GRAIL ALLIANCE

DEFENCE 3.0

INNOVATE FASTER, SCALE QUICKER, DO IT CHEAPER

A new paradigm to deter, defend, fight and win in modern conflict

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EXECUTIVE SUMMARY

A paradigm shift in modern conflict has taken place. If Defence 1.0 was defined by large standing armies held at readiness, Defence 2.0 was characterised by high-end, exquisite and expensive capabilities delivering precision strike, exemplified by the air campaign of the first Gulf War. That model has now been overtaken. When a $500 Ukrainian drone destroyed a $4.5 million Russian T-90 tank, it demonstrated a fundamental change in the economics of warfare. Defence 3.0 has emerged: an era in which advantage belongs to those who innovate fastest, scale quickest and deliver capability at the lowest cost.

Defence 3.0 therefore requires a fundamental reorganisation of how capability is developed and scaled not only in technology but across bureaucracy, process and culture. In wartime, it enables battle-winning capability to reach the frontline at the speed of relevance. In peacetime, it strengthens deterrence while supporting economic resilience, offering a more efficient and fiscally sustainable model than its predecessors. While the centre of effort shifts from the tactical edge to the industrial base, success remains defined by the needs of the warfighter and depends on timely, quantifiable feedback from frontline to factory.

This shift reflects a broader transformation in how modern systems innovate. The battlefield, like any leading centre of technological advancement, is driven by data and enabled by AI. Delivering a comparable transformation in defence therefore requires not only the adoption of dual-use technologies, but also the reform of processes across bureaucracy, decision-making and delivery models. Yet while the pace of technological change now far exceeds the cycle times of traditional defence acquisition, the structures, incentives and processes governing how capability is fielded remain rooted in a post-Cold War paradigm.

Closing this gap will require a fundamental rethink of how the UK and its allies conceive, procure and sustain military capability. The challenges this presents in terms of innovating faster, scaling more efficiently and reducing cost while cutting through complexity are not new. They have already been addressed at scale in the commercial sector. The task now is to apply these lessons to defence in practice.

This paper introduces GRAIL (Generative Real-time Artificial Intelligence Lethality) as the digital infrastructure required to operationalise Defence 3.0. GRAIL enables capability to be developed in hours rather than years, unlocks latent manufacturing capacity across sectors, and creates a metrics-driven marketplace that improves performance while reducing cost. By measuring what matters, from raw material extraction to battlefield effect, and embedding a continuous feedback loop from frontline to factory, it aligns operational demand directly with industrial supply.

The priority now is to move from concept to implementation. Tiberius Aerospace therefore recommends that the UK Government and industry act with urgency in three areas: first, launch a rapid UK proof-of-concept pilot in munitions acquisition to demonstrate Defence 3.0 in practice; second, work with European allies to develop a coordinated multinational approach; and third, build a broad coalition of support through the GRAIL Alliance, an ecosystem uniting suppliers across Europe, to accelerate innovation, scale production and strengthen industrial resilience.

DEFENCE ACQUISITION AS A STRATEGIC FUNCTION

The war in Ukraine has exposed a fundamental weakness at the heart of UK and allied defence: acquisition systems are no longer delivering capability at the speed, scale or cost required for modern conflict. What was once treated as an administrative function has become a decisive component of deterrence itself. The ability to translate operational need into fielded capability, quickly, reliably and at scale, is now a core determinant of military advantage.

In this context, defence acquisition can no longer sit at the periphery of strategy. It must instead be understood as one of its central instruments. Systems that fail to deliver capability at pace do not merely generate inefficiency; they weaken deterrence, constrain industrial mobilisation and deter private capital from entering the sector. Conversely, systems that align military demand, industrial capacity and financial confidence can generate sustained strategic advantage.

