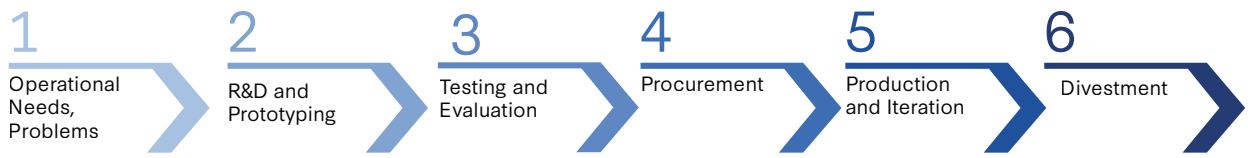
The full-scale invasion of Ukraine and the military's decisive **shift** toward the commercial sector to acquire effective, frontline-ready capabilities fundamentally transformed the country's approach to defense acquisition. The most significant change was the alignment of Ukraine's defense acquisition framework with the commercial product development lifecycle. The pressing demand for speed, innovation, and reliability—particularly in areas such as unmanned systems, software platforms, and AI solutions—forced the removal of unnecessary stages, bureaucratic checks, and outdated procedures that had previously slowed the process.

The new lifecycle did not emerge as an end-to-end strategy or a formalized vision of military leadership. Instead, Ukrainian authorities addressed bottlenecks and obstacles as they arose in the process of acquiring unmanned systems from the commercial sector. The approach that organically developed in Ukraine has significant value, as it represents a refined set of practices validated through real-world application under the conditions of an active war.

This new lifecycle, shown in Figure 3, is now much shorter and more agile, closely aligned with how commercial technologies are developed and brought to market. Any commercially developed product—whether hardware or software—typically follows the same product development cycle: (1) initial identification of a specific need or problem (not requirements), followed by (2) developing a technological solution and creating of a prototype or MVP by a commercial company, and (3) progressing through phases of testing, refinement, and eventual delivery.

Throughout this process, iterative development plays a central role. Every iteration enhances the product's performance, aligns it more closely with user needs, and advances its level of technological maturity. This continuous feedback and adaptation loop is essential for development of unmanned capabilities specifically, in order to achieve the level of readiness necessary for operational deployment.

Figure 3: The Ukrainian Military Commercial Sector Capability Development Life Cycle



Source: CSIS analysis.

At every stage of the new lifecycle framework, the government made necessary changes in regulation and funding procedures, which brought the military approach to capability acquisition closer to practices in the commercial sector. Although the revised process may appear straightforward, it plays a vital role in aligning language, timelines, expectations, and commitments between government and industry.

Before the full-scale invasion, capability acquisition **timelines** in Ukraine averaged approximately 11 years, with some programs taking as long as 20 years to complete. Since then, Ukraine has managed to **shorten this process** to an average of 18 months—and, in the case of small expendable systems, to as little as 6 months.

Recommendations for the United States

1. **Replace requirements with problem statements that come directly from those who will use the technology.** Instead of relying on rigid engineering requirements set far in advance, the U.S. military should define its needs through operational problem statements developed directly by those who will deploy the technology in the field. This approach is especially relevant for small drones and other unmanned systems, where rapid iteration and adaptability are essential. These problem statements should be communicated to the commercial ecosystem to guide innovation and encourage creative technical approaches. The only additional requirement should be that any proposed system integrates smoothly into existing and planned military networks, ensuring compatibility and interoperability from the outset.
2. **Outsource more early-stage drone R&D to commercial industry and only test and evaluate prototypes that are at least TRL 6–7 (i.e., ready for testing in operational environment).** The DOD should rely more heavily on commercial actors to conduct early-stage R&D for drone technologies, reserving government involvement only for the evaluation of systems that have already reached a high level of maturity—those at or beyond TRL 6–7. In practice, this means the military would receive prototypes ready for field testing, significantly shortening development timelines. This approach allows the private sector to absorb initial development risk, promotes competition, and ensures that only technically viable and operationally relevant systems move into military testing pipelines.
3. **Test and evaluate mature systems in operational or near-operational environments.** Testing and evaluation should be driven by end users—those who will actually operate the systems—in environments that replicate real battlefield conditions. For unmanned systems, this means including variables such as contested electromagnetic environments, complex terrain, and extreme weather. For AI-enabled drone software, this requires secure, closed-loop testing environments that incorporate realistic operational data and simulate actual use cases. Allowing users to assess the systems ensures technological relevance and encourages iterative refinement based on frontline feedback.
4. **Adopt a simplified and flexible procurement procedure—"other transactions" (OTs)—as the default mechanism for procuring drones from a nontraditional vendor.** To enable fast, flexible acquisition of commercially developed unmanned systems, the DOD should make OT authority the standard mechanism for working with nontraditional vendors. OTs allow the military to prototype and scale production without the bureaucratic constraints of the Federal Acquisition Regulation (FAR). For this to be effective, acquisition professionals need dedicated training on OT design and implementation, so they can structure agreements that are legally sound, strategically aligned, and tailored to the pace of commercial technology development.

