THE MUCA TRANSITION

Defense-industrial complex and its impending re-alignment with the emerging character of war

Global – Q3/2026

August 2026

Background

We regularly reach out to leading businesses and try to understand their orientations, concerns and interests.

This document presents an outcome of a similar assessment conducted over 2025/26 with a focus on how the theatre of war is evolving and how MUCA led industrial mis-alignment is creating challenges that need to be overcome.

Management Summary

- Warfare is moving through a third structural transition. Platform-centric warfare concentrated combat power in expensive aircraft, ships, vehicles and missile systems; network-centric warfare then connected those assets through sensors, communications and command networks. **MUCA—Munitions, Unmanned systems, Cyber and Artificial Intelligence**—shifts the centre of gravity again, from the platform toward the adaptive mission network. Combat effectiveness increasingly depends on how quickly forces can sense, decide, strike, disrupt and regenerate across distributed systems rather than on the standalone sophistication of individual platforms.
- MUCA also changes the economics of military power by weakening the traditional relationship between asset cost and battlefield effect. Relatively inexpensive UAVs[1], decoys, cyber tools and precision munitions can locate, constrain or threaten systems costing multiples more. The offence-defence equation is especially problematic: low-cost attacks can compel high-cost defensive responses. This raises a fundamental procurement question: what is the real value of an expensive platform once the full cost of protecting and sustaining it is included?
- The battlespace is simultaneously becoming broader and more systemic. Strategic targets increasingly extend beyond military formations to the national systems that sustain warfighting capacity and political resilience, including energy grids, telecommunications, data infrastructure, ports, food logistics, water, healthcare, finance and public perception. Local tactical actions can therefore create national or international consequences by disrupting essential services, trade flows, confidence or alliance cohesion. Modern warfare is increasingly a contest between national operating systems, making resilience, redundancy, recovery speed and information credibility as important to strategic endurance as conventional military inventory.
- The institutional problem is that the three principal actors in the war effort—the user, the procurement agency and the OEM—operate at different speeds. Users confront threats that can evolve in weeks; procurement processes are often measured in years; and traditional OEMs are structured around long engineering, certification and production cycles. As technology cycles shorten below procurement cycles, users receive solutions late, expensively or in forms already overtaken by operational need. Proprietary architectures, long-term liabilities and limited use of modular COTS[2] systems further widen this gap.
- The defence-industrial base therefore faces a structural rather than cyclical challenge. Traditional primes and Tier 1 suppliers have sunk capital into shipyards, aircraft plants, vehicle lines, specialised tooling and sustainment businesses linked to long-life platforms, while future value is increasingly migrating toward autonomy, unmanned systems, AI, counter-UAS, cyber, resilient communications and modular architectures. Incumbents still possess scale, engineering expertise and customer access, but these advantages can erode quickly if capital remains trapped in legacy models. The winning strategy is to use today's legacy cash flows to build, acquire or control tomorrow's MUCA categories before order books begin to weaken.