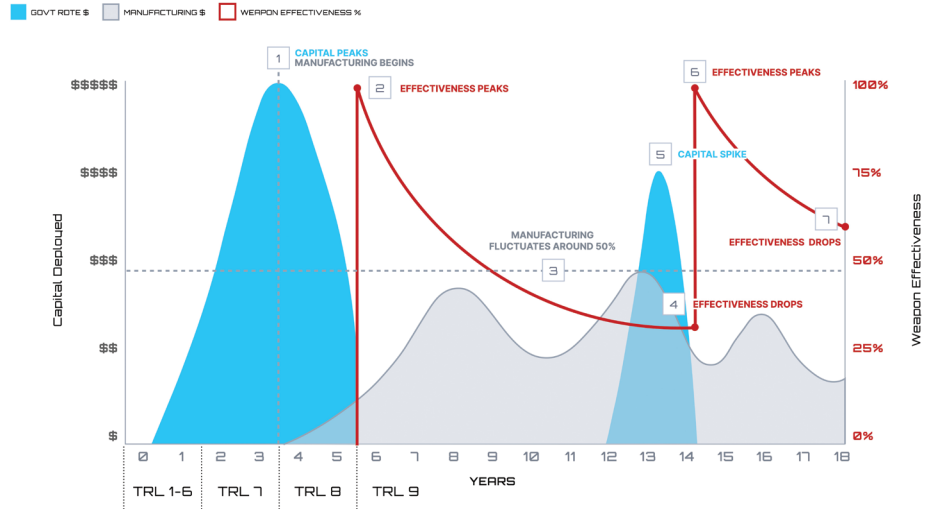
This paper argues for a fundamental shift in how defence acquisition is conceived and executed. It introduces Defence 3.0 as a theory of winning in modern conflict, defined by the ability to innovate faster, scale more effectively and do so more cheaply than the adversary. It presents GRAIL (Generative Real-time Artificial Intelligence Lethality) as the enabling digital infrastructure through which this model can be made operational.

DEFENCE ACQUISITION UNDER STRAIN

The UK's defence acquisition system is being pulled in two opposing directions. On the one hand, it carries the legacy of procurement practices shaped over decades by institutional complexity, procedural assurance and a deeply embedded aversion to risk. On the other, it faces a strategic environment in which agility, adaptability and industrial resilience are no longer desirable attributes, but essential conditions for deterrence.

Recent scrutiny, including the 2025 Strategic Defence Review and parliamentary oversight, has made clear that the system is struggling to reconcile these competing demands. Procurement timelines remain misaligned with the pace of technological change, barriers to entry continue to limit participation by new and innovative suppliers, and the link between operational need and contracted capability remains weak. The result is a system that too often delivers late, at excessive cost and with limited adaptability once fielded.

Legacy Defence Procurement Dynamics



This graph exposes a core flaw in traditional defence procurement. Investment is front-loaded, production lags, and effectiveness declines quickly as threats evolve leaving capital, capability and performance out of sync. In modern conflict, this means forces are fielding systems already being outpaced. Closing this gap requires a model that links frontline demand directly to industrial supply enabling continuous upgrade, rapid scaling and sustained advantage.

The consequences are both operational and financial. The Ministry of Defence is managing an equipment plan valued at £288.6 billion while simultaneously carrying a £16.9 billion affordability gap. At the same time, the changing character of warfare is exposing increasingly unfavourable cost-exchange ratios, in which low-cost systems can defeat or degrade capabilities that are orders of magnitude more expensive. In such an environment, inefficiency is not merely wasteful; it is strategically dangerous.

High-profile programme failures, including the suspension of the Ajax armoured vehicle programme after significant expenditure, have brought these issues into sharp relief. Yet they are symptomatic rather than exceptional. They point to a deeper structural problem: a system optimised for control and assurance rather than for speed, adaptability and delivery.

Although recent reforms, including the establishment of a National Armaments Director and initiatives such as Commercial X and the Defence Tech Scaler, represent meaningful progress, they remain constrained by the underlying structures and incentives of the existing system. Incremental reform, while necessary, is unlikely to deliver the scale of transformation now required.

THE EMERGENCE OF DEFENCE 3.0

To understand the scale of the required change, it is useful to consider how defence acquisition has evolved. Earlier models of procurement were shaped by the strategic and technological conditions of their time. Defence 1.0 reflected the demands of industrial-age warfare, in which the central challenge was the mobilisation of mass: raising large forces and equipping them at scale. Defence 2.0, which emerged during the Cold War and reached its most visible expression in the Gulf War, marked a shift towards precision, technical superiority and the acquisition of highly sophisticated platforms through long-cycle procurement processes.

How Defence Acquisition Has Evolved



TODAY, UK ACQUISITION REMAINS STRUCTURALLY DEFENCE 2.0 IN A DEFENCE 3.0 WORLD.

Today, however, a new paradigm has emerged. Defence 3.0 is defined not by mass alone, nor by precision alone, but by the interplay of speed, scale and cost. It is enabled by the widespread availability of commercial technologies, the growing centrality of software, and the compression of development cycles. Its logic is captured in the now-familiar image of a low-cost drone destroying a high-value armoured platform. The significance of this moment lies not only in its symbolism, but in what it reveals about the changing character of warfare: the erosion of the assumption that advantage can be secured through exquisite capability alone.