The current acquisition process in the DOD still reflects legacy approaches to innovation development and adoption—much like the outdated system Ukraine inherited from its Soviet past. This is not a

coincidence, as the U.S. acquisition system is also a **product of the Cold War** era, a time when technological progress moved at a much slower pace and the military was the **main driver** and funder of innovation.

Today, the most significant technological breakthroughs no longer appear in classified military labs, but rather in the offices of tech startups and large tech companies—often led by engineers in sneakers and T-shirts rather than white lab coats. While many of these breakthroughs are still indirectly supported by government funding, the gap between the commercial and military innovations in both the speed and nature of technological leaps has grown dramatically.

Given this reality, the military's challenge is not to compete with the commercial sector or to try to recreate its innovative success within the military industrial base, but rather to find the most effective ways to leverage these advancements and adapt them for defense purposes. The acquisition system is that gateway through which commercial technology can enter and be integrated into the military.

Today, the DOD still relies on a complicated, multistage process created to manage the entire lifecycle of a capability—from defining requirements and developing a prototype to procuring, using, and eventually divesting it. This system is deeply embedded in institutional policies, with funding procedures, layers of bureaucracy, and decisionmaking processes all organized around a rigid, requirement-based structure. Designed for a different era, this framework now struggles to keep pace with the speed, innovation, and agility demanded by modern conflict.

The DOD's most recent effort to modernize its acquisition system is the **Adaptive Acquisition Framework** (AAF), launched in 2020. The core idea behind the AAF is to give program managers more flexibility by offering **six different acquisition pathways**. Each pathway is designed to match the specific needs of a given capability, allowing faster and more efficient development. The goal is to move away from outdated, one-size-fits-all processes and reduce unnecessary bureaucracy, making it easier to deliver new technologies to the military more quickly.

However, in reality, the AAF pathways largely remain a refined version of the old system, rather than a true departure from it. Despite its intended **flexibility**, it continues to operate within the same institutional constraints and bureaucratic structures it was designed to overcome.

The programs continue to **experience significant delays**, lack of readily available resources for procurement of available solutions, and slow technology transitions. The **MTA** pathway, intended to accelerate delivery of systems smaller than MDAPs, shows **considerable inefficiencies**. The DOD plans to invest 44.5 billion USD across 20 of its most expensive MTA programs, yet many face development timelines that stretch well beyond their original targets. Several programs now anticipate delivering initial capabilities years after their MTA phases end. Moreover, programs entering the MTA pathway with immature technologies often face protracted development cycles rather than rapid fielding. The Government Accountability Office found that **none of the seven** reviewed MTA programs with low technology maturity were ready for production or fielding by the end of their efforts. These delays reveal a persistent structural inability to deliver timely innovation, even under acquisition models designed for speed.

To meet today's challenges, the U.S. government should go beyond the AAF for unmanned systems acquisition and align this capability development process more closely with commercial product development practices. This means not just simplifying the capability lifecycle, but also rethinking how each stage should support faster adoption, continuous updates, and better alignment with the pace and methods of commercial innovation.

Traditionally, any military capability starts with a formal process of writing detailed requirements. Within the current U.S. defense acquisition system, developing formal requirements is a **complicated process** which often **takes years**. As U.S. military personnel shared with CSIS, this process typically produces lengthy, highly technical documents, sometimes hundreds of pages long, that narrow the pool of potential vendors, often favoring a small group of large defense primes willing and able to meet the extensive list of specifications.

To better engage the commercial sector, requirements for commercial technology solutions should be short—preferably no more than three pages—focused on the operational problem, and flexible enough to allow a range of innovative approaches. Unlike traditional government-led R&D programs, the commercial sector can offer diverse, nonstandard solutions that compete on performance and cost efficiency.

The way military needs are shared with industry should also be updated. A single easy-to-use digital platform should be developed to let companies quickly see what the military needs, determine how urgent each problem is, and connect directly with end users through events, webinars, or other interactive tools. This direct communication would help companies better understand the problems and tailor their solutions more effectively.

