Ministry of Defence

Land Industrial Strategy

Fusing our capability and industrial objectives

Contents

Foreword

At a critical juncture for European security the Army is undertaking its most significant modernisation in a generation. The Army will be designed to operate on a continuous basis, able to field all the relevant capabilities for this era of constant competition and be persistently engaged around the globe, supporting our partners, and deterring our adversaries. Crucially, its warfighting capability will be transformed to make it an expeditionary fighting force that is both readily deployable and lethal when called upon to fight and win.

The war in Ukraine underscores the importance of delivering this modernisation at best speed. Our forces must be equipped with the technology and tools they require to defend the nation's interests against our adversaries. That is why in the integrated review we chose to increase our spending on Army equipment and support to £41.3bn this decade. With this investment, we intend to deliver a core nucleus of digitised capabilities – Challenger III, BOXER, AJAX and Apache – as well as new dismounted equipment, long-range fires, air defences, drones, electronic warfare, and cyber capabilities. These are all underpinned by a digital backbone providing modern, cohesive, secure communications across a multi-domain network.

History has taught us though, that threats and opportunities continuously evolve. Our forces must, therefore, be able to adapt the tactics and technology they employ to retain their edge. We are learning daily from the war in Ukraine. Our teams are working tirelessly to understand the consequence of those lessons for the UK. As the implications become sharper in focus, we stand ready to evolve our plans, if that is what the analysis demands. Our Defence industry has a key role to play in modernising our forces, sustaining them on operations, and evolving their capabilities to face the most contemporary of threats.

We have long thought this way in shipbuilding and combat air and now is the time to expand our approach. Last year, we published the Defence and Security Industrial Strategy (DSIS) setting out the framework for greater integration. It recognised the growing importance of operational independence in the Land sector, as well as the social value that investment here can bring to the UK. This Land Industrial Strategy (LIS) draws on DSIS principles to provide, for the first time, a specific strategy for the sector. It sets the conditions for a long-term collaborative approach based on shared culture and behaviours that support co-investment in capability delivery and innovation, while building the national industrial readiness and resilience the UK needs to respond to crisis.

At its heart, the LIS seeks to advance equipment onto the frontline more quickly than we have previously managed. We recognise that we must learn to not wait endlessly for 'gold plated perfection' and have the courage to take decisions earlier and bring good equipment into service. Key platforms will serve for decades, so we will focus on open physical, electronic and digital architectures, on commonality and modularity, and on working with industry to integrate iterative upgrades through-life. To get ahead of our adversaries, we will install a more integrated programme of innovation, research and experimentation. This will leverage the £6.6bn of R&D investment set out in the Integrated Review, to seek out 'game changing' combinations

of tactics and technologies. We will embrace the opportunities offered by artificial intelligence, automation and human-machine teaming, as well as new technologies such as directed energy weapons, drone swarms, electric propulsion, and systemic protection systems. Given the dual-use nature of many of these technologies, we are prepared to work across the private sector to pursue new concepts and ideas.

Critically though, the LIS also recognises the longer-term consequences and social value that Defence's investment can unleash. Today's land industrial base directly supports at least 10,000 jobs across the United Kingdom. This strategy makes manifest our commitment to partnerships with industry and create a stronger pipeline of investment in Land equipment and support. This will offer greater opportunity for technology providers and supply chains across the UK and allow us to collectively co-develop the high-end skills we need now and in the future. Our ambition is for land programmes to contribute at least 20% to social value policy outcomes and we will invite industry to demonstrate how they can leverage our investment to strengthen the union, level-up the nation, contribute to our Net Zero targets and bounce back better post COVID 19. As we strengthen our onshore industrial base, we are also signalling our readiness to collaborate internationally. We recognise that international partnering and inward investment can offer the most effective way to secure the technology, supply chains, and interoperability we need at an affordable through life cost. Indeed, our industrial prowess can supplement that of our allies and partners. It makes the UK a more attractive and powerful partner that can add even more to the strength and resilience of our alliances, most critically NATO.

Implementing the LIS starts now, and it marks a decisive period for Defence in the UK. I look forward to government, industry, and our international partners working together to turn this vision into reality. Together we can deliver a more lethal and expeditionary Army, stronger alliances and partnerships, and a more prosperous and Global Britain.

Jeremy Quin MP
Minister of State for Defence Procurement

Executive Summary

1. The Land Industrial Strategy (LIS) sets the **intent, ways of working, and actions** by which the Army, wider Ministry of Defence (MOD) and industry will collaborate to maximise the value from investment in Army modernisation and transformation. It will ensure the Army receives the capabilities it requires, but in a way that drives opportunity for UK industry and the economy.

2. The Army buys a wide range of goods and services, many of which are similar or identical to items purchased in the civilian world. This strategy focusses on specialised military equipment and services for which the Army has a unique demand not shared with the other services, and where there is a small number of suppliers in the UK or internationally to meet this demand. It is recognised that industrial strategies for capabilities also needed by other Services, such as complex weapons, are addressed in other pan-Defence frameworks.

LIS INTENT

3. The Integrated Review[1] has set the Army on a course for the most **radical transformation** in two decades. It will accelerate modernisation of the Army to become more agile, more integrated, and more expeditionary – ready for the next challenge not the last.[2]

4. Our people will continue to provide the point of difference in future conflicts, but the **Army is becoming an increasingly high-tech organisation** that derives much of its competitive advantage from the **sophistication of the technology it can wield**. To maximise this advantage, UK forces must be equipped with advanced, digitally networked platforms and mission systems that work within an international and multi-domain framework. These must be adaptable, resilient, sustainable, and updated rapidly as threats evolve and technology advances.

5. Delivering this intent **necessitates assured access to an innovative and globally competitive industrial base.** It must be recognised and treated as a strategic asset in its own right, with investment in the critical skills and capabilities needed in this Information Age.

6. Historically, the Land enterprise has been impacted by a combination of unstable priorities, a 'feast and famine' cycle of investment, and a lack of transparency. Consequently, over an extended period, the land industry and technology sector in the UK contracted and consolidated. Recent Army modernisation and investment in the sector, and other emergent sectors, has resulted in the UK establishing some key capabilities. **There is now an opportunity to reinforce this success and build upon it.**

7. Developed in concert with industry, academia and wider government, the LIS vision is for:

An innovative, globally competitive, and highly skilled sector in the UK that can develop, deliver, and sustain the capabilities we need in the land domain, collaborate domestically and internationally on key defence projects, export overseas, and contribute to our national prosperity.

WAYS OF WORKING & ACTIONS

8. The LIS builds on the investment laid out in the Integrated Review, the principles of the Defence and Security Industrial Strategy[3] and other MOD strategies such as the Defence Support Strategy[4] and Data Strategy. It does not replicate, or diverge from, the far-reaching changes set in train by these publications. **The LIS articulates the ways of working and actions** the Army, DE&S, wider MOD and industry will adopt to address historical issues in the Land domain.

9. Starting with **ways of working,** the LIS will adopt four mutually reinforcing approaches:

   - A **strategic approach to acquisition** that incorporates a wider definition of national value, including Operational Independence and Social Value;

   - A **longer-term approach to investment and partnering** that increases confidence in the UK's investment pipeline and provides the stability needed to invest in new technologies and skills;

1 Global Britain in a competitive age: The Integrated Review of Security, Defence, Development and Foreign Policy, HM Government, March 2021.
2 Future Soldier: Transforming the British Army, British Army, 22 March 2021.
3 Defence and Security Industrial Strategy: A strategic approach to UK's defence and security industrial sectors, Ministry of Defence, March 2021.
4 Defence Support Strategy, Ministry of Defence, November 2020.

- An **enhanced approach to portfolio management** to create a steadier drumbeat of investment, with an increasing focus on mission systems, where cost effective to do so; and
- A more **collaborative approach** between MOD and industry, based on co-operative and transparent cultures and behaviours.

10. To implement these new ways of working and build momentum a set of **tangible, early actions** have been agreed:
    - The MOD will put in place a framework to ensure future investment decisions reflect the wider definition of value the LIS seeks from our investment in Army modernisation and transformation. A **Land Industrial Strategy Objectives Framework (LISOF)[5] is being developed**, which includes operational independence requirements, industrial capability, skills and wider social value objectives, and international collaboration considerations. Our ambition is for future land procurements to contribute at least 20% to our social value policy outcomes.
    - The Army is embarking on a **wide-reaching rationalisation of the land fleet** to enhance commonality and create the opportunity to focus investment on our sunrise capabilities.
    - The Army and DE&S will launch the **Land Integrated Operating Services (LIOS) Project** to assess the benefits and value for money of establishing strategic partnerships with industry that secure access to the critical design and systems engineering skills we need to deliver frequent updates and upgrades.
    - The Army will **reinforce its investment in innovation, research, and experimentation** through increased transformation and accelerator funding, and with a new **Experimentation and Trials Group** that will help industry access a wide user community. The Army will continue to fuel broad-spectrum research and development via the Army Research, Innovation and Experimentation Laboratory, the Army Warfighting Experiment and the new **BattleLab**. These involve close collaboration with industry - including a range of Small and Medium-Sized Enterprises (SMEs) - to identify and refine new technologies and ways of operating.
    - The Army will partner with industry on a dedicated **strategic technology pipeline that will pull-through technology directly into fielded capabilities**. Cohered under the **MERCURY** concept, the Army is seeking co-investment with industry in new technologies that can secure critical UK skills and intellectual property, and **highlight the UK as a partner of choice in international collaborations.**
    - As a step toward greater transparency and to assist industry with its own investment planning, this publication **includes an overview of future Land capability investments**. Next year this will be developed into a longer-term investment plan, with the key elements shared with industry through a Land Enterprise Working Group.
    - It is the UK's intent to work closely with NATO, allies, and partners. **Early consideration will, therefore, be given to opportunities for international collaboration on major projects.** This includes assessing UK workshare options and the benefits of enhanced interoperability, improved supply chain resilience and reduced development and set up costs. Success will require careful balancing of UK requirements with those of allies, so the LIS sets out an initial view of UK considerations for operational independence, technology investment, and skills as a starting point for discussion.
    - Finally, a **Land Capability Campaigns Office** has been established under UK DSE leadership to co-ordinate efforts across government and promote co-operation with industry to secure a greater share of the land export market.