In this new environment, mass still matters and high-end capability retains its importance. But neither can remain the organising principle of the system. Instead, advantage accrues to those who can iterate rapidly, scale production efficiently and impose costs on the adversary at a favourable ratio. Defence 3.0 therefore represents not simply a technological shift, but a systemic one, requiring a reorganisation of how capability is conceived, developed and delivered.

DEFENCE 3.0 AS A THEORY OF WINNING

At its core, Defence 3.0 reframes acquisition as a continuous learning system centred on operational effect.

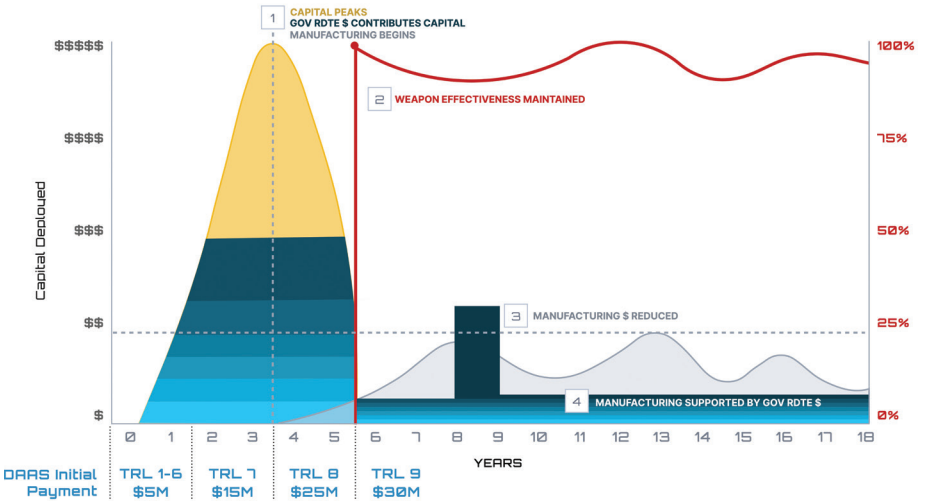
Traditional procurement models are linear, moving sequentially from requirement definition to design, production and eventual deployment. In contrast, Defence 3.0 replaces this with an iterative cycle in which capability is continuously refined in response to real-world performance:

Frontline → Data → Analysis → Design → Production → Deployment → Frontline

This feedback loop links the frontline directly to the industrial base. Operational experience generates data, which is analysed to inform design improvements, which are then rapidly manufactured, deployed and tested again in operational conditions. The system is therefore not static, but adaptive and capable of learning and evolving at pace.

Within this model, procurement is no longer governed primarily by compliance with predefined requirements, but by evidence of operational effect. Capability is defined not by what it is intended to do, but by what it demonstrably achieves. This shift has profound implications. It requires open architectures that allow components to be substituted and upgraded, modular designs that enable incremental improvement, and commercial models that support continuous delivery rather than one-off acquisition.

DAAS Procurement Dynamics



This graph illustrates how a Defence-as-a-Service (DaaS) model aligns capital, production and performance. Investment is staged and shared, peaking closer to deployment, while manufacturing scales dynamically in response to demand. Crucially, weapon effectiveness is maintained through continuous upgrade and iteration, rather than declining after fielding. The result is a system where capital is deployed at the right time, production matches need and capability improves in use.

The result is a system that can observe its own performance and adjust accordingly. In such a system, speed of learning becomes as important as speed of production, and the distinction between development and deployment begins to dissolve.

THE INDUSTRIAL BASE AS THE CENTRE OF GRAVITY

One of the most significant implications of Defence 3.0 is the shift in emphasis from the tactical edge to the industrial base. In earlier models of warfare, advantage was often determined primarily by battlefield performance. In the current environment, however, it is increasingly determined by the ability to generate, adapt and sustain capability over time.

This places the industrial base at the centre of gravity. The capacity to mobilise production rapidly, scale manufacturing across sectors and integrate commercial and defence supply chains becomes critical. It also requires the ability to attract private capital, which depends on the predictability and credibility of demand.