MUCA—Munitions, Unmanned systems, Cyber and Artificial Intelligence

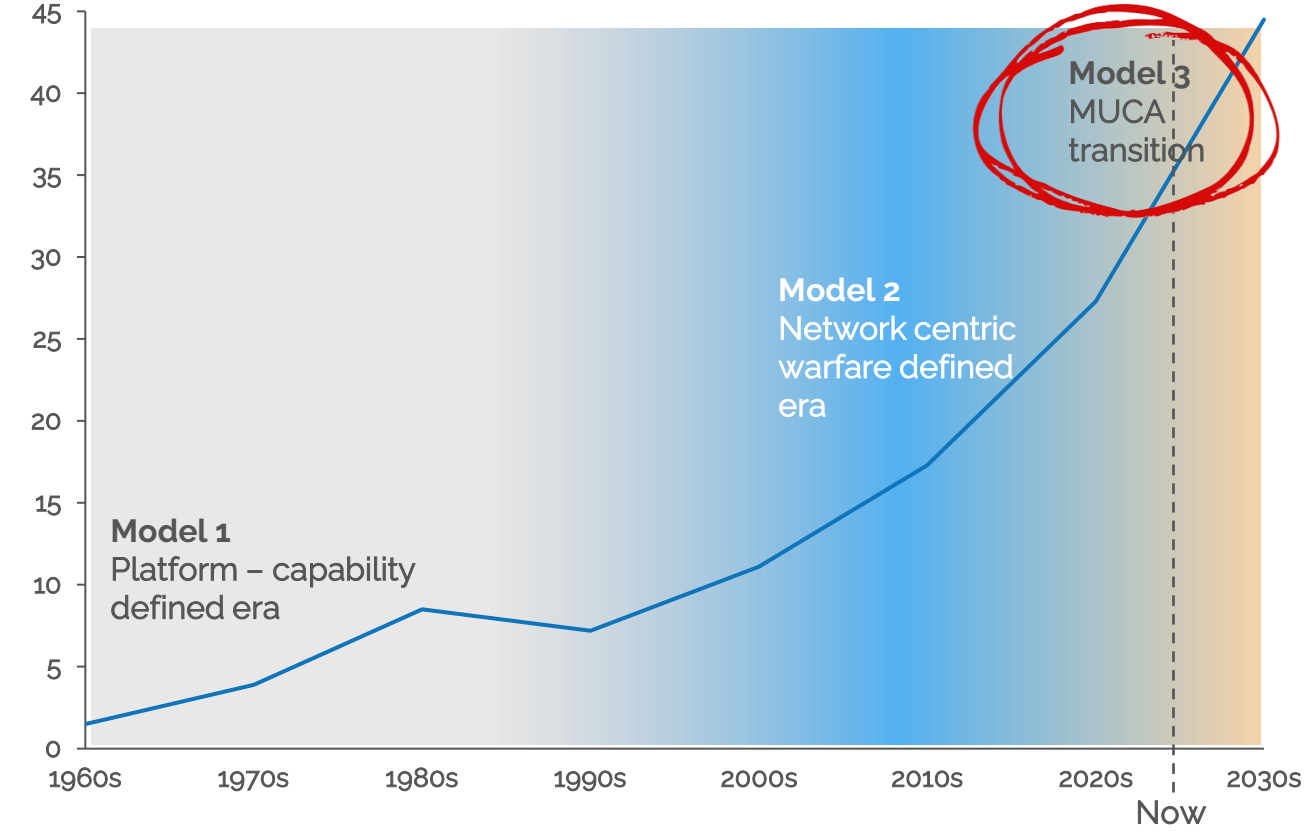
> **Legacy OEMs need rapid capability and capital realignment, before MUCA shifts value elsewhere and a new set of players define the market play.**

[1] UAV- Unmanned Aerial Systems, [2] COTS- Commercially-off-the-shelf

Sources : Industry estimates, Stonesbury Research

The nature of war is shifting to its third economic model in the last 6 decades – the shift is architectural, economic and industrial

Fig 1. Decadal global spend on Defense (USD Tn,, based on decadal markers)



Sources : 1960s–1970s: U.S. Arms Control and Disarmament Agency / U.S. Department of State, World Military Expenditures and Arms Transfers (WMEAT)..1988 onward: SIPRI Military Expenditure Database, Descrepancy may arise for limited reporting on defense spends of China and the Soviet Union/Russia in the past. .2030E: Stonesbury estimate