11. Implementing the LIS cannot be at any cost. It must drive value, so the shared challenge to government and industry is to work together to develop winning propositions in a globally competitive market for Land capabilities. By **aligning our capability and industrial goals**, we can support an Army fit for future warfare, enhance the resilience of our supply chains and industrial base, drive real investment in skills, and with that, value for both industry and the UK economy.

5 The LISOF is explained in chapter 4

1. LAND INDUSTRIAL STRATEGY: CONTEXT & APPROACH

- **The Army is becoming a high-tech organisation, capable of acquiring and operating advanced military capabilities that can keep pace with the continuously evolving threats and technology inherent in modern warfare.**
- **Army Modernisation has catalysed new investment in the UK industrial and technology base. The adoption of a Land Industrial Strategy will sustain and enhance the industries required for modernisation and transformation.**

FUTURE THREATS & THE CAPABILITY RESPONSE

12. We are in an era of persistent competition. Russian aggression in Ukraine brings into stark focus the need for the UK to be able to deliver the full spectrum of defence and security activities – both above and below the threshold of war.[6] Defence will need to operate in increasingly unpredictable and complex environments and respond to the pervasiveness of information and pace of technological change that are disrupting the economics and character of warfare.

13. Against this strategic backdrop, the Army requires capabilities that are agile, adaptable, resilient, interoperable by design, and affordable to give UK Land Forces – operating within an integrated, multi-domain network – advantage over their adversaries.[7] We must be better connected with other domains and allies, better able to intervene quickly and effectively over large distances, better protected from electronic, air and uncrewed aerial vehicle threats, and better able to engage an adversary at long range. This requires an Army that exploits technological advancements to be more integrated, more mobile, and sustainable, more systemically protected and lethal, and less reliant on human operators.

14. Meeting these requirements necessitates an increasingly high-tech Army that can field complex, digitally-enabled capabilities that are increasingly defined by the mission systems they comprise and the data they gather and exploit.

15. Through a portfolio of modernisation and transformation, enabled by the increased investment secured in the Integrated Review, the Army is investing in new vehicles, long range precision fires, ground-based air defence, tactical surveillance drones, electronic warfare, and cyber capabilities; all connected by an evolved digital backbone. Delivering these capabilities will require access to a technologically advanced industrial base.

UK LAND INDUSTRY: PAST & PRESENT

16. Over the past 20-25 years the UK's Land industrial and technology sector has substantially changed. The necessary focus on the delivery of urgent operational requirements (usually COTS/MOTS from a competitive global market) has created a significant requirement for upgrade and modernisation.

17. At the same time, the changing global environment has not provided industry with a stable demand signal that underpins long-term investment confidence. Industry has experienced repeated 'feast and famine' investment cycles, compounded by delayed or cancelled programmes. Some elements of industry have not invested sufficiently to maintain their competitiveness and secure a diversified customer base. Together, this has led to a consolidation (and subsequent hollowing out) of UK-based industrial skills and capabilities.

18. Recent **Army Modernisation** has provided the impetus and opportunity for the UK to develop an increasingly competitive industrial and technology sector. Major acquisition programmes have stimulated skills and knowledge transfer to the UK and the establishment of advanced systems integration laboratories. Ongoing network and sensor programmes are utilising industrial capability from leading technology companies working alongside the traditional industrial base. Army R&D investments are building UK technical knowhow, intellectual property, and an innovative supply chain across original equipment manufacturers, technology companies, and small and medium-sized enterprises (SMEs).

19. Overall, the UK land industrial base now directly supports at least 10,000 jobs, with a further 10,000 jobs indirectly supported.[8] Land ground combat system exports comprise 7% of UK defence exports (nearly £6Bn over the past 10 years),[9] which reflects the UK's position as a global leader in specific technologies and solutions.

6 Integrated Operating Concept, MOD, 2020.
7 Five Force Design Principles, Army Industrial Engagement Framework, MOD, 2019.
8 Future Soldier: Transforming the British Army, British Army, 22 March 2021.
9 UK Defence Solution Centre Analysis, 2020.

20. The Land enterprise is now at an inflection point. More stable, long-term investment is required, not only to enable continued modernisation, but to secure ongoing private sector investment in the industrial capabilities we need. This must leverage the transformative impacts of Industry 4.0[10] (such as developing factories of the future that can rapidly produce and integrate battle winning capability to meet ever changing threats) and the transition to more environmentally sustainable solutions. **Therefore, the MOD is making a conscious choice to work with industry to adopt, for the first time, a specific Land Industrial Strategy**.

THE LIS VISION & OBJECTIVES

21. This Land Industrial Strategy sets out the ways of working and actions needed to deliver a step change in approach and outcome. It is aligned to the £41.3bn of investment secured in the Integrated Review and builds on Defence and Security Industrial Strategy direction, specifically:

    - The shift in policy away from global competition by default, which has been routinely employed in the Land sector, towards a more nuanced and flexible approach;
    - Recognition of the importance of maintaining operational independence and resilience, including a greater role for UK supply chains; and
    - The need to support our industrial base, including SMEs, and commit to more stable, predictable, and visible acquisition and investment pipelines.

22. The LIS is also aligned to other MOD strategies that have identified similar underpinning imperatives, such as complex weapons pipeline and Defence's Support and Data Strategies.

23. The LIS vision is for:

    An innovative, globally competitive, and highly skilled sector in the UK that can develop, deliver, and sustain the capabilities we need in the land domain, collaborate domestically and internationally on key defence projects, export overseas, and contribute to our national prosperity.

24. The vision is enabled by five **strategic objectives** that will be incorporated into the processes and criteria by which the MOD makes investment decisions:

    - **Sustained military advantage in a competitive age** achieved through the generation and exploitation of new technologies and digital networks that can be integrated into force elements and evolved at the appropriate pace.
    - **Maintain operational independence** and resilience, where required, preserving choice and freedom to act, and reducing risks to security of supply (at home and overseas).
    - **Cultivate an innovative, competitive and highly skilled industrial base** that enables the UK to be a globally competitive centre for technologically advanced land systems, and efficiently contribute to developing, designing, producing, integrating, and supporting land capabilities for this generation and the next.
    - **Enhance social value** by working with wider government, academia, and industry to tackle economic inequality, fight climate change, and provide equal opportunity.[11] Our ambition is for land procurement programmes to contribute at least 20% to social value policy outcomes.
    - **Strengthen international influence** and relationships, collaborating with our unique network of allies and partners to share capability delivery risks and rewards and enhance interoperability with NATO and other allies.

25. The vision and objectives capture 'what' the Army wishes to achieve. The following chapters explain 'how' the LIS will be implemented by:

    - Modernising Land capabilities in the Information Age
    - Charting a course to the next generation of Land systems
    - Securing access to the critical industrial skills and capabilities we need
    - Increasing international cooperation and exports
    - Planning for successful implementation

10 Industry 4.0 or the 'Fourth Industrial revolution' generally refers to the ongoing automation of traditional manufacturing and industrial practices, using modern smart technology, such as the Internet of Things.
11 These themes and their associated policy outcomes are defined in the Cabinet Office's Social Value model.

Our Strategic Objectives

Sustain military advantage in a competitive age

Maintain operational independence

Cultivate an innovative, competitive, and highly skilled industrial base

Enhance social value

Strengthen international influence

2. MODERNISING LAND CAPABILITIES IN THE INFORMATION AGE

- **In this competitive Information Age, the UK must adapt its approach to acquisition and delivery to capitalise on new technology and maximise agility and resilience.**
- **This requires greater collaboration, transparency, and commitment, so that government and industry can co-invest in the Land capabilities we need... and then develop the next.**
- **The Army will prioritise investment in modernisation and create longer-term strategic partnerships centred on key platforms, systems, and networks.**
- **These partnerships will be expected to take demonstrable steps to work with the wider supply chain, including SMEs and non-traditional suppliers, to create a more resilient and integrated enterprise.**

ARMY MODERNISATION PRIORITIES

26. The Integrated Review increased the UK's investment in the Army and other pan-Defence capabilities the Army needs, such as the Digital Backbone and Cyber. The Army needs to **maximise the value it receives from this investment so it can optimise for the Information Age.**

