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Tactical Overmatch by Design: Acquisition Engineering for Smart Warfare

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Tactical Overmatch by Design: Acquisition Engineering for Smart Warfare

Louis Libin—holds an MS in Electrical Engineering with a concentration in Physics from the Belfer Graduate School of Science and a BS in Electrical Engineering from Pacific Western University. Libin completed an optical communications graduate program at MIT. He completed the Executive Leadership Program at the Center for Homeland Defense and Security, at the U.S. Naval Postgraduate School. Libin has completed almost 30 military and defense-related course including the U.S. Army War College, USAWC Commandants, National Security Program.

Libin served as Chief Technology Officer at General Electric for 13 years and has since founded four technology-driven companies. He is the founder of Broad Comm, a firm specializing in international wireless development, defense spectrum management (public safety), and operational communications across global conflict zones and high-demand civilian environments.

Internationally recognized for his leadership in wireless and spectrum policy, Libin serves as a Special Rapporteur to the International Telecommunication Union (ITU) in Geneva on wireless standards. Domestically, he serves on the U.S. Secret Service Spectrum Committee and chairs the Wireless Coordination Committee for major U.S. political events, including national political conventions, Election Day operations, and Presidential Inaugurations.

Libin has designed and instructed numerous academic and professional development courses focused on the intersection of military strategy, spectrum theory, and emerging technologies. His teaching integrates core concepts of physics, wireless engineering, and asymmetric warfare, with a focus on service learning, team-based operational planning, and experiential analysis.

He has deployed to active conflict zones—including Ukraine and Gaza—in support of U.S. military missions, where he provided advisory expertise on military innovation, conducted field-based operational analysis, and documented the impact of emerging technologies on modern warfare for strategic assessment. [louislibin@broad-comm.com]

Abstract

The modern battlefield is evolving under the influence of rapid technological advances in wireless communications and drone systems. These systems are no longer just support tools—they form the core of tactical superiority. This paper proposes a unified framework for achieving tactical overmatch through deliberate acquisition engineering. Drawing on battlefield lessons from Ukraine and Israel-Gaza, it details the convergence of software-defined networks, loitering munitions, and autonomous targeting systems. The argument is built around the thesis that acquisition reform must be engineered for speed, modularity, and interoperability. Recommendations center on digital twin validation, AI assurance protocols, zero-based budgeting, and dynamic field feedback loops. Only by redesigning the acquisition process to reflect the speed of modern warfare can the Department of Defense guarantee dominance in future conflicts.

Keywords: Tactical dominance, wireless communications, UAS, loitering munitions, acquisition reform, interoperability, modular design, digital twin, cyber resilience, AI assurance

Introduction

The dynamic evolution of wireless communications and unmanned systems is reshaping modern combat. From Ukraine's drone swarms to Israel's seamless battlefield coordination, today's warfare demands smarter tools and faster integration. However, outdated acquisition practices inhibit rapid fielding of these technologies. This paper argues that the U.S. Department of Defense (DoD) must adopt an acquisition engineering model that integrates modularity, cyber resilience, and real-time field feedback. Tactical overmatch is not accidental, it is engineered.

The Tactical Value of Wireless Communications and Unmanned Systems

Ukraine and Israel-Gaza as Case Studies

Ukraine's use of decentralized drone swarms and Elon Musk's Starlink network has shown how flexible communication networks and low-cost drones can reshape a battlefield. Meanwhile, Israel has perfected the synchronization of loitering munitions and wireless targeting in dense urban environments, as seen during the 2023 Gaza conflict.

Converging Technologies

Tactical superiority now depends on integrating Loitering Munitions (LM), Unmanned Aerial Systems (UAS), and Tactical Mesh Networks. These systems generate terabytes of data, requiring robust and adaptive wireless architectures. The battlefield is becoming a live data ecosystem.