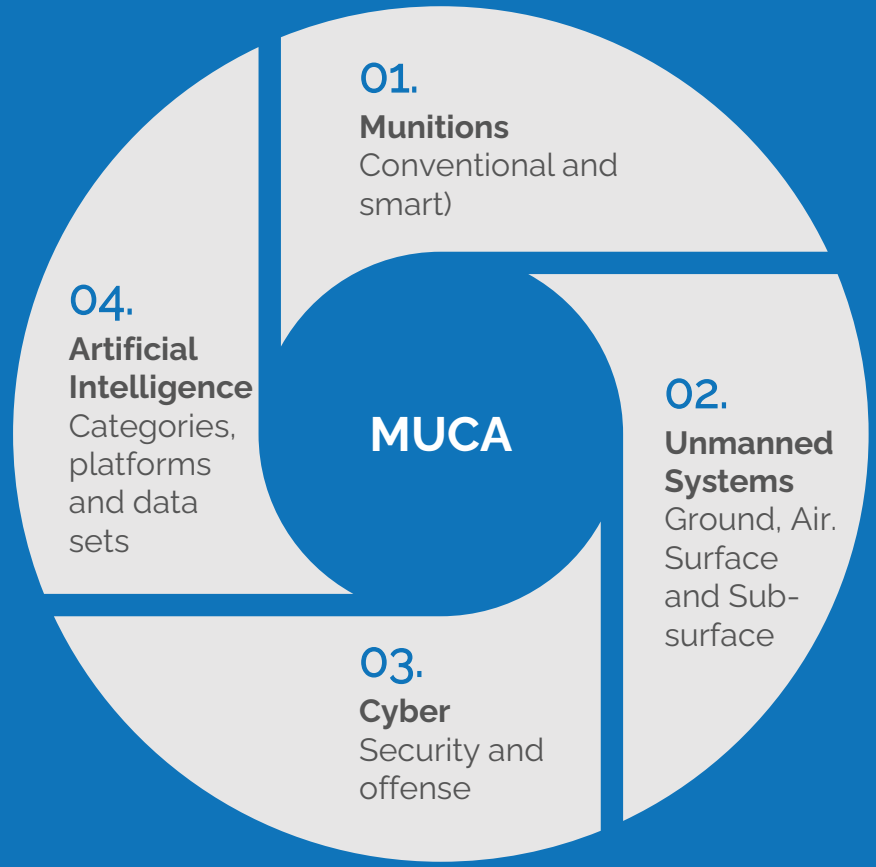
- Modern warfare is entering a third operating model. The platform-centric era concentrated combat power in expensive ships, aircraft, tanks and missile systems; network-centric warfare then connected those assets through sensors, communications and command systems, multiplying the effectiveness of each platform. MUCA—Munitions, Unmanned systems, Cyber and Artificial Intelligence—moves the centre of gravity again: from the connected platform to the adaptive mission network. In this model, inexpensive sensors can find targets, unmanned systems can distribute surveillance and strike, AI can accelerate analysis and allocation, cyber can disrupt the opponent's decision architecture, and munitions deliver the final effect.
- Ukraine's procurement trajectory illustrates the scale shift: more than 1.5 million UAVs were procured by government agencies in 2024, while the defence ministry planned approximately 4.5 million FPV UAVs in 2025. The U.S. Air Force is simultaneously pursuing a different version of the same logic through Collaborative Combat Aircraft, separating air vehicles from continuously competing autonomy software. The change is therefore not "more UAVs." It is a redesign of where combat power resides, how quickly capability can change, and how mass can be generated. MUCA makes warfare more distributed, software-intensive, adaptive and increasingly asymmetric. The shift is architectural, economic and increasingly industrial too.

MUCA – The emerging system of warfare : A primer

MUCA is a framework for understanding how military power is shifting away from dependence on a small number of expensive platforms toward a distributed, software-enabled and rapidly adaptable combat architecture.

1. Munitions provide scalable kinetic and non-kinetic effects
2. Unmanned systems distribute sensing, strike, logistics and deception
3. Cyber attacks and protects the digital and physical infrastructure on which modern forces depend;
4. AI accelerates sensing, analysis, targeting, decision support & resource allocation.