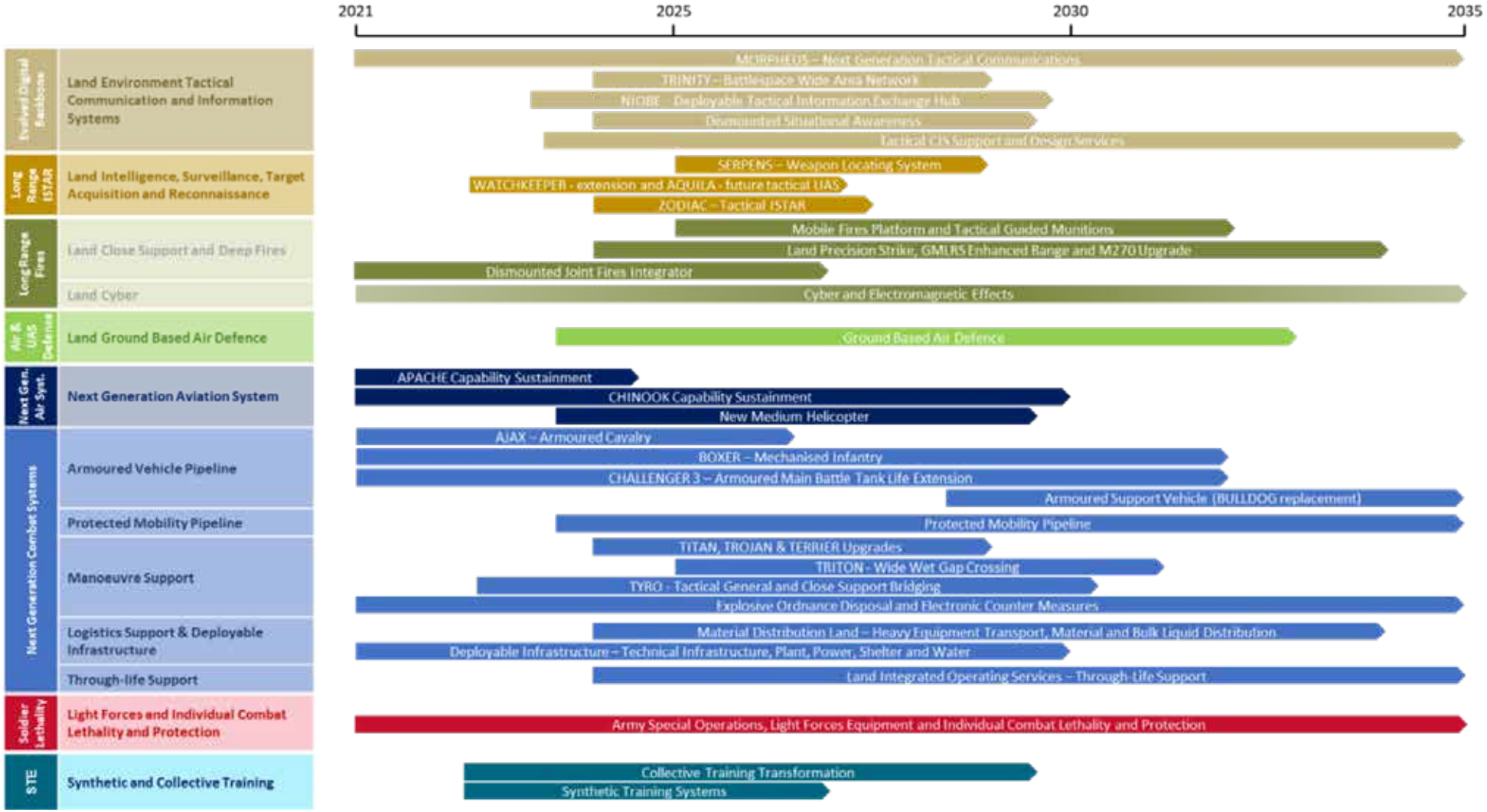
27. To enable this change, we have **eight modernisation and transformation priorities for the Land domain**, with capability investment by the Army, UK Strategic Command, and wider Defence coalescing around them. Referred to as the **"Integrated Eight"**, they are:

- **Evolved Digital Backbone** - increase the speed of the decision-action cycle relative to an adversary.
- **Long-range Intelligence, Surveillance, target Acquisition & Reconnaissance (ISTAR)** - revolutionise beyond line-of-sight collection.
- **Long-range Fires** – precision lethality at range.
- **Air and UAS Defence** – layered and full spectrum defence.
- **Next Generation of Combat Systems** – modernised, digitised vehicles moving towards a combination of crewed and autonomous.
- **Next Generation Aviation Systems** - harness the potential of human machine teaming, future vertical lift platforms and air-launched effects.[12]
- **Soldier Lethality, Human Optimisation and Automation** - better connected, prepared, and protected soldiers.
- **Synthetic Training Environment** - providing truly immersive and representative virtual training.

28. Major projects and programmes in the Land domain have been aligned to the Integrated Eight.[13] An overview of this investment landscape is shown in **Figure 1**. It demonstrates the rebalancing (as part of modernisation) towards mission systems and digitisation, with significant investment in the digital backbone, ISTAR, and synthetic training environments; as well as continued spend on the core digitised nucleus of AJAX, BOXER, Challenger 3, and AH-64 Apache over the next decade. This investment landscape will be refined and expanded into a 20-year comprehensive investment plan (explained in more detail in Chapter 4), which will include the mission systems and upgrades we require.

12 Note that aviation is not part of the LIS. However, for completeness the investment landscape includes Next Generation Aviation Systems.
13 These include projects and programmes where the Army acts as the Lead Command for Defence-wide initiatives and some capabilities funded by UK Strategic Command.

Figure 1 - **Land Investment Landscape**



* This figure sets out the MOD's Land capability investment landscape at the date of publication. It indicates the type of capabilities being considered and indicative timeframe for the programmes or projects.

** The accompanying table indicates the scale of investment being considered over the next 10 years. These figures represent new investments and do not include current operating and support costs.

*** Some investments have been fully approved, others are partially approved (i.e. a component part of the capability has full business case approval but not the totality) and others are yet to be considered. This Land Capability Investment landscape, therefore, indicates intent rather than commitment. Further, the landscape will remain subject to change as spending priorities are reviewed - it will be updated annually and discussed with industry at the Land Enterprise Working Group. Defence intends to mature this landscape toward a longer term, more comprehensive investment plan that better balances the need for stability with the need to seize opportunities to innovate.

Table 1: **Land Investment Landscape**

CATEGORY	PROGRAMME / PROJECT	APPROXIMATE TIMEFRAME	APPROXIMATE INVESTMENT VALUE OVER THE NEXT 10 YEARS
EVOLVED DIGITAL BACKBONE			
Land Environment Tactical Communications and Information Systems	MORPHEUS - Next Generation Tactical Communications	Approved	£5,500m-£6,000m
	TRINITY - Battlespace Wide Area Network	2024-2028	
	NIOBE - Deployable Tactical Information Exchange Hub	2023-2029	
	Dismounted Situational Awareness	2024-2029	
	Tactical CIS Support and Design Services	2023-2035	
LONG-RANGE ISTAR			
Land Intelligence, Surveillance and Reconnaissance	SERPENS - Next Generation Weapon Locating System	2025-2029	£1,100m-£1,300m
	WATCHKEEPER - Mid-Life Extension and AQUILA - Future Integrated Tactical UAS	2022-2027	
	ZODIAC - Future Integrated Tactical ISTAR	2024-2027	
LONG-RANGE FIRES			
Close Support and Deep Fires	Close Support Fires - Mobile Fires Platform and Tactical Guided Munitions	2025-2032	£2,000m-£2,400m
	Land Deep Fires - Land Precision Strike, GMLRS Enhanced Range and M270 recapitalisation	2024-2034	
	Dismounted Joint Fires Integrator and fire control systems	Approved	
Cyber	Cyber and Electromagnetic Effects	2020-2035	
AIR AND UAS DEFENCE			
Land Ground Based Air Defence	Ground Based Air Defence	2023-2033	£900m-£1,100m
NEXT GENERATION AVIATION SYSTEM			
Next Generation Aviation Systems	APACHE - Capability Sustainment	Approved	£4,500m-£5,000m
	CHINOOK - Capability Sustainment	Part Approved	
	New Medium Helicopter	2023-2029	

CATEGORY	PROGRAMME / PROJECT	PROGRAMME TIMEFRAME	APPROXIMATE INVESTMENT VALUE OVER THE NEXT 10 YEARS
NEXT GENERATION COMBAT SYSTEMS			
Armoured Vehicle Pipeline	AJAX - Armoured Cavalry	Approved	£18,000m-£21,000m
	BOXER - Mechanised Infantry Vehicle	Part Approved	
	CHALLENGER 3 - Main Battle Tank Life Extension	Approved	
	Armoured Support Vehicle (BULLDOG Replacement)	2028-onwards	
Protected Mobility	Protected Mobility Pipeline - Protected Mobility Platforms, Multi-Role and General Support Utility Vehicles, and Future All-Terrain Vehicle	2023-onwards	
Manoeuvre Support	TITAN, TROJAN & TERRIER Mid-Life Upgrades	2024-2028	
	TRITON - Wide Wet Gap Crossing	2025-2031	
	TYRO - Tactical Close and General Support Bridging	2022-2030	
	Explosive Ordnance Disposal and Electronic Counter Measures	Part Approved	
Logistics Support and Deployable Infrastructure	Material Distribution - Heavy Equipment Transport, Materiel and Bulk Liquid Distribution	2024-onwards	
	Deployable Infrastructure - Deployed Technical Infrastructure, Plant, Manoeuvre Power, Manoeuvre Shelter, Static Infrastructure & Power, Combat Water Supply	Part Approved	
Through-Life Support	Land Integrated Operating Services - Through-Life Support	2024-onwards	
SOLDIER LETHALITY			
Light Forces, & Individual Combat Lethality & Protection	Army Special Operations, Light Forces and Individual Combat Lethality and Protection	Part Approved	£600m-£800m
SYNTHETIC TRAINING ENVIRONMENT & OTHER TRAINING			
Synthetic and Collective Training	Collective Training Transformation	2022-2029	£400m-£600m
	Other Synthetic Training Systems	2022-2027	

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MODERNISATION: RATIONALISING THE FLEET

29. The UK Armed Forces' inventory currently comprises 35 unique land platform types, 400 variants and 26 different engine types. The majority of these are based on analogue technologies, closed or bespoke architectures, and have limited growth capacity. As such, they are ill-suited for the Information Age.