Finally, capability requirements should originate closer to the real operational environment. Ukraine's experience has shown that operational needs can vary significantly across different parts of the frontline and domains, showing the importance of context-specific solutions. For the United States, this means that, ideally, combatant commands would engage more frequently and directly with industry to inform and refine operational needs development alongside formal acquisition processes.

Two examples within the DOD illustrate how requirements generation and communication can be modernized to better align with contemporary innovation practices. First, **The Navy's PEO for Digital and Enterprise Services**, or PEO Digital, shared with CSIS that the office has developed the **Electronic Requirements Governance Board (eRGB)**, a digital, Jira-style ticketing system that allows end users to submit capability needs and enables PEO Digital to further track, refine, remove duplications, and assign resources. Each request is reviewed within a unified platform that integrates feasibility assessments, dependency analyses, and real-time dashboards. This system reduces the average requirements cycle from three years to just three months, enabling faster translation of operational needs into actionable acquisition initiatives, while improving transparency and minimizing duplication across the Navy.

Similarly, the DIU has redefined how capability needs are communicated to industry through its use of **Commercial Solutions Openings** (CSOs). These brief solicitations describe operational problems without prescribing technical solutions, leaving room for commercial creativity and rapid response. By often requiring those proposed solutions to be only interoperable and integrable with existing systems,

DIU ensures technical compatibility without stifling innovation. This concise format also functions as a technology scouting tool, allowing the DIU to quickly map emerging technologies and **engage** with a broad spectrum of commercial actors.

The next stage of the product development lifecycle is the most time-consuming and resource-intensive: research, development, and prototyping. Commercial companies and startups outpace government and big primes because competitive market pressure and commitments to investors drive fast, continuous iteration for a working prototype or MVP. In the commercial technology world, software updates roll out far faster than any formal requirements or budgeting cycle can track, and success is measured by delivered products rather than achievement of process milestones. Therefore, outsourcing early R&D lets the military tap this momentum and receive mature, high-TRL prototypes without bearing the cost of prolonged R&D in usual acquisition process.

The DOD must establish continuous technology scouting to maintain real-time awareness of the commercial innovation landscape. This requires consolidating all incoming responses from existing channels—such as CSOs, **Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR)** submissions, and service-level innovation hubs—into a unified, searchable database. Each entry should be evaluated against the TRL scale and made accessible across program offices to avoid duplication and improve coordination. An additional mechanism should be created to receive and assess unsolicited commercial proposals, tracking their readiness and any prior DOD engagement. Together, these efforts would provide acquisition professionals with a real-time map of available commercial capabilities, ensuring that promising and existing solutions are evaluated and not lost in bureaucratic silos.

To ensure that these unmanned systems prototypes align with actual operational needs, testing and evaluation must be conducted by the same end users who originally identified the capability gaps. A concern raised numerous times by combatant commands in discussions with CSIS is that too often the systems delivered to them are based on assumptions generated at the service level, resulting in misaligned or underperforming capabilities. Embedding end users directly into the testing process, ideally within the intended deployment environment and alongside manufacturers' engineering teams, enables real-time feedback and rapid iteration.

This is particularly crucial for AI-powered software for unmanned systems, which should be evaluated in controlled, secure environments that replicate operational conditions, using declassified data where feasible to for realistic assessment. The U.S. military can implement this approach by decentralizing testing and evaluation and embedding it closer to the operational edge. This can be achieved through the establishment of dedicated units—small-scale equivalents of the DIU—within each service or even at lower levels.

A more effective model for testing and evaluation may involve empowering existing acquisition entities—such as PEOs—to conduct experimentation in close cooperation with the end users, as demonstrated by the success of Navy's PEO Digital in **piloting commercial solutions**.

At the heart of PEO Digital's Innovation Adoption Kit is its four-stage "investment horizons" model, which structures the journey of technology from early exploration to operational deployment. Horizon 3 serves as the entry point for commercially developed innovations, acting as a technology backlog

filled with solutions that have emerged independently of Navy funding. This allows the Navy to monitor a broad range of emerging capabilities without immediate investment, institutionalizing early-stage scouting and creating a pipeline for future testing.

When a Horizon 3 technology shows promise, it moves into Horizon 2, where the Navy funds pilot programs to evaluate performance in mission-relevant environments. These pilots prioritize outcome-based testing over full compliance with military standards, removing a major barrier for commercial entrants. Flexible contracting tools—such as OTs—enable rapid iteration, with some Navy program offices running up to 20 pilots a year compared to the traditional pace of just 1.