MUCA integrated effect = Munitions × Unmanned × Cyber × AI × Integration × Resilience × Regeneration



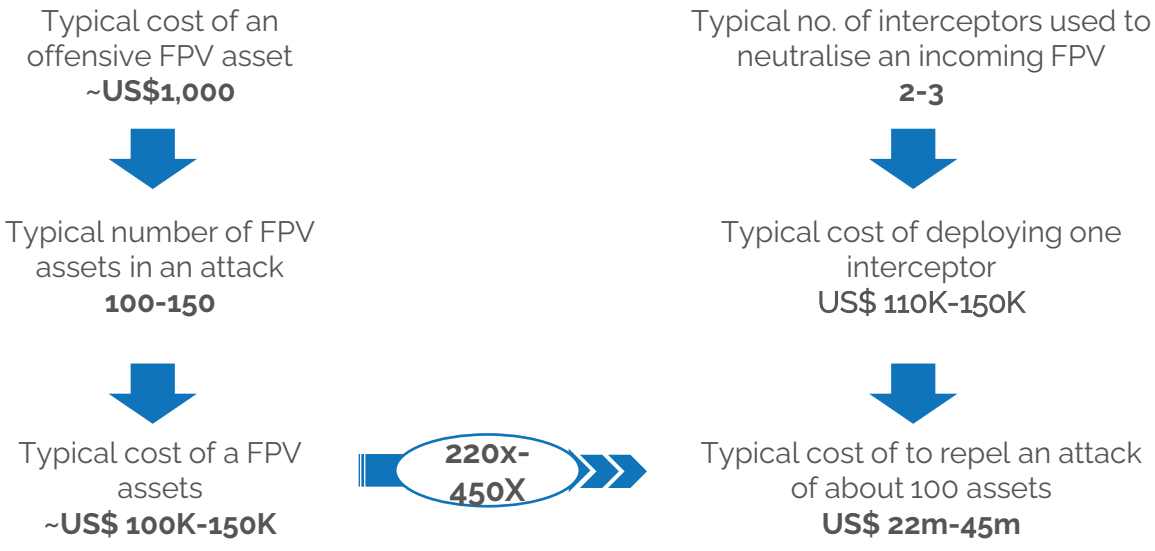
This transition is different - it delinks economic cost of a platform to effectiveness; thereby distorting offense-defense cost equation

- MUCA breaks the historic link between asset cost and military effect. As low-cost systems can neutralise the economics of expensive platforms. A high-value aircraft, ship, radar or armoured platform no longer needs to be attacked by an equivalently expensive system. It can be detected, tracked, deceived, saturated or destroyed by networks of inexpensive sensors, UAVs and precision munitions. This changes the procurement question fundamentally. The relevant metric is no longer simply platform performance, but the total cost required to keep that platform survivable, connected and operational against increasingly cheap, distributed threats. Thus, the offence-defence exchange is also becoming economically unsustainable.
- The asymmetry is even more pronounced on the defence side of the equation. A small UAV costing only thousands or tens of thousands of dollars can force a defender to fire multiple interceptors or missiles costing hundreds of thousands or even millions of dollars each. The attacker therefore imposes cost even when the UAV is successfully destroyed. Repeated at scale, this creates an unfavourable exchange ratio in which the defender consumes expensive munitions, radar capacity, crews and readiness simply to defeat low-cost threats, turning successful defence into a potentially losing economic proposition.

Traditional model
High-cost offensive capability backed by high-cost defensive platforms

MUCA model
Low-cost offensive capability that triggers a high-cost defensive response

Fig 2: MUCA driven distortion in cost equation of Offense-Defense



Sources : Industry estimates, Stonesbury Research

This plays out in the backdrop of MUCA driven accelerated extension of the battlefield to much beyond the contact zone