30. Moreover, as this inventory has aged, the companies that originally designed and manufactured the equipment have diminished. As such, it has become increasingly costly to maintain niche but diverse supply chains and manage safety and obsolescence risks.

31. To create the programmatic and financial headroom for far-reaching modernisation, the Land enterprise must transition from its current equipment towards newer 'sunrise' capabilities that are fit for the Information Age.

32. As we focus on modernising and adapting fielded capabilities, we are making reductions in overall fleet numbers and the level of variation within our fleets. By 2035, the Army aims to **rationalise the current 35 core military platforms down to 15 platform families** that are modular, connected, and adaptable, with redundant equipment sold or disposed.

33. The MOD will continue to seize opportunities to support our partners through our disposal strategy, which offers industrial and international relationship benefits.

MODERNISATION: OPEN DIGITAL ARCHITECTURES & MISSION SYSTEMS

34. The entry into service in the coming years of a range of new capabilities, such as long-range artillery and air defence systems, digital networks, ISR assets, and mission-system enabled armoured platforms will deliver a step change in land combat systems.

35. Mission systems and the network connecting them are critical to the effectiveness and interoperability of Land Forces. All future platforms and equipment will form part of a wider digital network, built on Defence's **digital backbone**, which provides modern, cohesive, secure communications from the command post to the frontline. It is imperative that future mission systems and the platforms that host them can seamlessly integrate with the digital backbone.

36. Through the LIS, the Army intends to continue its work with UK Strategic Command and Defence Digital to develop and embed an **open architecture approach** (with enterprise architectures delivering our strategic outcomes). This includes **data standards and architectures** that will ensure data can move across the Land enterprise.[14] This approach will enable the rapid integration of new technology across the Army's inventory, provide access to a greater choice of potential suppliers, and support multi-domain integration and interoperability with NATO and other allies.

MODERNISATION: DRIVING COMMONALITY THROUGH CATEGORY MANAGEMENT

37. As the Army fields ever more capable mission systems, sensors, and networks it needs to be able to rapidly develop them and deploy updates and upgrades across multiple fleets. Therefore, the Army, in line with DE&S and wider Defence ambition, is adopting **Category Management**[15] and will work in partnership with systems providers on the through-life design, development, and delivery of cross-cutting capabilities. This will reduce complexity across mission systems and assist with integration, streamline disparate supply chains, reduce logistic drag, and enable more frequent and wide-ranging upgrades.

38. From 2022, early implementation will identify categories where there is already a degree of cross-platform commonality between requirements and solutions, and then shape future commercial constructs to maximise this commonality in planned upgrades and ongoing support. In the medium-term, the LIS will drive additional category

14 This approach utilises the Army Mission Systems Integration Strategy and standards such as Land Open Systems Architectures (LOSA) and Generic Vehicle Architectures and is in line with the wider Defence Data Strategy.
15 Broadly defined as, the application of a value adding procurement strategy to a group of market similar products or services.

management opportunities through promoting scalable, modular, and open architectures in requirements and commercial arrangements, including those for technology pull-through.

MODERNISATION: AN AGILE APPROACH TO THROUGH-LIFE CAPABILITY UPGRADES & SUPPORT

39. Historically, the MOD has mobilised Land industrial capability to deliver major programmes, including funding the set-up costs to build skills, expertise, and infrastructure. After the initial procurement, separate and short-term contracts for minimal 'upkeep' solutions have been let.

40. The LIS introduces the opportunity for a different model for through-life support. From 2025 onwards, all systems, platforms, and equipment categories, starting with new core platforms, will be considered on a case-by-case basis for transition onto new through-life support arrangements – to be known as **Land Integrated Operating Service (LIOS) arrangements** – that incentivise a step-change in platform availability and through-life performance via more frequent updates and upgrades.

41. LIOS arrangements will seek to be of a **longer duration** than traditional support contracts and cover the **full range of upkeep, update, and upgrade services.**[16] This will remove the routine separation of support contracts from mid-life upgrades (that are often delayed or descoped) providing the conditions for **co-investment, collaboration and partnership** between the MOD and industry. In providing this increase in confidence and commitment, the MOD will incentivise industry to take tangible steps to invest in maintaining and growing the skills and capabilities needed to support and upgrade current and future Land capabilities.

42. The Army's intent and capability goals will be set out in through-life capability 'roadmaps'. These will be shared with industry, and the Army expects industry to reciprocate by sharing their own product investment plans and target export markets. The Army and industry can then work together to understand the most viable update and upgrade pathways that attend to our shared objectives. This will build confidence that there is a viable capability pipeline that we can coinvest in. Adopting LIOS arrangements will necessarily require **earlier and more frequent decisions, with greater transparency on realistic costings and risk ownership**. The Army will place more emphasis on commercialising ideas and reducing risk through investing in prototyping/proofs of concept that provide 'minimum viable products' (which are then improved iteratively using Agile approaches superimposed onto longer hardware cycles) rather than endlessly seeking exquisite and decisive advantage captured in exhaustive and lengthy user requirement documents.

43. Not all systems, platforms and equipment will require a LIOS arrangement (e.g. because the remaining lifespan is too short, or it is uneconomic to continue to invest). In these cases, the **Army will require effective support services that sustain the capability and improve on current system/platform availability**.

44. Implementation of LIOS arrangements and future support services is being taken forward through a **newly established LIOS project that will develop a detailed plan over the coming year**. This is a wide-ranging, transformative project jointly managed between Army HQ and the DE&S, with initial industry engagement expected in Summer 2022. The Army has earmarked **funding for LIOS arrangements and other support solutions from their commencement in 2025.**

MANAGING MODERNISATION

45. As part of broader modernisation, the Army has moved to an operating model that embeds the forward looking, through-life capability mindset demanded by the LIS. Specific changes to the operating model that have been implemented include:

    - A Director Futures, responsible for energising innovation, research, and experimentation; closely linked to the MOD's Science and Technology Strategy.

16 Upkeep: the need to deliver the required levels of serviceability through preventative and corrective maintenance; Update: activity that seeks and results in renewal, continuation or extension of an existing capability and, although it does not necessarily seek it, results in additional functionality or material improvement to a capability; Upgrade: that seeks and results in a material improvement to a capability.

- A Director Programmes, responsible for coherence of all Army projects and programmes across the Integrated Eight and beyond.
- Increasing the number and length in post of dedicated Senior Responsible Owners (SROs) for major projects to provide increased focus, continuity in role and speed of decisions.
- Investing in additional P3M resource to support SROs and enable timely delivery.

3. CHARTING A COURSE TO THE NEXT GENERATION OF LAND SYSTEMS

- **In an era of unprecedented change, the MOD must improve the pull-through of technology to allow UK Land Forces to keep pace with the competition and, where possible, accelerate beyond.**
- **The Army will increase investment in innovation, research, and experimentation. It will work with the industrial base, including SMEs and others that create and provide enabling technologies, to develop appropriate partnering arrangements. These will enable co-investment in the intellectual property and skills in which the UK can be world-leading and pull-through new technologies into production and fielding.**
- **This will harness more of the innovative power of UK industry to transform Land capabilities, enhance the multiplier effects of our spending, and promote the UK as a partner of choice for future international projects.**

INCREASING INVESTMENT IN 'GAME CHANGING' TECHNOLOGIES

46. **Science and technology (S&T) are developing and proliferating faster than ever and have become new theatres of competition**. Sustaining strategic advantage through S&T is, therefore, an essential component of the UK's national defence and security strategy. This is why, through the Integrated Review, **the UK committed to increasing its R&D investment to £6.6bn**[17]; reversing the long-term decline in R&D since the end of the cold war.

47. Recent conflicts have shown that threats and tactics evolve quickly in the Land environment. Accordingly, new and disruptive technologies can allow the Army to speed its transition to new ways of operating. This offers genuine strategic advantage; not just in direct military application, but also in the international influence and national prosperity they generate.

48. However, as **Land capabilities become more hi-tech** they are increasingly defined by interchangeable mission systems, software applications, and connecting networks. Investing in the skills, systems, and processes that will enable the adoption of these technologies is paramount.

49. This **necessitates a more proactive approach**. As we modernise UK Land forces (described in the previous chapter), the Army also seeks to identify, develop, and integrate 'game changing' technologies that will transform its capabilities. This means pulling through next generation S&T, while priming the pump for the generation after next.