Once a pilot proves effective, Horizon 1 facilitates the transition to scaled deployment by streamlining budgeting, governance, and compliance steps. Instead of requiring all regulatory hurdles be cleared up front, this phase front-loads only what is necessary, accelerating adoption while managing risk. One 2022 Innovation Adoption Kit open call **drew** over 100 commercial applicants, and within seven months, an AI analytics firm had gone from proposal to fielded contract. This approach offers vendors a transparent and accelerated path from prototype to production while ensuring that government investment is tied to demonstrated results.

Similarly, organizations like the Rapid Capabilities Offices and U.S. Special Operations Command have developed agile frameworks that prioritize operational relevance and iterative feedback. The Rapid Capabilities Offices, for example, uses **a model** that directly involves warfighters in identifying urgent capability gaps, rapidly sourcing prototypes, and testing them under real operational conditions. Special Operations Command's **SOFWERX** is an example of how collaborative ecosystems—with open access to small businesses, academia, and labs—can drive innovation at scale.

However, despite these advances, many of these efforts still lack well-defined pathways for transitioning validated solutions into larger acquisition programs, limiting their broader impact. To solve this problem, services and end users should have readily available budgets, as discussed in previous chapter.

Last but not least, an important aspect of innovation adoption is contracting. It should not be treated as a special form of art requiring a vast, siloed workforce. Instead, it should be boiled down to a technical service—focused on executing agreements—within a broader product development ecosystem. This approach would allow acquisition professionals to focus on one core function: structuring fair, efficient contracts that support the iterative development, maintenance, and scaling of systems.

Adopting a single default contracting mechanism across the product lifecycle would simplify this process significantly. **OTs**—nontraditional contractual instruments employed by the DOD to support research, development, and prototyping activities outside the **FAR**—already offer this kind of flexibility. Specifically designed to engage nontraditional defense contractors and accelerate the adoption of innovative technologies, OTs offer a highly flexible mechanism for structuring agreements that align with commercial business practices.

By **exempting some key regulatory requirements**, such as cost accounting system compliance and conventional intellectual property provisions, OTs reduce barriers to entry and facilitate broader participation from private sector innovators. Unlike standard procurement contracts, OTs are not subject to many of the statutory constraints typically governing federal acquisitions, including the

Competition in Contracting Act. This legal flexibility enables the tailoring of agreements to the specific needs of emerging technologies and diverse development models.

While OTs frequently rely on RDT&E funding, their use is **not limited** to this appropriation category. Agreements may be structured as fixed-price, expenditure-based, or hybrid models, depending on the nature of the project and its anticipated outcomes. This adaptability makes OTs particularly well suited for advancing defense innovation through rapid, mission-driven procurement.

Later stages of the capability lifecycle are beyond the focus of this analysis. In the Ukrainian context, many systems are deployed directly to the front line after testing and procurement, often used in combat before reaching any formal sustainment phase. In the U.S. context, technologies that advance beyond prototyping can enter further iteration cycles where every new procurement will be conducted as a market transaction or transition into traditional sustainment processes. Both stages are characterized more by incremental adjustments and bureaucratic management than by rapid innovation. As such, these phases offer little insight into the dynamics of commercial integration or agile acquisition, which are the central focus of this report.

DIMENSION 3: DIGITAL COMMUNICATION CHANNELS

Lessons Learned from Ukraine

1. **Digital platforms enable real-time collaboration between military users and commercial innovators.** Real-time communication between military end users and commercial innovators is essential for developing effective unmanned systems. Ukraine has demonstrated the importance of building dedicated digital platforms that enable frontline soldiers to interact directly with civilian engineers throughout the entire capability development lifecycle. These platforms—such as Brave1 and DOT-Chain—facilitate early-stage problem identification, feedback exchange during prototyping, and post-deployment assessments.
2. **Digitalization streamlines testing, procurement, and feedback cycles.** By digitizing traditionally paper-based processes, Ukraine has streamlined the cycle of testing, procuring, and refining commercial technologies, particularly in the drone sector. Online procurement marketplaces allow unit commanders to directly select and acquire unmanned systems based on immediate needs. At the same time, digital feedback and reporting mechanisms ensure that warfighters can quickly report performance issues, request improvements, and influence future procurement decisions.

The communication between commercial and defense worlds should go digital. It cannot be buried in paperwork or stalled by outdated rules. Soldiers on the front lines and engineers in hoodies need to be in real-time communication, solving urgent problems together. The future of defense depends on it.

Ukraine, having already made significant **success in digital governance**, has begun extending this approach to its military. While it has not yet established a unified system of a capability delivery, it has **launched initiatives** to address immediate communication needs through digital tools. If these initiatives are eventually integrated into a coherent digital infrastructure, Ukraine could get a sophisticated, agile capability development system grounded in direct communication between its armed forces and its industrial base. The following section explores some of these emerging initiatives in more detail.

