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Beyond the JCIDS and the JROC:
Mission Engineering for Accelerated Operational Design

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Beyond the JCIDS and the JROC: Mission Engineering for Accelerated Operational Design

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His specialization in missile defense and acquisition activities began at the Missile Defense Agency, where he served as Deputy for Operational Concept Development for maritime ballistic missile defense. In this role, he acted as a bridge between engineers, international partners, and Joint U.S. operators translating missile defense requirements into Aegis Combat System maritime multi-mission operational reality.

He later designed and launched the University of Southern California and Missile Defense Advocacy Alliance's SHIELD Executive Education Program collaboration in 2021, in its fifth year continuing to inspire industry, government, and academic leaders to collaborate for outputs of actionable policy and acquisition solutions.

In his current position at Kitty Hawk Technologies, he strives daily to integrate operational insight, digital engineering experience, and acquisition understanding to develop mission-relevant capability for excellence in national security outcomes as a catalyst to growing small businesses. (DoDI 5000.97, 2023)

Stephen Lundberg—is a Mission Analyst at Kitty Hawk Technologies, supporting the Naval Surface Warfare Center Dahlgren Division with data driven assessments that inform system performance and mission suitability. He develops analytical metrics, participates in operational events to gather qualitative and quantitative insights, and works closely with prototype teams to resolve data issues and validate system integrity.

He applies a strong foundation in computational modeling, data analytics, mathematics, and statistics to large datasets, leveraging tools such as Python, R, and MATLAB to automate workflows and produce actionable analysis for fleet relevant systems.

Lundberg holds a BS in Computational Modeling and Data Analytics, with a minor in Mathematics, from Virginia Tech.

Abstract

The Department of Defense (DoD) faces a persistent gap between rapid commercial innovation and the slow, requirements-driven processes that historically shaped military capability development. Legacy frameworks such as the JCIDS and JROC often constrained the warfighter's influence, limiting their ability to shape the systems they ultimately rely on in operational environments. Their recent disestablishment and replacement by mission-driven constructs, including the Key Operational Problems framework and the Mission Engineering and Integration Activity (MEIA), signal a shift toward capability development that centers operational outcomes and restores the warfighter's role in defining them (Hegseth & Feinberg, 2025; Joint Staff J8, 2021).

Mission engineering provides the structure needed to realize this shift. By grounding capability development in executable mission threads and shared digital engineering environments, mission engineering creates a continuous feedback loop in which warfighter experience and operational learning directly inform architecture updates. This closes the long-standing disconnect between operators and designers and enables earlier system-level integration, virtual validation of operational effects, and faster iteration as threats evolve (Office of the Under Secretary of Defense for Research and Engineering, 2023).

Building on this foundation, the paper introduces Mission Thread Integration Leads (MTILs): engineering organizations responsible for assembling and integrating distributed emerging

technologies into coherent mission architectures before formal acquisition. MTILs complement MEIA's government-side mission engineering role by providing an industry mechanism for iterative experimentation, digital integration, and mission-thread-level maturation of capability driven by real operational needs (Hegseth & Feinberg, 2025).

By aligning the Department's new mission-driven governance structures with a warfighter-centered engineering approach, MTILs offer a practical path to close the integration gap and accelerate the transition from technological innovation to operational advantage. This paper outlines the policy, workforce, and digital infrastructure investments required to institutionalize this model and fully realize the DoD's transition from the JCIDS and JROC to MEIA (Hegseth & Feinberg, 2025; Joint Staff J8, 2021).

Problem Statement

Despite significant investment in innovation pathways, digital engineering initiatives, and rapid prototyping programs over the past decade, the Department of Defense (DoD) continues to face difficulty translating emerging technologies into operational capability at the pace required by modern conflict. The challenge is rarely the absence of promising technologies. Rather, it is the absence of mechanisms that integrate those technologies into coherent mission architectures early enough to inform operational design and acquisition decisions within increasingly complex multi domain operational environments (Office of the Under Secretary of Defense for Research and Engineering, 2023).