Unlocking latent manufacturing capacity across both defence and civilian industries is therefore essential. This is not simply a question of resilience, but of strategic advantage illustrated by initiatives such as Brave1 in Ukraine and the UK's expansion of aircraft production during the Battle of Britain. A system that can draw on a broad and flexible industrial base will be better able to respond to shocks, adapt to changing requirements and sustain operations over prolonged periods.

At the same time, this model aligns defence more closely with national prosperity. By creating the conditions for sustained industrial activity and private investment, Defence 3.0 offers a pathway to economic as well as military strength.

LEARNING FROM COMMERCIAL INNOVATION

The challenges posed by Defence 3.0 are not unique to defence. They have already been addressed, in different forms, within the commercial technology ecosystem.

High-growth companies operate through rapid iteration, continuous user feedback and capital efficiency. They function in environments where speed is a competitive advantage and where the ability to adapt quickly determines success or failure. There are clear lessons here for defence: the value of developing minimum viable capability, the importance of integrating user feedback into development cycles, and the benefits of fostering competitive ecosystems in which multiple suppliers can contribute to innovation.

Adopting these approaches requires more than the incorporation of dual-use technologies. It requires the adoption of dual-use processes and organisational models, including faster decision-making cycles, data-driven performance measurement and new forms of collaboration between government and industry.

GRAIL: ENABLING DEFENCE 3.0

GRAIL (Generative Real-time Artificial Intelligence Lethality) is conceived as the digital infrastructure through which Defence 3.0 can be operationalised.

It provides a shared, secure environment in which government, industry and military users can collaborate around a common understanding of operational effect. Within this environment, lethality is treated as

a measurable output rather than an abstract objective. Data from operational use is captured and analysed in real time, enabling continuous assessment of performance. This, in turn, informs the design and refinement of capability, allowing systems to evolve rapidly in response to evidence.

GRAIL also functions as a marketplace, bringing together a wide range of suppliers from across the defence and commercial sectors. By federating this ecosystem within a single framework, it enables greater competition at the early stages of capability development, while allowing prime contractors to focus on integration and scaling.

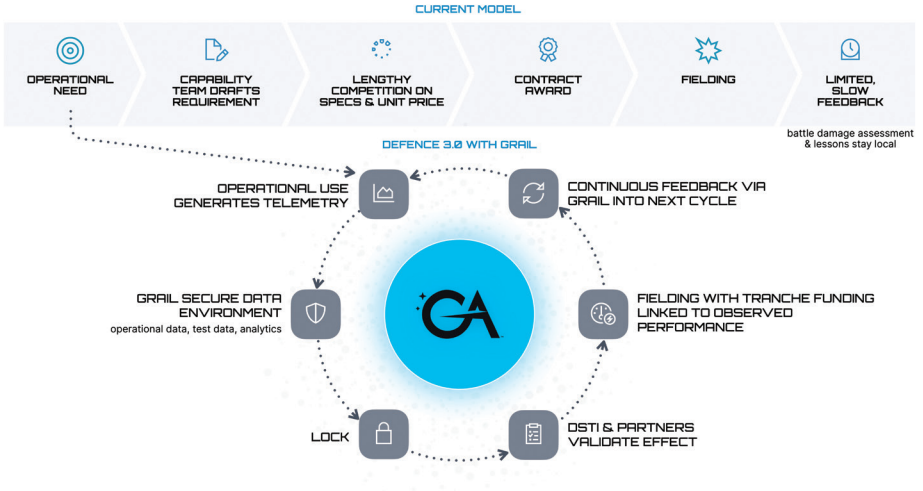
In doing so, it transforms acquisition from a closed and sequential process into an open, data-driven system. Decisions are informed by evidence rather than assumption, and capability development becomes a continuous process of optimisation.

A PRACTICAL APPLICATION: MUNITIONS ACQUISITION

The munitions domain provides a clear and immediate illustration of how a Defence 3.0 acquisition model can operate in practice. The Strategic Defence Review's £6 billion commitment to munitions, including a £1.5 billion "always-on" pipeline, creates the conditions for a more continuous, outcome-led approach to capability generation under the emerging Defence Industrial Strategy.

Under a Defence 3.0 model, military users would generate operational requirements directly, feeding them into a shared, secure data environment owned and assured by the Ministry of Defence. Within this environment, operational feedback, test data and analytical insight would be continuously captured and assessed. Defence scientists, working alongside external partners where appropriate, would translate this evidence into validated judgments of performance and operational effect.