The Brave1 platform, launched soon after the full-scale invasion, was initially designed to foster collaboration between defense sector institutions and the private technology industry. One of its most distinctive features is its use of open calls, challenges, and hackathons to collect solutions from innovators in response to urgent battlefield needs. In close coordination with the MOD and other agencies, Brave1 aggregates frontline requirements and communicates them to industry as requests for prototype submissions. Whether through formal challenges or open solicitations, the platform serves as a centralized channel through which multiple startups and early-stage companies can submit technologies for evaluation and potential testing.

Beyond its role in requirements communication, Brave1 also functions as a national-level technology scouting tool. According to representatives interviewed by CSIS, the platform is aware of approximately 85 percent of all defense technology products currently developed in Ukraine. As such, Brave1 effectively bridges the gap between military demand and industrial supply by facilitating early engagement of emerging defense companies and maintaining real-time visibility into the innovation landscape. It embodies the principles discussed earlier in this report: digitalizing requirements formulation, accelerating prototyping, and enabling a continuous, structured dialogue between the military and the commercial ecosystem.

For testing and evaluation purposes, Ukraine has developed institutional mechanisms to support rapid, end user–driven testing of defense technologies, with a strong emphasis on digitalization and operational relevance. One key initiative is **the Iron Range system**, which combines a newly established government-owned testing range with a fully digital application and evaluation process. The system replaces paper-based procedures and allows manufacturers to quickly and regularly access state testing infrastructure and technical expertise. This enables commercial companies to test their technologies, refine them, and get approved for limited operational use within weeks rather than years.

The MOD is also launching the DOT-Chain Defense weapons marketplace operated by the Defense Procurement Agency. The marketplace represents a groundbreaking shift in Ukraine's defense acquisition strategy, introducing a digital, decentralized system that empowers frontline units to select and procure the capabilities they need directly from domestic manufacturers. **Launched with a pilot** allocation of 1 billion UAH for 10 brigades of the Ukrainian Armed Forces, the system enables military units to independently order drones within their assigned budgets using a transparent digital platform.

Units can browse available systems, place real-time and preproduction orders, leave reviews, and submit maintenance requests—bringing consumer-style flexibility and feedback mechanisms into defense procurement.

On the supplier side, drone manufacturers upload product listings, update availability and production timelines, and deliver directly to the military, bypassing traditional intermediaries. The Defense Procurement Agency serves as the coordinating body, managing payments, monitoring deliveries, and analyzing user feedback to refine procurement and ensure accountability.

With over 80 domestic drone producers already applying and more than 400 UAV models proposed, DOT-Chain is quickly **becoming a central node** in Ukraine's wartime tech ecosystem.

Future plans include scaling the marketplace beyond drones to other weapon categories and integrating it with **Army+**, an app for digital services and reporting in the armed forces, to streamline logistics, maintenance, and frontline requests—further reinforcing Ukraine's agile, demand-driven model of defense innovation.

In addition to the marketplace, the ministry is developing a feature within Army+ to enable feedback collection on unmanned systems performance, the results from which will be shared with the manufacturer.

> *The urgency of conflict has acted both as a catalyst for rapid action and a constraint on long-term planning and institutional coherence.*

Ukraine has taken important steps toward building a digital ecosystem to support the integration of commercial technologies into its military arsenal. However, this progress has not emerged from a unified, top-down strategy, rather, it has resulted from a series of ad hoc initiatives aimed at closing communication gaps and resolving specific bottlenecks as they arose. Therefore, these efforts are fragmented, developed and managed by different government stakeholders, making coordination and integration into a single platform challenging. This fragmentation reflects the broader realities of wartime innovation: the urgency of conflict has acted both as a catalyst for rapid action and a constraint on long-term planning and institutional coherence.