50. The Army will start by increasing investment in innovation, research, and experimentation (IRE) over the course of this decade, including **new investment dedicated to pulling through Land domain system technologies that show most military and commercial potential**. Key areas include:
    - Artificial Intelligence (AI).
    - Advanced materials science, survivability & protection.
    - Electrification, hybrid propulsion and power generation.
    - Novel and directed energy weapons.
    - Networks and sensors.
    - Robotics, automation, and Human-Machine Teaming.
    - Synthetic environments.
    - System and 'system of systems' integration.
    - Human optimisation, enhancement, and augmentation.

51. It is recognised that the UK does not need to be a leader in all fields of technological development. The MOD expects to collaborate with NATO and other allies and partners on the design and development of future Land combat systems. In doing so, we aim to improve access to technology, enhance our interoperability, share the burden of development, and increase export opportunities. This offers mutual benefits for all parties and is covered in more detail in chapter 5.

17 Including directed energy weapons, swarming drones, the new domains of space and cyber space, and modern platforms and weapons systems.

52. The UK has a lot to offer, but we must prioritise our investment to pull through the most promising technologies. In lockstep with the wider MOD, the Army will therefore work with industry over the coming year to prioritise key technology investment areas. This includes agreement on which must be preserved and/or grown to provide the technological advantage necessary to meet our capability needs, while reinforcing the UK's status as a scientific power. Where international collaboration offers the most advantageous route, we will decide that early to maximise the opportunity for UK workshare, skills transfer and inward investment.

53. Activity will not be constrained to the defence sector. The MOD also seeks to make better use of existing wider government initiatives in innovation and technology development. For example, the 'Grand Challenges',[18] three of which have significant overlap with Army priority areas: AI & Data Economy, Clean Growth, and Future of Mobility. Similarly, the network of Catapult Centres – particularly those in the West Midlands with expertise in advanced manufacturing, and energy research – offer opportunities for collaboration and co-investment.

SUPERCHARGING INNOVATION, RESEARCH AND EXPERIMENTATION

54. The Army has already begun to reimagine how it will operate in the future. Over the past decade the Army's flagship innovation experimentation programme – the Army's Warfighting Experiment (AWE) – has helped forge relationships with industry and academia and provided a proving ground for new technologies. It provides direct access to the user community for industry primes and SMEs, inviting participants to help solve some of our most pressing challenges at the annual event.

55. The AWE is complemented by the Army's Rapid Innovation and Experimentation Laboratory (ARIEL), which provides an enduring hub for innovation and experimentation. It acts as the Army's accelerator, providing the means to work collaboratively with industry to rapidly prototype, test, and refine solutions.

56. In 2020, the MOD announced the launch of the Defence BattleLab, which has been established in the Dorset Innovation Park with joint investment from the MOD and the Dorset Council and Dorset Local Enterprise Partnership. The BattleLab is the physical manifestation of ARIEL and provides dedicated working space for collaboration with academic institutions, defence primes, SMEs, and wider industry.

57. The Army will continue this investment and is supercharging innovation by **establishing a dedicated Experimentation and Trials Group** that will help test the latest tactics and technology and push the boundaries of land capability. It will also exploit multi-domain experimentation exercises, such as WARFIGHTER in the US and DEFENDER in Europe.

18 The Government Industrial Strategy sets out 'Grand Challenges' to put the UK at the forefront of the industries of the future, ensuring that the UK takes advantage of major global changes, improving people's lives and the country's productivity. The first 4 Grand Challenges are focused on the global trends which will transform our future: namely Artificial Intelligence and data, ageing society, clean growth, and future of mobility.

AWE21

AWE21 posed five challenges to industry:

1. **Synthetic Wrap** - Provide a common, immersive and credible synthetic wrap that seamlessly supports training across the Live, Virtual, and Constructive environments.

2. **Urban Training** - Transform the quality and scale of the Urban Training environment.

3. **Complex Human Terrain** - Provide an immersive, complex and multifaceted ecosystem that challenges the training audience across the human, physical, and information domains.

4. **Data Exploitation** - Improve the capture, access, feedback and exploitation of data across all training systems.

5. **Connectivity** - Demonstrate a single, deployable and scalable connectivity solution.

AWE21 experimented with **28 varied products from 12 industry partners** including: new variations of TES, updated Exercise Control Applications, Common Battle Pictures and Augmented Reality solutions, rapid LIDAR scanning devices and data-capture mechanisms.

The initial results provided new insights into how a seamless Live, Virtual, Constructive environment can be achieved, how data-capture is best presented to soldiers and how a platform or open-standards model is able to work for a single underpinning simulation.

IMPROVING PULL THROUGH AND TECHNOLOGICAL ADVANTAGE

58. To maximise the benefits of investment in IRE, the MOD **must improve the rate at which key technologies, discovered during research and experimentation, are matured into fieldable capability**, especially for complex systems that require dedicated investment. Often a lack of pull through discourages innovation, slows the rate at which we can adopt new technology, and stymies co-investment, including in the critical design skills and intellectual property needed for the future.

59. The Army is augmenting its approach to IRE by **providing a much clearer connection between technology investment and future projects**. Through the MERCURY concept (**Figure 2**), the Army will articulate a commonly understood capability aiming point and a pipeline of investment in mission and sub-system technologies that leads, when appropriate, directly into fielded capability. Industry can then align its investment plans to these capability goals and timelines, as well as highlighting additional technology opportunities, or similar investment activity taking place in other countries, that the Army may be unaware of. The intent is to help bridge the gap between mid-Technology Readiness Level demonstrators and viable products that can be produced at scale.

60. To be successful, MERCURY will require an **open and transparent partnership with industry**, with engagement taking place much earlier in the development lifecycle to jointly improve the viability of concepts, hone requirements, identify the necessary trade-offs, and de-risk delivery. Several commercial models exist to enable this more partnered approach and the Army, supported by DE&S, will work with industry to find the most appropriate model for the technology in question. This will include consideration of intellectual property strategies to protect access and ownership. A series of industry engagements has already been established to work through the MERCURY concept.

61. The scope of MERCURY has three constituent themes:

- **Systemic protection.** MERCURY will pull-through novel technologies that progressively move the Army towards a systemically protected force e.g.:
  - Removing physically integrated protection systems from platforms and instead operating them 'off-board' and autonomously to increase protection and agility
  - Reducing crew burden by using AI solutions to integrate multiple sensors, protection systems, and effectors into a multi-domain 'sensor-decider-effector' network to find and neutralise threats.
- **Novel and electric power.** MERCURY will exploit the rapid advances in hybrid and full-electric drive technologies, harnessing the operational advantages that such technologies offer the Land environment. It will consider the generation, storage, transfer, and management of power throughout an ultimately electrically powered force.
- **Modularity.** MERCURY will exploit autonomous systems to minimise the need for people in high threat environments. Similarly, Human-Machine Teaming provides the option of increased overall mass in the battlespace (thereby providing influence over a larger geographic footprint), focusing people on the roles to which they are most suited while minimising risk.

62. Initial activities under these themes are already yielding positive results for Army capability, e.g.:

- **Army approach to electrification.** Building on recent Hybrid Electric Drive technology demonstrators that helped prove the benefits of 'sustainable' technologies, the goal now is to increase operational advantage by utilising novel solutions to generate power and enhance performance whilst also reducing logistic need and carbon emissions. Continued investment will pave the way for the integration of technologies that require more power and help sharpen the edge that UK industry already has in this important technology area. **An Industry Advisory Group has been established** to bring together a community of interest, including