Table 1. Comparative Assessment of Tactical Tech Usage

Region	Technology Focus	Tactical Outcome
Ukraine	Starlink, DJI drones	Disrupted Russian command and logistics
Israel-Gaza	Loitering munitions, C4I	Rapid neutralization of high-value targets

Current Acquisition Gaps

Speed Deficiencies

The traditional Defense Acquisition System (DAS) cycle—Concept > Development > Testing > Procurement—takes 7–15 years. On today's battlefield, that's an eternity.

Cybersecurity Fragmentation

Platform-centric procurement often lacks integrated cybersecurity from the ground up. Systems are patched after deployment rather than designed for cyber resilience.

Interoperability Challenges

Vendors push proprietary interfaces. As a result, drones, radios, and artificial intelligence (AI) systems often fail to communicate across branches or with allies.

Acquisition Engineering for Tactical Overmatch

Digital Twin Environments

Digital twins allow real-time testing of equipment in simulated battlefield conditions. All systems should be tested against adversarial jamming, GPS spoofing, and denied environments.

Modular Open Systems Architecture

All acquisitions must meet modular open systems architecture (MOSA) standards. Interchangeable sensors, payloads, and control systems cut costs and speed up integration.

AI Assurance Protocols

Machine learning models used in targeting or threat analysis must undergo continuous adversarial testing. Explainability and bias detection are critical. The DoD should require formal AI red-teaming.

Cybersecurity by Design

Zero Trust Architecture and secure firmware updates must be embedded in design, not retrofitted post-fielding.

Human-System Integration Testing

New systems must undergo usability testing with real-world operators. Systems that overwhelm the user reduce battlefield efficiency.

Battlefield-Driven Procurement: A Feedback Loop Model

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[Field Ops] → [Data Capture] → [Dev/Test in Sim] → [Rapid Prototype] →
[Deploy] → [Field Ops] → …
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Figure 1. Smart Acquisition Feedback Loop

This loop minimizes bureaucracy while validating systems directly in operational environments.

Budgeting and Contract Reform

Zero-Based Budgeting

Zero-based budgeting (ZBB) ensures every program component is justified annually. No more “use it or lose it” spending.

Fast-Track for Mission-Critical Prototypes

Congress should authorize a permanent Other Transaction Authority (OTA) path for prototypes under $50 million linked to frontline utility.

Dual-Use Incentives

Companies building commercial 5G, IoT, or AI systems should receive DoD tax credits for modifying their products for military use.

Decentralized Procurement Cells

Empower units with their own procurement officers trained in acquisition engineering to address specific tactical needs.

Adaptive Contracting Models

Use outcome-based and rolling contracts that emphasize iterative deliveries and operational validation.

Table 2. Suggested Acquisition Metrics by Phase

Phase	Metric	Ideal Benchmark
Prototyping	Time to field	< 6 months
Integration	Interoperability Index	90%+ compatibility
Security	Penetration test pass rate	100% against known threats
Usability	Operator performance rating	90%+ satisfaction

Recommendations for Implementation

Create a Joint Tactical Engineering Office under the DoD to manage battlefield-tech acquisition

To streamline the integration and acquisition of advanced battlefield technologies, the DoD should establish a Joint Tactical Engineering Office (JTEO). This office would serve as a centralized hub to manage the development, testing, and deployment of battlefield technologies, ensuring that innovations from across the services are effectively synchronized. By centralizing expertise and oversight, the JTEO would reduce redundancy, enhance cross-branch collaboration, and ensure that all tactical systems meet the rigorous operational demands of the modern battlefield. This approach would facilitate faster decision-making, improve resource allocation, and ensure that new technologies are fielded in a timely manner.

Mandate MOSA compliance for all new tactical systems.

Mandating MOSA compliance for all new tactical systems would enable interoperability, flexibility, and scalability in the military's technology portfolio. By designing systems with open standards, the DoD can more easily integrate components from various manufacturers, ensuring that future upgrades and improvements can be made without replacing entire systems. This would foster innovation, reduce long-term costs, and allow for faster adaptation to evolving threats. MOSA compliance would also ensure that systems remain adaptable to future technologies, reducing the risk of obsolescence and enabling quicker responses to emerging battlefield needs.

Develop cross-branch digital twin simulation centers.