Recommendations for the United States

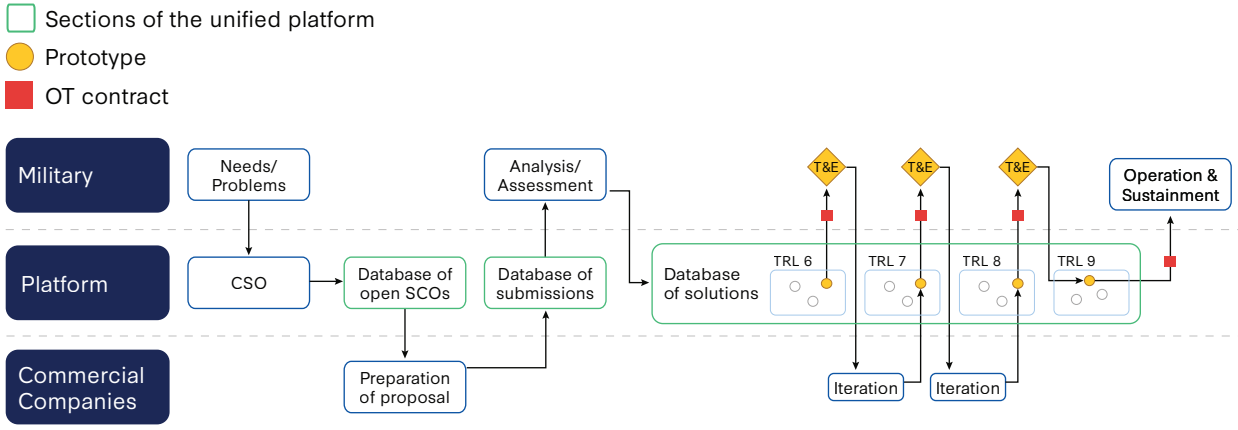
1. **Establish a unified digital platform for defense innovation that spans the full capability lifecycle.** The DOD should develop or adapt a single user-friendly platform that enables real-time communication, submission of proposals, testing coordination, and progress tracking across all branches and agencies. This system should communicate problem-based requests for technical solutions, allow both solicited and unsolicited submissions, store testing and performance data in a centralized, searchable repository, and connect military needs with existing commercial solutions using AI-enabled tools. It should also serve as a hub for industry engagement events and integrate current tools like **Digital OnRamp**, **Tradewinds**, and **Vulcan** into a coherent, streamlined interface.
2. **Mandate the use of this platform through formal policy and institutional incentives.** To ensure adoption, the DOD must implement a policy shift that requires the use of the unified digital platform for all commercial technology-related acquisition and communication. Without mandatory usage or alignment with success metrics, such tools risk becoming underutilized. Clear directives and institutional buy-in will be essential for building a genuinely connected innovation ecosystem across the military and the commercial sector. Incentives to motivate acquisition professionals and military personnel to use the platform could include integrating platform engagement into performance reviews, promotion criteria, and award recognitions.

Unlike Ukraine, which was forced to build digital solutions under the pressures of wartime urgency, the United States has the advantage of peacetime stability, and with it, the time and resources to design a unified digital system for collaboration with the commercial sector.

To ensure effective communication across the product development lifecycle and between the military and industry, the DOD should establish a single, modern digital platform with integrated communication channels, enabling real-time collaboration, information exchange between the industry and the military, as well as progress tracking. This platform, which could be newly developed or built upon existing systems, must serve the entire DOD and all services to prevent duplication of efforts and facilitate shared awareness of operational needs and available commercial solutions.

The platform should support the full capability development cycle for commercial technology and include several key functions. The basic workflow should function as shown in Figure 4.

Figure 4: Workflow Within a Single Digital Platform



Source: CSIS analysis.

First, after military end-user needs are collected and articulated as problem statements—with only minimal technical requirements such as interoperability standards—these solicitations (e.g., CSOs) should be published in a dedicated section of the platform.

Second, commercial companies should be required to register and maintain individual secure profiles through which they can submit proposals, track their progress, and maintain confidential communication with acquisition officials.

Third, all submitted solutions should be stored in a centralized database, updated in real time with each proposal's status and testing outcomes. This database must be accessible across the DOD, allowing acquisition professionals and end users to search existing submissions, evaluate prior testing results, and identify solutions that could satisfy new requirements without duplicating development efforts. Military users should be able to view solution specifications, integration histories, and feedback from other units to inform purchasing decisions.

Companies should likewise have visibility into their performance records with DOD customers, enabling them to build business pipelines based on demonstrated capability delivery. The platform should incorporate intelligent search functions, including AI-enabled matching tools, to connect military needs with existing solutions.

Fourth, companies should be able to independently register and present unsolicited solutions, broadening the pool of available technologies. These entries would be marked as "not yet tested" but would allow the DOD to quickly identify promising innovations for future pilot programs or evaluations.

Fifth, the platform should also centralize information about industry engagement events—such as industry days, hackathons, and technology challenges—facilitating broader participation from military units facing similar operational challenges and encouraging collective problem-solving efforts.

Ultimately, this platform would serve as a digital backbone for continuous communication between the military and the commercial sector across the entire product development lifecycle. It would reduce duplication, consolidate efforts and resources, and enhance coordination in areas such as training, logistics, and capability deployment, thus supporting broader doctrine, organization, training, materiel, leadership and education, personnel, and facilities—or **DOTMLPF**—integration and modernization efforts.