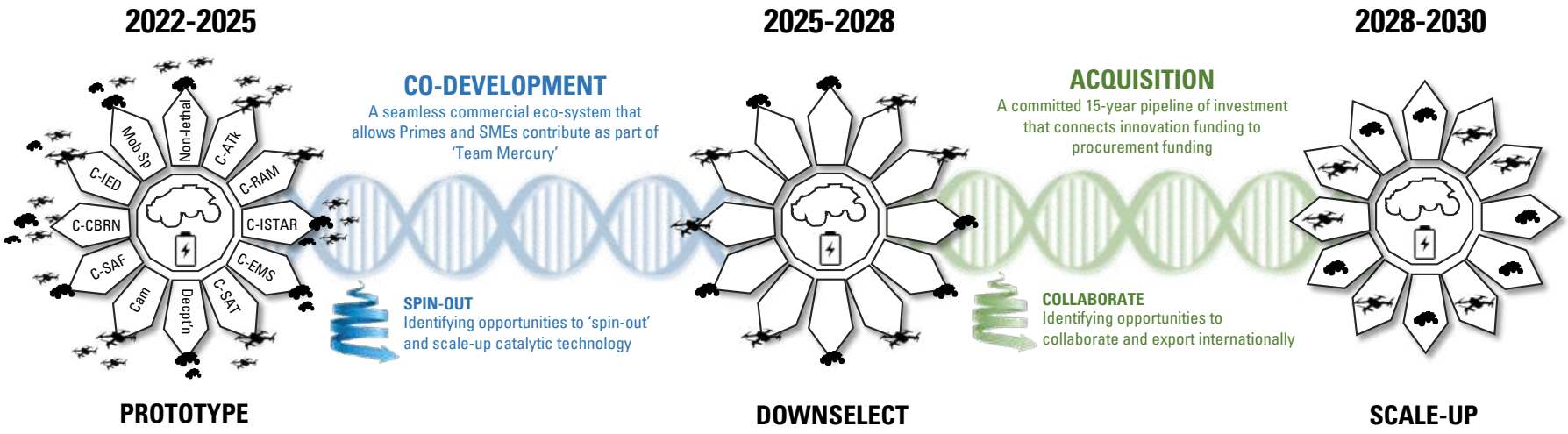
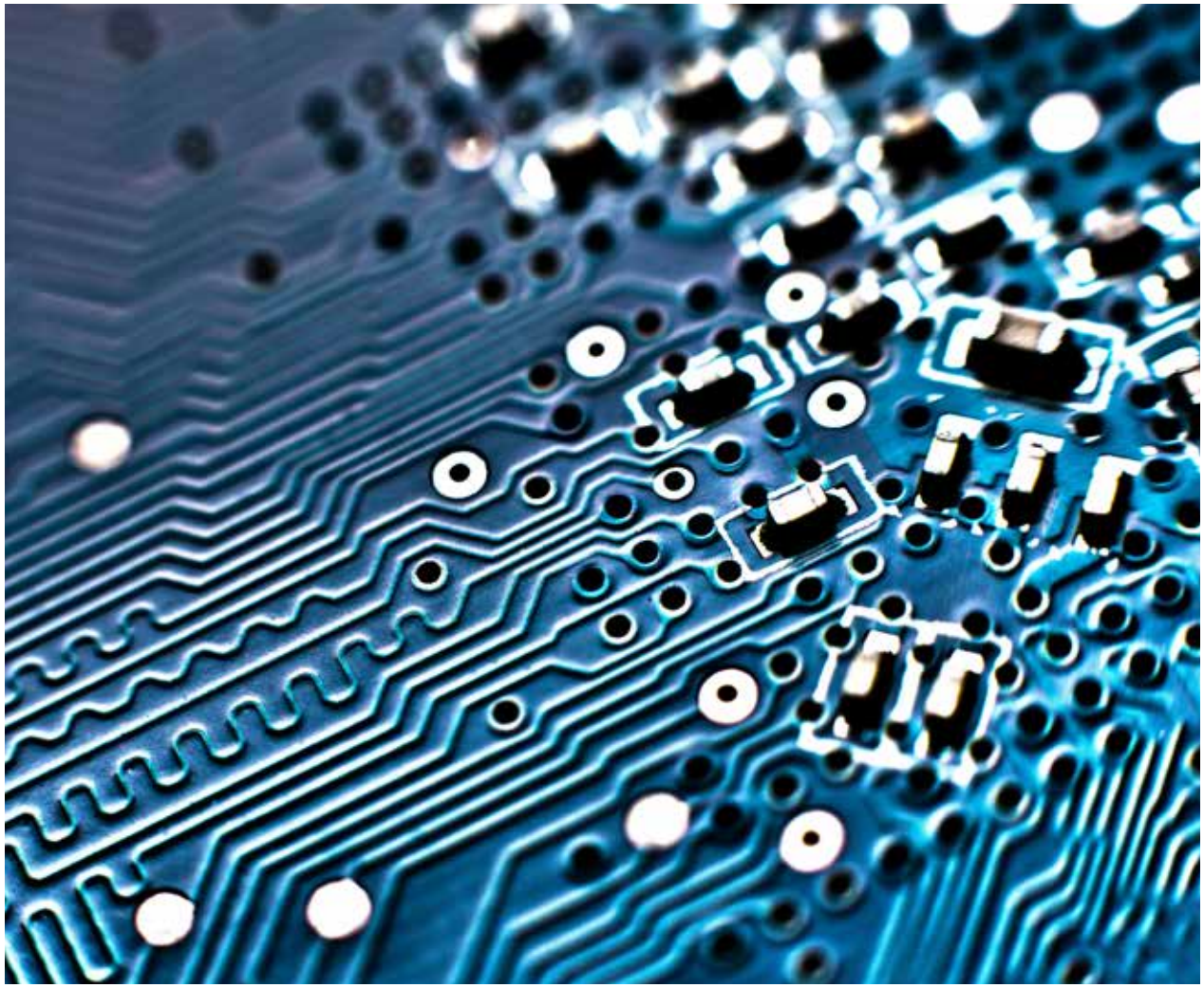


Figure 2: **Illustration of the MERCURY concept, showing iterative investment in mission system technologies.** This will be further developed with industry and academia.

Defence industry, non-traditional suppliers and the UK's Catapult Centres. The Army recently published its approach to Battlefield Electrification.

- **Modular, integrated protection system architecture.** Following a successful technology demonstrator, the Army is exploring options to use an open architecture to integrate active protection systems into its core platforms - starting with Challenger 3. This will help mitigate the different integration challenges and create options for different sensors and effectors. Further research and experimentation in this area will also consider how such an architecture can **incorporate a broader set of sensors and effectors to provide a more holistic system of protection** against multiple ground and airborne threats.



4. SECURING ACCESS TO THE CRITICAL INDUSTRIAL SKILLS AND CAPABILITIES WE NEED

- **The Army aims to secure access to the industrial skills and capabilities that underpin operational independence and technological advantage, now and in the future.**
- **To achieve this aim, it will adopt a strategic, long-term portfolio approach, alongside industry partnerships, enhanced social value, and collaborative behaviours, to drive investment in key UK skills and capabilities.**

A STRATEGIC APPROACH TO VALUE

63. Chapter 1 sets out the strategic objectives of the LIS. To ensure the full set of objectives are consistently considered in future investment decisions, the Army and DE&S will develop and adopt a **Land Industrial Strategy Objectives Framework (LISOF).**

64. This will establish a golden thread from the LIS strategic objectives to the agreed decision criteria the MOD will use to assess individual programme and project investment decisions – in addition to the assessment of Key User Requirements and cost.

65. 'Sustained Military Advantage' will always be the priority objective, but the formal inclusion of Operational Independence, international influence, building the onshore industrial base, and Social Value marks a step change in the importance placed on these considerations.

66. The core elements of the LISOF are shown in **Figure 3** below. A more detailed framework will be developed over the coming year to determine how the LISOF will be used to accommodate the specific project circumstances and value for money.[19]

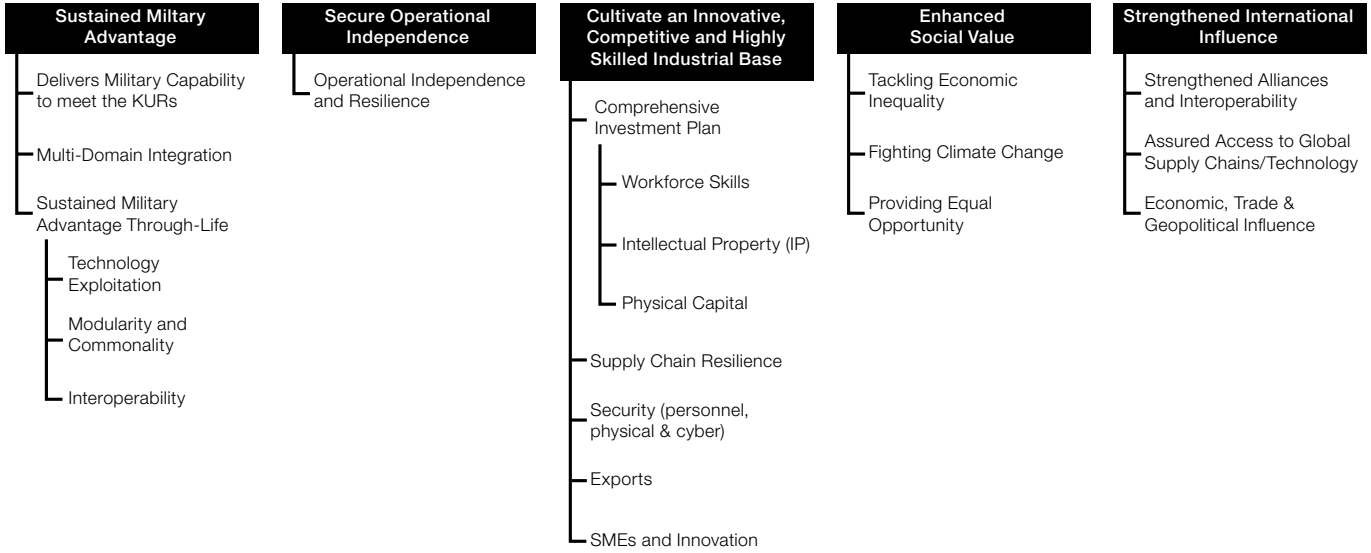


Figure 3: **Elements of the Land Industrial Strategy Objectives Framework (LISOF)**

19 For example, a percentage weighting of the total score used in procurement evaluations will be applied to the specified objectives. Weighting will depend on the project circumstances, but our ambition for land procurement to contribute at least 20% to social value outcomes. These outcomes are represented in both the 'industrial base' and 'social value' objectives.

A PORTFOLIO APPROACH TO SUSTAINING INDUSTRIAL CAPABILITIES

67. To reduce future 'feast to famine' investment cycles the Army will embed a **portfolio approach** within its strategic Balance of Investment process. This will combine the three dimensions of military capability needs, available financial resources and industrial factors. Through its Balance of Investment, the Army will consider sequencing its investment plans to provide a more stable investment profile; for example, adopting a steady drumbeat of orders to sustain volume at key sites. It will also consider the long-term value-for-money implications of changes to the industrial base.

68. A critical aspect of this is taking an overall enterprise-level view of the opportunities and impacts, rather than a project-by-project approach. This will take some time to achieve and must align to existing departmental budget and planning cycles. The outputs of this process will be reflected in a **comprehensive investment plan** that solidifies the Army's investment pipeline over a 20-year horizon. A first version will be shared with industry next year, and subsequently updated following Annual Budget Cycles and Spending Reviews.