To enhance training and operational preparedness, the DoD should establish cross-branch digital twin simulation centers. These centers would use advanced simulation technologies to create virtual replicas of physical assets, systems, and battlefields, enabling real-time, data-driven analysis and testing of different scenarios. By allowing joint forces to simulate complex operations, cross-branch digital twin centers would foster interoperability, refine tactics, and optimize decision-making. They would also enable rapid testing of new technologies and systems before deployment, ensuring that innovations are field-tested in a virtual environment before they are introduced in the real world.

Adopt AI assurance protocols as part of milestone reviews.

As AI becomes an integral part of military operations, it is essential to incorporate AI assurance protocols into the DoD's acquisition milestone reviews. These protocols would ensure that AI-driven systems are rigorously tested for safety, reliability, and ethical compliance before being deployed. By embedding AI assurance into the acquisition process, the military can mitigate risks associated with autonomous systems and ensure that they function as intended in real-world conditions. This would build confidence in AI technologies while safeguarding against unintended consequences, ensuring that systems remain under human oversight and control.

Expand OTA use and ZBB-based budgeting models.

To accelerate the development and fielding of new technologies, the DoD should expand the use of OTAs and ZBB models. OTAs offer flexibility in acquiring innovative technologies by bypassing traditional acquisition processes, enabling faster collaboration with industry partners. Meanwhile, ZBB-based budgeting would require a fresh evaluation of each program's needs, ensuring that resources are allocated efficiently and aligned with the most urgent priorities. Together, OTAs and ZBB would enhance the DoD's ability to quickly adopt new technologies, adapt to changing priorities, and reduce waste in defense spending.

Require cyber threat modeling and mitigation prior to procurement.

Cybersecurity must be an integral part of the acquisition process for all new military systems. Requiring cyber threat modeling and mitigation strategies prior to procurement would ensure that potential vulnerabilities are identified and addressed before systems are deployed. This proactive approach would minimize the risk of cyberattacks, enhance the resilience of military technologies, and ensure that sensitive data remains protected. By incorporating cybersecurity considerations early in the acquisition process, the DoD can ensure that new systems are secure, reducing the likelihood of costly breaches and ensuring the integrity of critical military operations.

Incorporate usability testing and operator feedback into acquisition milestones.

The effectiveness of new tactical systems depends not only on their technical capabilities but also on their usability by the operators who rely on them in combat. Incorporating usability testing and operator feedback into acquisition milestones would ensure that systems are intuitive, user-friendly, and aligned with the needs of military personnel. Regular feedback loops throughout the development process would help identify and resolve operational challenges, improving system performance and reducing the likelihood of operational errors. This approach would prioritize the human element in technology design, ensuring that systems are not only advanced but also effective in the hands of soldiers.

H. Encourage industry-academic-military partnerships for tech transitions.

To facilitate the transition of cutting-edge technologies into military applications, the DoD should foster stronger partnerships between industry, academia, and the military. These collaborations would combine the innovative capacity of the private sector with the expertise of academic researchers and the operational experience of the military. By creating a more dynamic and collaborative ecosystem, the DoD can accelerate the development and deployment of next-generation technologies, while ensuring that these solutions meet the unique needs of military operations. These partnerships would also provide a continuous feedback loop that fosters ongoing innovation and ensures that military technologies remain at the forefront of global advancements.

Conclusion

The pathway to smart warfare lies not only in adopting new technologies but in engineering acquisition processes that foster tactical overmatch by design. Wireless communications and drone systems have proven their critical role in asymmetric warfare, yet they remain under-leveraged due to outdated acquisition models. With bold shifts—digital twins, modular open systems, cyber-secure platforms, and combat-ready prototyping—the DoD can transform procurement into a force multiplier. This engineering-first approach to acquisition ensures U.S. forces remain ahead of adversaries across every domain.

Disclaimer

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

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Acquisition Research Program
Department of Defense Management
Naval Postgraduate School
555 Dyer Road, Ingersoll Hall
Monterey, CA 93943

www.acquisitionresearch.net