There are few initiatives in the DOD that partially align with the vision described above. These digital platforms are an effort to make it easier and faster for military organizations to connect with commercial technology providers. These tools help match military needs with innovative solutions from the private sector, streamlining the way new capabilities are discovered, tested, and acquired.

Digital OnRamp, built by the DIU, uses AI to match plain-language descriptions of defense needs with relevant commercial technologies. **Tradewinds Solutions Marketplace**, managed by the Chief Digital and Artificial Intelligence Office, offers a searchable library of vetted, ready-to-contract solution videos from industry and academia. **Vulcan**, sponsored by U.S. Special Operations Command, acts as a national security-focused scouting platform that helps identify and evaluate promising technologies. Together, these and other platforms represent a growing effort to modernize defense acquisition by opening the door to faster, more direct engagement with commercial innovators.

However, each of these platforms is seeing a limited use and has not yet become the go-to place where the military and industry communicate and work together. To change that, there needs to be a policy shift that requires communication and business processes to go through a single platform. People are rarely willing to change how they work unless it is either required or clearly tied to their success—so making the use of such a platform mandatory is key to building a truly connected and effective system.

Next Steps for the Department of Defense

1. **Adopt a commercial-first approach for acquiring unmanned systems—using these rapidly evolving technologies as a proving ground for broader acquisition reform.** These technologies are advancing fastest in the commercial sector, where innovation cycles are shorter and new capabilities emerge continuously. Given the strategic importance of AI and autonomy to future warfare, and the pace at which these technologies are being developed outside traditional defense channels, it is critical for the DOD to prioritize their acquisition directly from commercial providers. This will allow the military to test new acquisition models that can later be scaled across other capability areas.
2. **Establish a dedicated, flexible budget for unmanned systems that spans the full capability lifecycle without separation into colors of money and is not constrained by**

traditional appropriations. To accelerate the acquisition and fielding of unmanned systems, the DOD should create a separate budget line that can be used across research, development, procurement, and sustainment phases. This funding pool should be decoupled from rigid, predefined requirements and made readily available for acquiring mature, commercially developed technologies. By consolidating narrow budget categories into a larger mission-aligned fund, the DOD would gain the flexibility to quickly procure and iterate on unmanned systems based on evolving operational needs. This approach would reduce administrative delays, enable continuous upgrades, and reflect the real-world pace of technology development and battlefield demands.

3. **Organize funding for unmanned systems around broad mission areas, not narrow, preset requirements, to enable faster problem-solving and support commercial innovation.** This shift would allow military units to address real-time operational challenges by purchasing available commercial technologies rather than waiting for lengthy procurement cycles tied to outdated or overly specific requirements. By focusing on mission outcomes rather than predefined technical specifications, the DOD can more easily integrate nontraditional vendors, accelerate adoption of emerging capabilities like drones and AI systems, and create incentives for private sector R&D investment. This more flexible approach also ensures that acquisition aligns with the dynamic nature of modern conflict, where needs evolve rapidly and speed of adaptation can determine battlefield advantage.
4. **Create a separate acquisition track for unmanned systems that prioritizes off-the-shelf procurement at high maturity levels, distinct from conventional platforms multiyear acquisition.** Unlike conventional acquisition programs—which fund technology maturation and follow lengthy development and oversight processes—this commercial-first pathway would focus on procuring off-the-shelf or near-ready unmanned systems using a dedicated budget with readily available funds. This approach would enable rapid fielding of capabilities without waiting for traditional program timelines and allow the military to buy what it needs now, rather than investing years and resources into maturing technologies that already exist on the commercial market.
5. **Lower entry barriers for nontraditional vendors by removing noncritical security requirements in early testing and fielding of unmanned systems.** Excessive clearance and facility security demands—such as requiring personnel and production sites to meet strict security standards, cybersecurity checks, and components' origin control—pose a major obstacle for small startups, which often lack the resources to navigate this complex process. For companies with often fewer than ten employees, meeting these requirements can delay or block access to pilot opportunities altogether. Easing these constraints is a critical first step, such as piloting and testing, toward opening the defense market to commercial-first solutions and enabling faster testing and adoption of innovative technologies.
6. **Ensure rapid access to testing infrastructure and enable trials in conditions that closely replicate real operational environments.** Current processes in the United States often require six months to a year—or more—for companies to gain access to military testing ranges. This delay risks making technologies obsolete before they are even evaluated, especially in fast-moving fields like AI, autonomy, and electronic warfare. Moreover, existing U.S. testing environments are heavily constrained by domestic regulations, limiting the realism of trials. For example,

restrictions on frequency use and jamming often prevent the simulation of real-world threats, such as those involving non-GPS satellite systems like GLONASS. To address this, the DOD should either reform outdated regulatory barriers to enable more realistic domestic testing or consider outsourcing evaluation to allied nations like Ukraine, where battlefield-like conditions and relevant threats can be more accurately simulated.