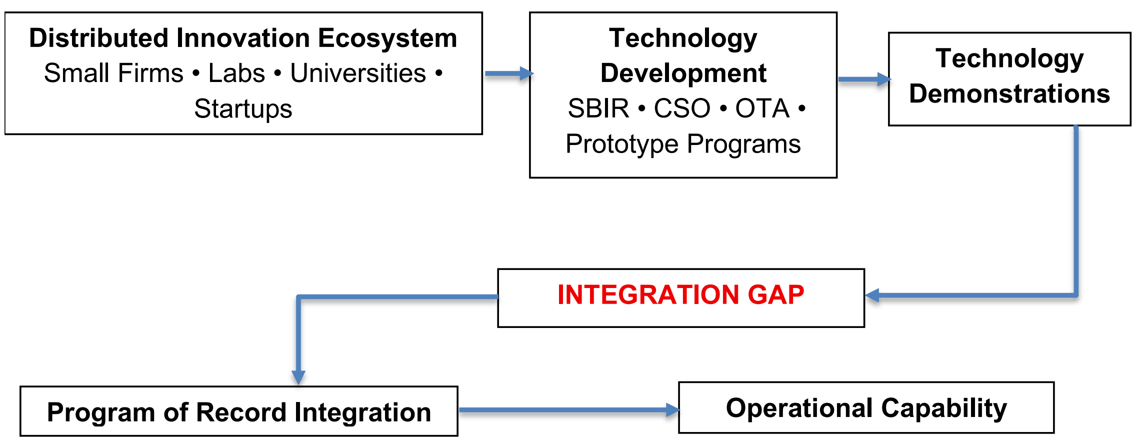

Figure 1. Innovation Integration Gap

Figure 1 illustrates that distributed innovation within the defense ecosystem frequently produces promising technologies, but integration into operational mission architectures typically occurs much later in the acquisition process.

Introduction

For more than two decades, the DoD has relied on requirements driven acquisition frameworks such as the Joint Capabilities Integration and Development System (JCIDS) and the Joint Requirements Oversight Council (JROC) to translate operational needs into military capability and, at times, fail to integrate emerging technologies in time to meet operational demands (Joint Staff J8, 2021). This framework, long criticized for adding more than 800 days to the capability approval cycle, has now been formally disestablished. In April 2025, President Trump signed Executive Order 14265, "Modernizing Defense Acquisitions and Spurring Innovation in the Defense Industrial Base," directing a comprehensive review of JCIDS with the aim of streamlining and accelerating acquisition. That review culminated in an August 2025 memorandum signed by Secretary of Defense Pete Hegseth and Deputy Secretary Steve Feinberg, titled “Reforming the Joint Requirements Process to Accelerate Fielding of Warfighting Capabilities,” which directed the immediate disestablishment of JCIDS and fundamentally redefined the JROC’s role. In its place, the Department has adopted a Key Operational Problems (KOP) framework, established a Requirements and Resourcing Alignment Board (RRAB), and directed the creation of a Mission Engineering and Integration Activity (MEIA), all oriented toward mission-driven, outcome-focused capability development at the speed of relevance (Hegseth & Feinberg, 2025; Joint Staff J8, 2021; Trump, 2025).

The JSIDS and JROC frameworks may have processes still relevant to some degree for large, complex acquisition programs that require deliberate development cycles and long-term investment. However, the operational and technological environment in which these processes were designed has changed significantly (Office of the Under Secretary of Defense for Acquisition and Sustainment, 2020). Today’s operational challenges increasingly depend on integrating many capabilities across platforms, networks, and domains rather than delivering improvements to individual systems alone.

Recent efforts to accelerate technology adoption through programs such as the Small Business Innovation Research program, Commercial Solutions Openings, and Other Transaction Authority agreements have expanded the Department’s access to innovation across the defense ecosystem. These mechanisms have significantly improved engagement with non-traditional vendors and emerging technology providers. However, they remain primarily structured to evaluate individual technologies rather than integrated mission architectures.

Mission Engineering

Mission engineering has emerged as a critical framework for bridging the gap between technology development and operational capability, particularly where JCIDS and JROC processes fall short. Rather than focusing solely on individual systems, mission engineering evaluates how systems interact within mission threads that represent operational activities involving platforms, networks, operators, and environments (Joint Staff J8, 2021).

Enabled by model-based systems engineering and the Department’s broader digital engineering initiatives, mission engineering allows organizations to explore system architectures earlier in development and evaluate operational effects before committing to formal programs of record (Office of the Deputy Assistant Secretary of Defense for Systems Engineering, 2018; Office of the Under Secretary of Defense for Research and Engineering, 2023).