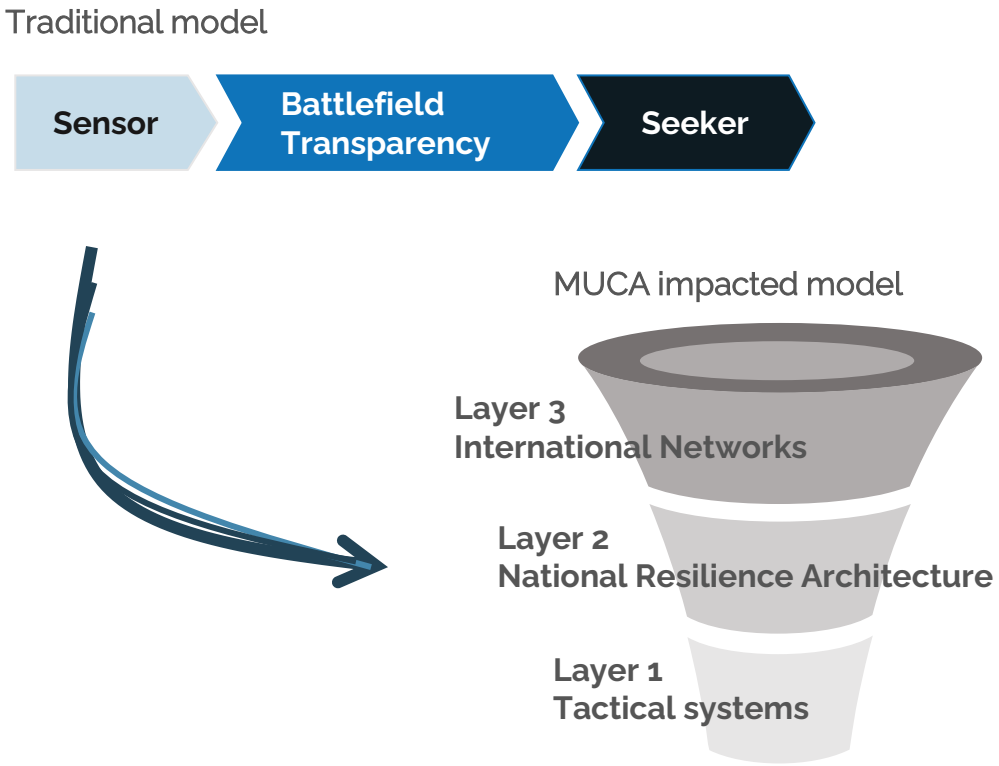


Fig 3: MUCA driven battlefield pivot and extension

Sources : Industry estimates, Stonesbury Research

- MUCA expands the battlespace well beyond the physical contact zone because modern states increasingly fight through interconnected military, civilian and commercial systems. Combat effectiveness is no longer determined only by what happens at the tactical edge. Power generation, communications, logistics, cloud infrastructure, financial networks, satellite services and information flows all contribute directly to a state's ability to mobilise, sustain operations and maintain political cohesion. In a MUCA environment, disruption of these systems can generate strategic effects without requiring the destruction of large military formations.
- The resultant battlefield includes all traditional segments like civil infrastructure (including energy grids, communications backbones, water and food supplies, transport infrastructure, data centres and even healthcare and education facilities).. Todays MUCA influenced battlefield also includes satellite and terrestrial data networks, public perception, internet and AI driven commerce infrastructure and even political processes. Increasingly that leads to blurring of targets between military and civil objects.
- The architecture of warfare is therefore migrating from a traditional sensor–seeker–effector model toward a three-layer battlespace. The first layer comprises local tactical systems: sensors, unmanned systems, electronic warfare, munitions and battlefield command networks. The second comprises national resilience systems: energy, logistics, communications, healthcare, finance, food, water, government and industrial capacity. The third comprises international networks: satellite constellations, subsea cables, cloud providers, financial clearing systems, shipping routes, commodity markets, software ecosystems and global information platforms. Military power increasingly depends on the ability to operate across, protect and recover all three layers.