SECURING OPERATIONAL INDEPENDENCE

69. As set out in the DSIS, **the ability to design, develop, integrate, test, evaluate, update, upgrade, and assure land combat systems onshore will be a high priority and an important factor in future investment choices**. Therefore, achieving an appropriate level of operational independence is a LIS objective and a core element within the LISOF.

70. Attainment of operational independence where required is very distinct from seeking to sole-source national procurement domestically. In many cases, collaboration with international partners or secure access to overseas industrial capability will be sufficient to meet these independence requirements.

71. The detail of what is and is not required for operational independence at a sub-sector or system component level is expected to change over time. Therefore, it will be iteratively reviewed to keep ahead of technology developments, threat changes, and the evolution of the MOD's Integrated Operating Concept, with changes communicated to industry. Specific operational independence requirements will be set out as part of future tender (or equivalent) processes, with a clear expectation that industry will configure itself and its proposed solutions to meet these. **Table 2** provides a summary of the elements of operational independence in the Land domain that we expect to consider in these processes.

Table 2: **Summary of elements of operational independence in the Land Domain**

Rationale		Elements of Operational Independence in the Land Domain
DESIGN, DEVELOP & INTEGRATE	Guaranteed access (via a UK presence) to the Design Authority, relevant IPR and S&T capability, as well as the systems engineering skills, resources, and capabilities to undertake systems integration	• Deep understanding of the **military context** for the UK Land user, including the **operational context**. • Guaranteed access (via a UK presence) to **Design Authorities** able to design, develop, and assemble new Land systems and platforms, and continued access to the **design knowledge/IPR** relating to existing in-service systems and platforms necessary to underwrite their **safety, legality and performance**. • Ability to **identify, incubate and develop S&T capability** to a level of maturity to support UK plans for Land Systems, including the maintenance of IP and skills for critical technologies. • Ability to **define and own appropriate enterprise architectures** (physical and information) for next generation systems, including system and sub-system modularity, commonality, openness, etc that suppliers can work within. • Access to onshore **systems engineering skills, resources and capabilities** to understand the interfaces necessary for UK systems of systems integration, and **undertake overarching integration** of systems, sub-systems and platforms (both with each other and into the wider network/ digital backbone). • Retention of the **industrial base** (IPR, skills, infrastructure, materiel) to design, manufacture and integrate **critical Land systems and sub-systems**.
UPKEEP, UPDATE & UPGRADE	Guaranteed access to the industrial base required to provide availability of key battle-winning systems/ platforms and the through-life sustainment of capability and performance	• Access to onshore industrial capabilities needed to **support (upkeep) key battle-winning systems and platforms**, both for routine activities and in response to operational needs. • Access to onshore skills, resources and infrastructure required to develop **through-life capability management roadmaps** for Land systems and platforms, including the ability to understand the likely **integration implications** of incorporating planned updates and upgrades or urgent operational requirements in response to new threat information or technology changes. • Ability to respond and scale at pace in times of high operational tempo to preserve freedom to act, including onshore elements of the **Whole Force Approach needed for operations**, and the **management/ coordination of a responsive supply chain** able to provide secure sourcing of essential raw materials, and manufacture of/access to components for critical sub-systems.
TEST, EVALUATE & ASSURE	Ability to independently design and undertake testing activities, evaluate/ validate results, and provide assurance of military capabilities onshore	• Access to experimental capabilities and resources to **design and undertake testing** of military capabilities and **evaluate results** against MOD requirements and **verify** manufacturers' claims. • Access to onshore skills and resources to **independently validate and interpret** system and system-of-systems level capabilities and interoperability in appropriate operating environments. • Guaranteed access to onshore skills and resources able to provide **assurance of the safety and capability** of Land systems and platforms.

LONG-TERM SKILLS PARTNERSHIPS TO DEVELOP UK TECHNOLOGICAL ADVANTAGE

72. Previous chapters have set out the Army's capability vision and renewed focus on increasing investment in S&T; supercharging innovation, research, and experimentation; and co-developing next generation skills and capabilities. This investment will be directed towards a set of technology areas and skill sets. Some of these align to existing strengths of the UK industrial base (where we wish to maintain access and our competitive edge) whilst others will be candidates for international collaboration and, potentially, inward investment to the UK.

73. By collaborating and investing in priority technology areas, the Army seeks to secure access to critical technologies. **To do so, the Army and its delivery agents will place a premium on enhancing social value outcomes**, including the long-term skills base and associated industrial capabilities.

74. The strength of our **industrial base depends on a highly skilled, qualified, and experienced workforce that can deal with the rapidly changing level of technology and evolution of complex systems needed for future capability development.** Attracting new talent capable of performing the complex data and computer science tasks that are required for the next generation of systems is a challenge that the Army and defence industry share.

For the Army, the priority areas where a cadre of skills and experience requires development and sustainment include:

- Software developers and product managers.
- Signal processing engineers.
- Software and systems quality assurance.
- Design and systems engineers and expertise.
- Systems integrators.
- Safety engineers.
- Data scientists.
- Survivability Engineering.
- Materials Scientists for metals, composites, and fabrication processes.
- Energetics engineers and experts.
- Programme and Project Managers.

75. This list is not exhaustive. Some of the skills will sit in industry and some will need to reside within the MOD. To understand the current state of Land-facing industry, a periodic **Industrial Health Assessment** will be developed that will highlight areas of strength and weakness across key skills and capabilities.

76. To enhance the development of, and access to, workforce and skills the Army will:

- Continue to build a professional project and programme management cadre. The Army is investing in dedicated Senior Responsible Owners and more stable project teams to provide **workforce continuity** in major projects. We expect industry to reciprocate.
- Establish a **programme of external placements** where we seek to embed our people directly into the Army and industry to develop strategic knowledge, skills, and experience over a longer period for mutual benefit.
- Make more use of **Sponsored Reserves** to enable industry to provide future capability and surge capacity.
- Continue our success with **apprenticeships, Further Education Colleges and Universities**, building on our strong relationship with the education institutions to deliver a highly skilled workforce across the land sector.

INCREASED FOCUS ON ENHANCING UK SOCIAL VALUE

77. The government has published its intent in relation to delivering social value, and how it expects social value to be considered in all significant public sector procurements (including those under the Defence & Security Procurement Regulations). **Our ambition is that future land procurement programmes will contribute at least**

20% to social value policy outcomes. With £41.3bn of investment in Land equipment and support over the next ten years there is an incredible opportunity now to help 'build back better' post COVID-19, level up the whole of the UK, and support the transition to NetZero. This intent is captured in the LISOF, which includes 'Enhancing Social Value' and 'Cultivating an Innovative, Competitive and Highly Skilled Industrial Base' as key objectives.

78. The LIS supports the government's social value outcomes in a range of other ways. In relation to **tackling economic inequality**, the LIS will drive the **creation of new businesses, jobs, and skills**[20] by investing in innovation and disruptive technologies throughout the supply chain. Furthermore, over the next 10 years, the MOD will invest over £40Bn[21] in Land equipment and support. **This pipeline of investment will create more opportunity for businesses across the UK, promote growth in high-end skilled employment, generate UK work share and intellectual property, and help secure greater export opportunities**. As part of future tenders and ongoing contract management, we expect businesses to demonstrate how they are investing in UK skills, infrastructure and innovation and will measure and monitor progress through contractual performance indicators.

79. Tackling economic inequality also requires an **increase in supply chain resilience and capacity**[22]. The new approach to operational independence (set out above) will increase the resilience of UK and international supply chains, but we also wish to enhance the capacity and diversity of the UK supplier base. **This includes a greater role for start-ups and SMEs, which are often an engine for new skills, technology, and innovation**.

80. In terms of **fighting climate change**, the Army and Industry have significant opportunities to reduce greenhouse gas emissions and transform its infrastructure and equipment to be more sustainable. For the Army, increased use of synthetic training, optimisation of the training estate, and changes to the built estate will drive reductions in carbon emissions. Investment in the development of hybrid/electric powertrains, hydrogen power and other green fuels offer operational benefits (e.g., enhanced mobility and lower noise) alongside sustainability improvements. Introducing circular economy and other sustainability targets across the supply chain will aim to reduce Scope 3 emissions.

81. Where possible, the Army will act as a 'fast-follower' and leverage the investment being made by civilian organisations in developing green technologies; working collaboratively with them to pursue potential military applications. UK industry has already made significant progress in civilian-focused applications and there is an opportunity to gain first mover advantage in relation to how these are applied in a military environment. An industry advisory group has already been established, including UK Universities and Catapult Centres, to help plot the best route to an electrified Army.

82. The LIS will also help **provide equal opportunity** by inviting companies that wish to work with the Army to explain the steps they are taking to reduce the disability employment gap and tackle workforce inequality.

A COLLABORATIVE APPROACH TO CULTURE, BEHAVIOURS & COMMUNICATION

83. Successful implementation of the LIS will require an associated change in culture and behaviours across the enterprise. Too often, overly transactional relationships between all parts of MOD and industry have led to cautious, risk averse and low trust behaviours that, ultimately, have not resulted in good delivery performance. This must change.