The growing emphasis on shared digital environments and common data standards further enables collaborative development and integration across distributed engineering organizations (Defense Standardization Program Office, 2026). The DoD’s August 2025 memorandum formalizes this direction by establishing the MEIA, explicitly directed to conduct mission engineering analysis and engage industry through iterative experimentation. MEIA represents the institutional recognition that mission engineering is no longer an aspirational framework, it is now the Department’s designated replacement for the requirements architecture that JCIDS provided (Defense Standardization Program Office, 2026; Hegseth & Feinberg, 2025; Joint Staff J8, 2021).

The Integration Gap

The modern defense innovation ecosystem includes a wide range of organizations developing emerging technologies. Small engineering firms, research laboratories, universities, venture backed startups, and traditional defense contractors all contribute capabilities that may hold operational relevance.

These technologies are often developed independently and evaluated through isolated prototype programs. Without mechanisms to integrate these capabilities within mission architectures, their operational value can remain difficult to assess. Technologies may reach moderate levels of technical maturity while remaining disconnected from the operational systems in which they must ultimately function.

This phenomenon is often described as the gap between technology readiness and operational capability.

A deeper and less frequently examined dimension of this gap concerns the warfighter community's relationship to capability development after initial delivery. Under JCIDS, warfighter input was concentrated at the front end of the acquisition cycle, captured in Initial Capabilities Documents and Capability Development Documents, and then largely frozen as programs moved through Milestone B and C decisions. This design reflected the deliberate, linear nature of JCIDS: requirements were intended to be stable, not dynamic. The consequence was that operational experience accumulated after IOC and FOC had no formal pathway back into the system architecture. Warfighters learned from deployment. Systems did not (Joint Staff J8, 2021).

Mission engineering fundamentally changes this relationship. By structuring capability development around executable mission threads, digital representations of operational activities that can be updated as threat environments and operational concepts evolve, mission engineering can create a continuous feedback loop between the warfighter community and the engineering enterprise. Operational learnings discovered after initial fielding can be inserted back into the mission thread model, analyzed for architecture impact, and translated into iterative updates without requiring the initiation of a new formal requirements process. This creates a closed-loop learning architecture becoming not merely a technical convenience, but a structural shift in how the acquisition system relates to the people it is intended to serve.

Institutional Friction to Organizational Pathways

Although the DoD has established several mechanisms designed to accelerate adoption of emerging technologies, including SBIR programs, Commercial Solutions Openings, and Other Transaction Authority consortia, these pathways remain primarily structured to evaluate individual technologies or prototype efforts (Office of Investment and Innovation, 2023).

Proposals that emphasize mission level integration of multiple capabilities often fall outside the evaluation frameworks used in these programs. Engineering firms and capability providers frequently assemble teams designed to address operational problems through integrated capability demonstrations. In practice, however, these proposals are commonly evaluated as collections of individual technologies rather than mission integration efforts.

From the perspective of industry participants, the result can be a subtle form of institutional friction. Integration focused proposals may be submitted through traditional innovation pathways, yet the system does not always have mechanisms designed to evaluate or sponsor that type of activity.

Mission Thread Integration Leads

One approach to addressing this challenge is the concept of Mission Thread Integration Leads (MTILs).

An MTIL is an engineering organization designated to assemble and integrate distributed capabilities along an operational mission thread. Rather than delivering a single system, the

MTIL orchestrates an ecosystem of technology providers whose capabilities contribute to solving a specific operational problem.

In this model, the government defines the operational mission problem and provides experimentation environments in which potential solutions can be evaluated. The MTIL assembles a team of capability providers and integrates those technologies within a shared digital engineering environment (Office of the Under Secretary of Defense for Research and Engineering, 2023).

This integration function is already being explored in limited contexts by small engineering organizations that work across multiple capability providers to connect emerging technologies within operational mission threads. Firms with operational and systems engineering experience are increasingly positioned to perform this role by linking distributed innovation to mission architecture experimentation.

Through iterative experimentation cycles, the integrated architecture can evolve and demonstrate mission effectiveness before transition to formal acquisition programs.