This is amplified by shortening technology cycles of MUCA platforms – thereby creating a mismatch in demand-supply

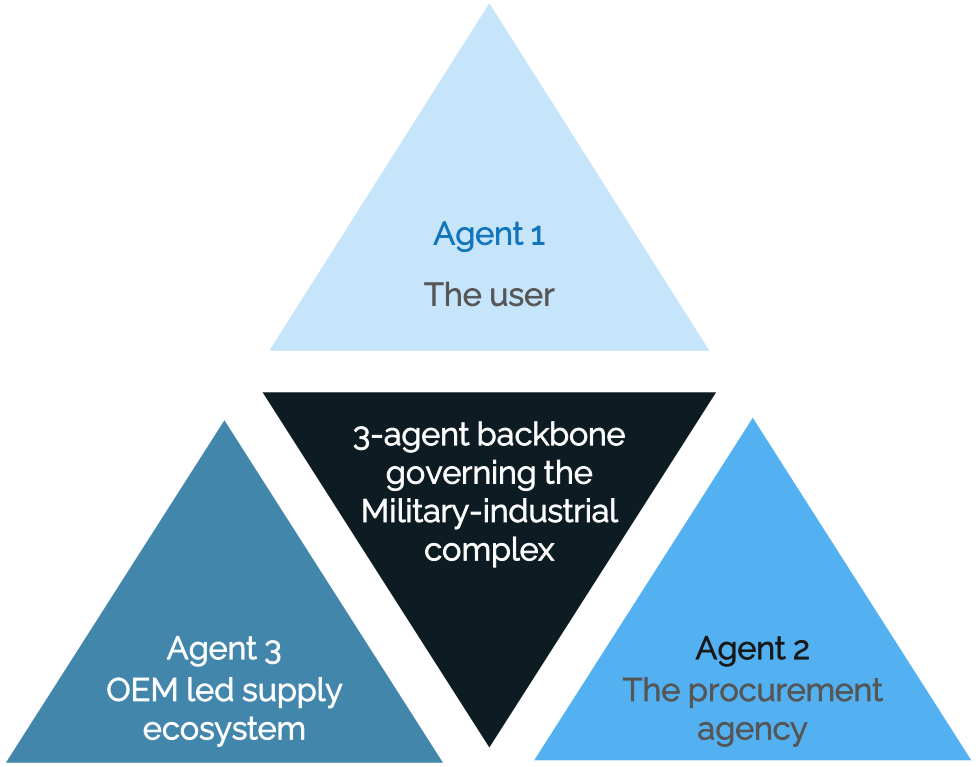


Fig 5: The now failing 3-agent framework

- The institutional problem is that the war effort depends on three agents operating at radically different speeds: the user, the procurement agency and the delivery organisation or the OEM. Their roles can be understood as follows:-
  - The user experiences threats and tactical adaptation almost continuously;
  - Procurement translates those needs into requirements, budgets, competitions and contracts;
  - OEMs engineer, certify and manufacture the response.
- This architecture worked when technology cycles were longer than procurement cycles.
- However, in many MUCA categories the relationship has reversed. U.S. Army officials now describe UAV threats as evolving weekly while traditional counter-UAV acquisition pipelines have historically been measured in years. GAO found that major U.S. defence acquisition programmes averaged about twelve years to initial capability in 2025. The mismatch is compounded by four constraints: institutions often misunderstand the new cost-per-effect economics; budgets are tied to long-term liabilities; proprietary defence architectures inhibit component substitution; and commercial off-the-shelf technology is not integrated quickly enough. Open architectures, COTS components, right-to-repair, additive manufacturing and digital design can compress this cycle. U.S. defence demonstrations have shown some parts moving from lead times of eighteen months or more to production in weeks using additive manufacturing. The required model is therefore not faster procurement alone, but continuous user-procurement-industry iteration loops.