7. **Shift cost evaluation approach from unit price to mission-based value, aligning more closely with the price-per-mission model used by Ukraine.** Rather than focusing solely on the upfront cost of individual platforms or systems, the DOD should assess the overall effectiveness and cost-efficiency of a technology in the context of its operational impact. Ukraine's experience demonstrates that low-cost, commercially available systems—such as FPV drones or AI-enabled platforms—can deliver disproportionate battlefield value when judged by their ability to complete specific missions rather than their unit cost. This shift in perspective encourages the adoption of agile, scalable, and often lower-cost solutions that may not meet traditional procurement benchmarks but offer significant advantages in real-world operations. By focusing on price per mission, the DOD can make smarter investments, reward functional performance, and accelerate the integration of commercially developed capabilities that deliver tangible impact on the battlefield.
8. **Create dedicated units within each service to help testing and evaluation of new technologies in real operational settings and by end users.** To make testing more effective and relevant, these activities should be done by the actual end users within the services. Organizations such as DIU are still seen as outsiders and do not control service-level budgets. Instead, the services themselves should set up permanent innovation units with access to flexible funding for commercial-first capabilities, allowing them to test commercial technologies, evaluate performance in real-world conditions, and buy what works directly and quickly.
9. **Train and test AI-enabled autonomy software for unmanned systems in operationally relevant environments to perform effectively.** For any AI system to work properly, it must be built on data that reflects the realities of its intended use. Autonomous unmanned systems need exposure to the actual terrain, enemy equipment, and countermeasures to navigate accurately and detect threats. Similarly, AI platforms designed for analyzing open-source intelligence must be able to recognize patterns, narratives, and behaviors specific to a country's language, media environment, and population. Without this contextual training, AI systems risk underperforming or producing misleading results in real-world operations.
10. **Build a unified digital platform to manage end-to-end collaboration with the commercial sector.** This platform should consolidate functions currently spread across multiple tools and enable military users to communicate their needs as operational problems to the industry and allow commercial companies to submit, track, and update their proposals through secure profiles. A shared, searchable database would ensure visibility into submitted solutions, testing outcomes, and prior integration results—helping avoid duplication and speeding up adoption. The platform should incorporate AI-enabled search to match military needs with relevant technologies. By establishing this digital backbone and making its use mandatory in acquisition from the commercial sector, the DOD can enhance coordination, improve acquisition efficiency, and support long-term modernization across the force.

Conclusion

The U.S. military is failing to leverage the full potential of the U.S. commercial sector—particularly in unmanned systems and AI-enabled software, where the U.S. technology companies are global leaders. As warfare becomes increasingly software-driven, AI will be central to enabling next-generation capabilities such as autonomous systems and unmanned platforms. These technologies are advancing rapidly in the commercial domain and must be integrated into defense acquisition.

To fully harness this potential, the DOD must make three critical changes: (1) create a separate budget which is not be tied to rigid requirements and line items for procuring, testing, fielding, and iterating commercial technologies at speed, (2) remove outdated and excessive security and classification barriers that currently exclude nontraditional vendors and favor only large defense contractors, and (3) build modern, digital communication channels that allow real-time collaboration between commercial innovators and military end users. Together, these steps would lay the foundation for a true commercial-first acquisition model capable of keeping the U.S. military on the leading edge of technological innovation.

Such a shift will take time, but there is precedent—the evolution of the U.S. space sector. For decades, NASA led a government-only model of space exploration and providing services for national security agencies. But over time, commercial companies like SpaceX, Maxar, and Planet Labs emerged and were given the opportunity—and funding—to demonstrate their value. Today, two parallel systems coexist, with the commercial sector proving to be not only cost-effective but often more agile and operationally capable. The DOD can take a similar path with unmanned systems, gradually integrating a commercial-first model alongside traditional acquisition and allowing results to speak for themselves.

The success of this approach in Ukraine lies in the dual-track systems that coexist alongside and complement one another. By embracing this shift, the department can not only unlock the full potential of U.S. innovation but also build a defense ecosystem that is better prepared for the demands of modern warfare. The time to act is now—while the United States still has the advantage of peace, unmatched technological leadership, and the resources to lead this transformation on its own terms. ■

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