UK Munitions Acquisition: Today vs. Defence 3.0



Capability Sponsors would then update requirements dynamically, informed by real-world performance rather than inherited assumptions. Commercial teams would structure competitions around validated outcomes - for example, achieving a defined effect below a specified cost-per-shot threshold rather than prescribing fixed technical solutions. This shifts the focus of procurement from inputs to measurable outputs.

Suppliers would be able to compete across multiple stages of the lifecycle. Early-stage innovation would be opened to a wider ecosystem, including spinouts, specialist firms, academic institutions and manufacturing SMEs, rather than being confined to subcontracting roles after prime selection. Prime contractors would compete on integration,

delivery and scaling. Funding would be released incrementally, linked to demonstrated performance, while security controls would be applied proportionately across the system rather than through blanket programme-level restrictions.

The result is a system grounded in transparent and auditable evidence. Each procurement decision is linked to operational effect, creating a continuous learning loop between frontline use and industrial production. In this model, acquisition moves from episodic delivery to continuous optimisation capable of identifying rapidly what should be scaled, what should be improved and what should be discontinued.

IMPLEMENTATION: THE LONDON AGENDA

This white paper is published in advance of the London Defence Conference 2026 (10–11 April), at which Tiberius Aerospace will present Defence 3.0 and GRAIL as a practical blueprint for reform. The immediate priority is to translate theory into practice.

This begins with a UK-based proof-of-concept pilot focused on munitions acquisition, designed to demonstrate operational value, establish assurance frameworks and build institutional confidence.

At the same time, Defence 3.0 should be advanced as a multinational initiative. The challenges it addresses, from lethality measurement and industrial resilience to capability development at scale, are shared across NATO. The UK has a clear opportunity to lead the development of a common approach, working with European allies and frameworks such as the Joint Expeditionary Force.

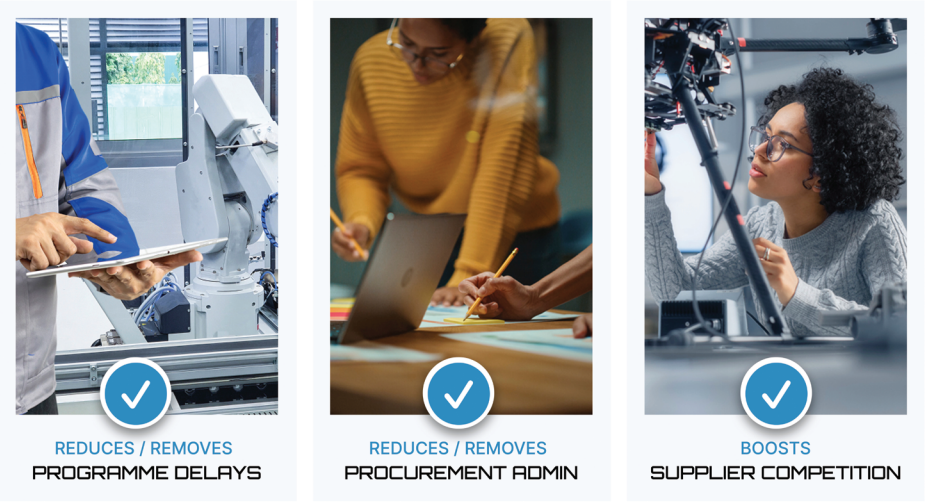
Finally, the success of Defence 3.0 will depend on the strength of the ecosystem that supports it. The GRAIL Alliance brings together defence suppliers, technology firms, industrial partners and investors to contribute evidence, shape standards and build a community of practice around more adaptive acquisition.

CONCLUSION: A STRATEGIC OPPORTUNITY

If the UK and its allies are serious about rearmament, industrial resilience and deterrence, defence acquisition must be reconstituted as a strategic function organised around learning, operational effect and the mobilisation of industrial capacity.

Defence 3.0 provides the doctrine for how to win in this environment: advantage will accrue to those who innovate faster, scale more effectively and deliver capability at lower cost. GRAIL provides the means to deliver that doctrine in practice.

The Scale of Opportunity



The opportunity now is not simply to reform procurement, but to redefine it establishing a new multinational model for how capability is conceived, measured and delivered. If seized, this will not only strengthen deterrence, but also unlock sustained industrial growth and attract the private capital required to support it.

This white paper is intended as a starting point. Tiberius Aerospace invites engagement from government, industry and the wider defence innovation ecosystem to refine, test and implement this model, moving from concept to capability at the speed that modern conflict demands.



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