Sources : Industry estimates, Stonesbury Research

This results in a fundamental challenge in linking the three agents together to deliver a stable solution from traditional sources

MUCA amplifies the reasons for the break-down of the current system by making

1. **Technology cycle < procurement cycle** – Significant shortening of the technology cycle creates risks in programmes for requirements being technically relevant whilst procurement lasts
2. **Legacy cost-per-platform economics** – MUCA redefines the cost-per-effect economics for platforms worsening the case and effectiveness of legacy platforms; in an era of economic uncertainty this becomes a key determinant.
3. There is a natural resistance to OEMs who have over the past decades worked to **exhaust the national budgets**, preferably by committed long-term platform liabilities
4. Lastly, a historical **preference for proprietary technology architectures**, especially when seen in contrast with MUCA platforms which are largely made with Lego block COTS (commercially-off-the-shelf) architectures.

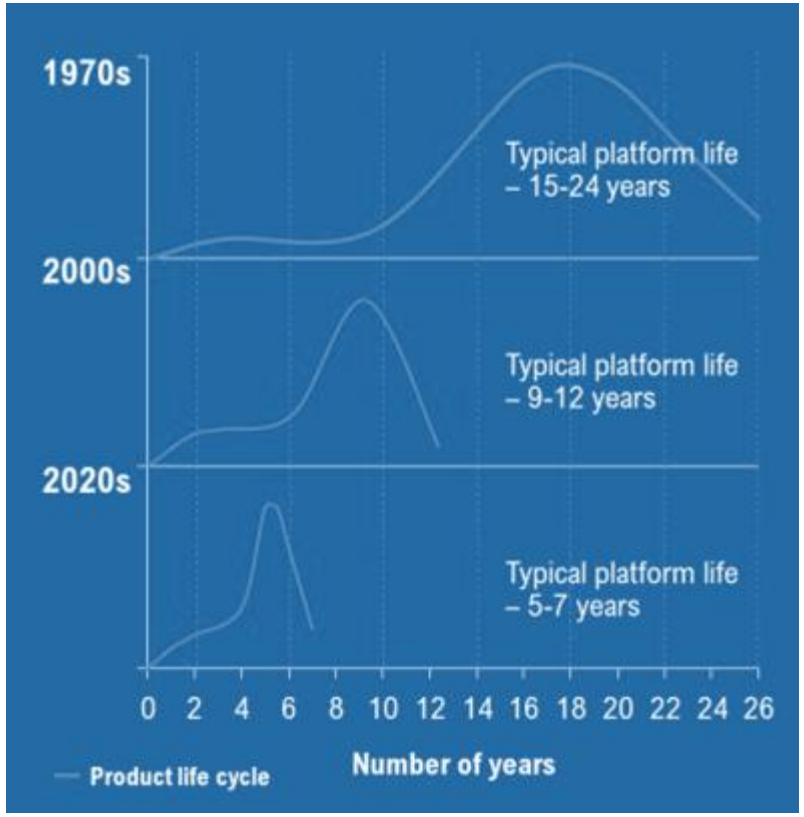


Fig 5: MUCA platform driven distortion of technology vs. procurement

Activity	Observed / reference cycle	Implication
MUCA platform threat evolution	**Weekly**	Operational requirements can change continuously
Traditional threat neutralisation capex acquisition	**Measured in years**	Procurement can never have a stabilised set of technological requirements and even if it does, it risks delivering yesterday's solution

Sources : Industry estimates, Stonesbury Research

In a MUCA world, A&D OEMs & suppliers face a trifecta of choices to execute; leading to an uncomfortable question for investors

Approach 1 - Own the MUCA architecture

- OEMs and suppliers can aim to be the integrator connecting legacy platforms to Munitions, Unmanned, Cyber and AI. – This approach is less disruptive but time and effort intensive approach that requires companies to own and excel on multiple technology generations across platforms

Approach 2 - Own a MUCA category

- OEMs and suppliers could try to dominate autonomy, propulsion, sensors, munitions, AI, networking or any another critical MUCA layer. – This approach is disruptive but allows players to start from a clean sheet and build platform agnostic approach