84. The LIS ambition is that trust and collaboration will be central to future ways of working, with all parties aligned and incentivised around a set of long-term capability goals or outcomes. We intend to embed this drive for a different culture in our agreements with industry,[23] in the way we set up governance and take decisions, in the way we

20 As per Theme 2 of the Cabinet Office Social Value model Social-Value-Model-Edn-1.1-3-Dec-20.pdf (publishing.service.gov.uk).
21 Defence Equipment Plan 2021.
22 As per Theme 2 of the Cabinet Office Social Value model.
23 For example, including ISO44001 collaborative business relationships principles within future contracts to place the onus on MOD and industry to demonstrate collaborative behaviours.

share our intent, requirements, and plans, and in how we establish dedicated SROs and project teams that can be an intelligent customer of industry.

85. As a first step, the LIS sets out an overview of Land investments, to provide industry with a level of visibility of the Army's intent. We wish to go further. A **Land Enterprise Working Group (LEWG)** will be established toward the end of this year between MOD, industry (including SMEs), and academia. The LEWG will complement the work carried out by the Defence Suppliers Forum and its various sub-groups, with care taken to avoid duplication. Its focus will be to:

    - Promote meaningful dialogue across a range of topics, with industry providing their insight and experience to shape approaches and solutions.
    - Agree, monitor, and manage a series of confidence building measures that capture the collective view of the key changes that will drive improved outcomes.
    - Provide visibility of capability goals, roadmaps, and MOD/ industry investment plans.
    - Discuss and agree technology investment priorities and where the UK can develop a technological 'edge'.
    - Discuss application of the LISOF, including Operational Independence and associated risks and issues.
    - Assess the state of Land-facing industry (drawing on an Industrial Health Check) and leverage pan-Domain lessons identified.

86. The Army expects that industry will reciprocate by working collaboratively and by using the increased transparency and confidence in Army intent to invest in the skills and capabilities needed to tackle shared challenges.

5. INCREASING INTERNATIONAL COLLABORATION AND EXPORTS

- **Effective international partnering offers the UK the best opportunity to access the capabilities and supply chains we need at an affordable through life cost.**
- **All new projects will explore collaborative opportunities utilising our unique network of capability cooperation forums to identify mutually beneficial propositions that still meet the UK's operational independence and technology investment needs.**
- **A new cross-government Land Capability Campaigns Office (LCCO) will help co-ordinate government support to key export campaigns with industry and partner nations.**

INCREASING INTERNATIONAL COLLABORATION

87. The range of technological and industrial capabilities required to field cutting edge military equipment in any domain is extensive. The UK has several world-leading companies, as do our allies, so the UK often draws on their expertise to complement our own. We assess that **cooperation will become increasingly important as Land capabilities become more complex** and reliant on diverse technologies and supply chains.

88. The size of UK Land Forces has reduced considerably since the MOD's last major investment in its core equipment. As the MOD modernises and transforms UK Land Forces, **it must address the challenge of low volume acquisition.** The lesson of the past is that bespoke equipment and low batch numbers incur disproportionate design, manufacture, and through life costs; a challenge also faced by many of the UK's allies and partners.

89. UK Land Forces are also international by design. They fight in coalition and the UK has a leading role in integrating partner nations into effective formations, especially within NATO. Co-investment in new capabilities offers the potential to **spread development and procurement costs, while enhancing interoperability, and supply chain resilience.**

90. The DSIS emphasised that the UK would remain uniquely open to working with trusted allies and partners, and that the Government would continue to welcome overseas-based companies and foreign direct investment into the onshore industrial base. As part of the LIS, the MOD is **choosing to prioritise effective international co-operation** on new projects as it offers the best opportunity to secure access to the innovative and affordable capabilities we need, as well as increasing Defence's contribution to alliances and UK prosperity.

91. To give weight to this prioritisation, **new projects will now be required to consider collaborative opportunities** as a matter of course and assess the concomitant benefits to the UK. We see these as:

    - Access world-leading capabilities.
    - Shared risk and reward of development.
    - Reduced unit acquisition and through life support costs.
    - Greater interoperability with allies.

92. To identify the most promising propositions, the **MOD will leverage its unique network of international Land capability co-operation forums.** The Army is already considering collaboration on a number of fronts, including additional BOXER variants and through life support; the procurement of bridging assets, synthetic trainers and long-range fires; the development of advanced ammunition; and early co-investment in a future ground combat system. This list is far from exhaustive. Implementation will build on the successful use of multinational R&D programmes, user groups and institutions that have significantly improved the mechanisms for joint acquisition. These have increased confidence in effective partnering and the benefits that can be realised through international collaboration.

93. Of course, national requirements don't always match so the MOD will need to be clear with our partners as to what IP, technology, and industrial capability the UK will contribute and why. As a starting point, we have set out in this document our operational independence requirements and technology investment priorities in Chapter 4.

BOXER USER GROUP

The British Army is looking forward to cooperating with Germany, Netherlands, Lithuania, and Australia in the all-new five Nation BOXER User Group. This is an important step in multinational co-operation on shared defence equipment ownership and management, with five Nations united around the aim of exploring and maximising the BOXER Capabilities through life.

This new International User Group will add value to all five Nations as they develop and deploy BOXER, by contributing their different operational experiences and sharing ideas on experimentation and support.

INCREASING EXPORTS

94. Securing land exports can also increase supply chain volume and create a steadier drumbeat of orders to help sustain the industrial base beyond a UK order book. In turn, this helps industry invest in their own future, including the industrial skills and capabilities the UK needs. Moreover, exporting capabilities and associated training, information, and support services to partner nations allows the UK to increase its global reach, build important defence relationships and offset the rise of new (potentially malign) actors in this highly competitive market.

95. On the back of Army modernisation, there is now an opportunity to garner a greater share of the **£45bn UK addressable market for ground combat systems over the next decade**;[24] with a realistic aiming point of an additional £6bn and spin-offs into other uses and markets. This makes the UK's Land sector an attractive market in which to invest, creating significant opportunity for industry and UK prosperity.

96. Given the importance of Land exports, the UK Government has **formed a new LCCO, under UK Defence and Security Exports leadership**, that will co-ordinate activity across government and wider stakeholders to generate market intelligence, direct specific campaigns, provide wider support to exporters and facilitate inward investment. To ensure it is properly supported, the LCCO will report to the ministerial Defence and Security Export Working Group through the MOD-led Strategic Exports Group.

97. The LCCO will also be augmented by **a new Army Industry & Exports Office, that has been stood up to ensure exports becomes part of the Army's routine activity**. This includes international Army to Army engagement, and the Army's contribution to government export offers, such as information sharing, programme support, and joint training. Importantly, it will also provide advice on export considerations at the outset of a project to help SROs shape user requirements and set suitable export objectives that bear an appropriate weighting. This advice applies equally to disposal activity as the Army looks to rationalise its fleet and maximise the value of sales to the UK and partner nations.

24 Estimations provided by the UK Defence Solutions Centre.

6. PLANNING FOR SUCCESSFUL IMPLEMENTATION

- **Implementing the LIS requires a multi-year programme of wide-ranging activities across MOD and industry. Progress will be monitored and managed through the LEWG.**
- **A set of initial Confidence Building Measures have been developed as part of wider implementation. These will be refined further in collaboration with industry.**

CONFIDENCE BUILDING MEASURES

98. LIS implementation requires wide-ranging changes across multiple years. It is also dependent on changes being pursued through other strategies, such as DSIS, the Army strategy and the DE&S strategy. The Army Industry & Exports Office will take the lead on developing LIS implementation plans and mapping the dependencies with other change initiatives.

99. As part of building an open, transparent, and collaborative culture, an initial set of Confidence Building Measures (CBMs) have been developed (see **Table 3**). These provide a high-level view of some of the key changes required by the LIS and associated timeline. The LEWG will be used as a mechanism for the MOD, industry, and academia to monitor progress to deliver these CBMs and manage any slippage or changes. It is expected that this initial set of CBMs will be reviewed and refined as part of the work of the early LEWGs, with additional CBMs being added through this process.

#	Initial Confidence Building Measures	Date
1	Publish Ministerially endorsed LIS including initial Land investment landscape	2022
2	Establish Land Environment Working Group (LEWG), hold first meeting and agree a charter, upcoming topics for discussion and key actions	
3	Commence formal industry engagement on the Land Integrated Operating Services (LIOS) project, including proofs of concept	
4	Experimentation & Trials Group established	
5	Develop a commonly understood capability aiming point for MERCURY and the first tranche of capability goals informed by industry workshops and the LEWG	
6	Develop joint priority technology investment areas between Army and industry (via the LEWG)	
7	Publish Battlefield Electrification Strategy	
8	Commission Industrial Health Assessment (jointly with industry via 3rd party)	
9	Deliver Army Warfighting Experiment 2022	
10	Confirm fleet rationalisation and disposals plan and share with LEWG	
11	Develop first joint technology investment priorities list between Army and industry (via the LEWG)	2023
12	Develop priority platform and system Through-life Capability Roadmaps, informed by the LEWG and incorporating wider industry investment activity	
13	LIOS Invitation(s) to Tender or equivalent initiated (for contract commencement in 2025)	
14	Category Management future contracting landscape confirmed	
15	Develop MECURY technology pull-through plan for target areas (systemic protection)	
16	LIOS ITT/contracting (for commencement in 2025)	2024
17	LIOS contracts for initial tranche of platforms commence	2025

Table 3: **Summary of initial Confidence Building Measures relating to LIS implementation**

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