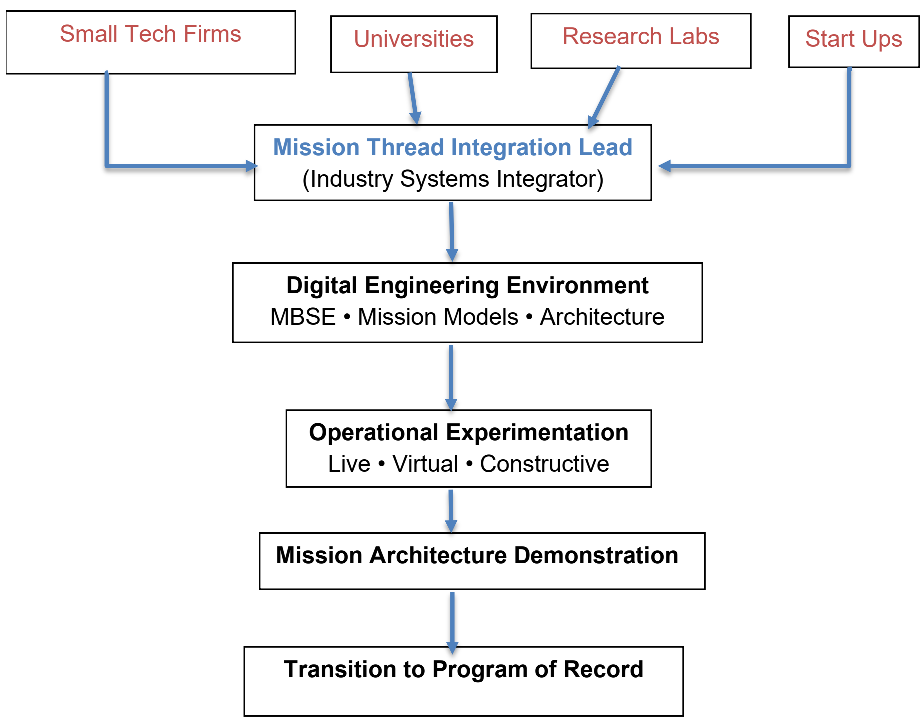

Figure 2. MTIL Concept

In Figure 2, the MTIL concept illustrates how an integration lead assembles distributed capabilities from multiple technology providers and integrates them through digital engineering and operational experimentation to produce mission architectures ready for acquisition transition (Office of the Under Secretary of Defense for Research and Engineering, 2023).

Operational Perspective

Having served in fleet operational roles and later in positions linking experimentation and capability development, the lead author has observed firsthand how promising technologies can struggle to transition into operational systems when integration occurs late in the development process.

Operational experimentation frequently reveals that the effectiveness of a capability depends less on the performance of individual systems than on how those systems interact within broader mission architectures. Mission engineering approaches that integrate technologies earlier in development therefore provide an opportunity to align innovation more directly with operational outcomes.

Implementing MTIL Within Existing Authorities and Processes

The MTIL concept can be implemented largely within existing Department of War (DoW) authorities. Mission focused solicitations could be issued by operational commands, warfare centers, or research organizations.

Rather than requesting individual technologies, these solicitations would define operational mission problems and invite organizations to serve as integration leads responsible for assembling ecosystems of complementary capabilities.

Existing contracting mechanisms including Other Transaction Authority agreements, Commercial Solutions Openings, and SBIR Phase III transitions already provide sufficient flexibility to support integration focused efforts.

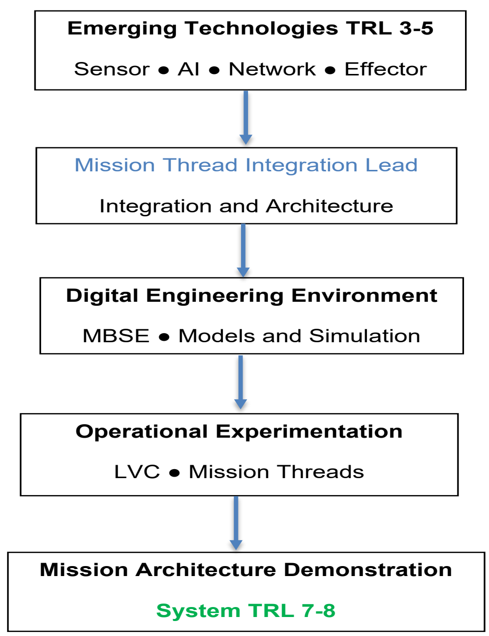

Figure 3. Technology TRL to System TRL Through Mission Thread Integration

Mission thread integration accelerates the maturation of individual technologies into system-level operational capability by integrating emerging capabilities through digital engineering and operational experimentation prior to formal acquisition programs.