Approach 3 – Defend the legacy platform

- OEMs and suppliers can pursue a 'sunset strategy' by continuing to extract returns from existing programs while risking progressive migration of value elsewhere. – Least disruptive approach but runs a near certain risk of faster than planned business obsolescence

For MUCA, a ten-year order book does not necessarily imply a ten-year strategic franchise. Therefore, the critical questions for management and investors become:-

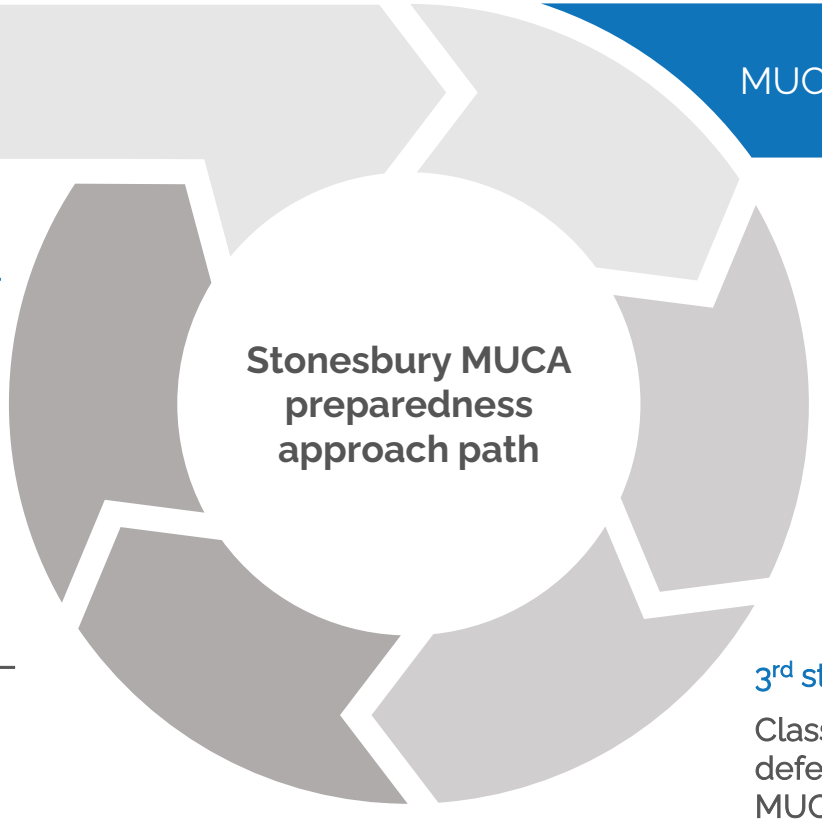
Is there going to be a real business in near term or will my legacy business evaporate, and is legacy free cash flow being used to defend the old architecture—or to acquire, build and own the new one?

Sources : Industry estimates, Stonesbury Research

OEMs & suppliers need to plan a step-by-step approach to being ready for this MUCA challenge; we can assist you on this journey

Traditional way of doing busness

MUCA transition ready business



1st step – Define and diagnose exposure –

Assess revenue, backlog and committed capex tied to legacy platforms.

2nd step - Map MUCA opportunity pools

Identify addressable categories: autonomy, drones, counter-UAS, AI, EW, cyber, resilient comms, munitions, additive manufacturing.

For each : Identify total, accessible and addressable opportunity

3rd step – Redesign portfolio

Classify platforms, technologies and competencies into defend, repurpose, acquire, partner or exit considering the MUCA value chain and profit pools

4th step – Build transition roadmap

Define for both transitional state as well as final state – Quantum of capital for redeployment, M&A targets, Incubation and excubation priorities, partnerships, product pivots and operating-model changes.

5th step – Generate a MUCA execution dashboard with early warning capability and multiple on and off-ramps

Track MUCA revenue share, cycle time, modularity, supplier resilience and capex migration whilst simultaneously tracking new threats thereby creating a fluid response mechanism – Build organizational fluidity to operationalize this.

Sources : Industry estimates, Stonesbury Research

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