Policy Implications: Institutionalizing Mission Threat Integration

If the DoW is to fully leverage the pace of commercial innovation while maintaining operational rigor, mechanisms must exist to integrate emerging technologies into mission architectures earlier in the capability development process.

The concept of MTILs offers one potential approach for addressing this challenge without requiring significant structural reform to existing acquisition authorities. Instead, it builds upon mechanisms already available within the Department's innovation ecosystem.

Operational commands, warfare centers, and research organizations could define mission focused integration challenges centered on specific operational problems. Integration leads would assemble teams of capability providers and integrate those technologies within shared digital engineering environments aligned to defined mission threads. This approach also creates a natural role for small business engineering firms to serve as integration leads, given their ability to operate across multiple capability providers and adapt to mission-focused problems sets (Office of the Under Secretary of Defense for Research and Engineering, 2023).

This approach allows the Department to evaluate mission architectures rather than individual technologies, enabling earlier insight into how emerging capabilities interact within operational contexts.

The August 2025 disestablishment of JCIDS and the creation of the MEIA now provide a formal institutional context for the approach described in this paper. MEIA is directed to conduct mission engineering analysis, coordinate experimentation campaigns, and engage industry early in the requirements process. Further, functions that align directly with the MTIL concept proposed here. MTILs should be understood not as an alternative to MEIA, but as a complementary industry-side construct: MEIA provides the government's mission engineering and integration function, while MTILs represent how industry can organize itself to respond to that function at mission-thread level. The synergy between the two creates the conditions necessary to close the integration gap described throughout this paper (Hegseth & Feinberg, 2025; Joint Staff J8, 2021).

To fully realize this potential, three reinforcing investments are required. First, on policy reform: the DoW should formally recognize the MTIL concept within MEIA implementation guidance, creating a solicitation pathway that invites industry to compete as integration leads organized around Key Operational Problems rather than individual system requirements. Second, on workforce development, the Department must grow a cadre of mission engineers who can think across platforms, domains, and mission threads, not solely within the boundaries of a single program office. Mission engineering is a discipline, and it requires deliberate cultivation through professional military education, defense acquisition workforce programs, and industry partnerships. Third, regarding digital infrastructure, shared mission thread environments, federated digital twin architectures, and common data standards are the technical foundation that makes iterative, closed-loop capability development possible. Investment in these shared environments is not overhead, it is the enabling infrastructure for the acquisition speed (Hegseth & Feinberg, 2025).

Conclusion

The DoW has built a robust ecosystem for generating technological innovation. The next step is building mechanisms capable of integrating that innovation into operational capability.

MTILs provide one approach for connecting distributed innovation, mission engineering, and operational experimentation. By integrating emerging technologies along mission threads earlier in development, the Department can accelerate the transition from technological innovation to operational advantage in increasingly complex multi-domain operational environments.

The views expressed in this paper are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, the Department of War, or the United States Government or our Industry Employer.

References

Defense Standardization Program Office. (2026). *Digital standards strategy*. Department of War.

Hegseth, P., & Feinberg, S. (2025). *Reforming the joint requirements process to accelerate fielding of warfighting capabilities*. Department of Defense.

Joint Staff J-8. (2021). *Manual for the operation of the joint capabilities integration and development system*. Joint Chiefs of Staff.

Office of the Under Secretary of Defense for Acquisition and Sustainment. (2020). *DoD Instruction 5000.02: Operation of the adaptive acquisition framework*. Department of Defense.

Office of the Under Secretary of Defense for Acquisition and Sustainment. (2025). *Acquisition transformation strategy*. Department of War.

Office of the Under Secretary of Defense for Research and Engineering. (2023). *DoD Instruction 5000.97: Digital Engineering*. Department of Defense.

Office of Investment and Innovation. (2023). *Small business innovation research and small business technology transfer program policy directive*. U.S. Small Business Administration.

Office of the Deputy Assistant Secretary of Defense for Systems Engineering. (2018). *Digital engineering strategy*. Department of Defense.

Trump, D. J. (2025). Executive Order 14265: *Modernizing defense acquisitions and spurring innovation in the defense industrial base*.

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