

UKspace Defence Industrial Strategy Submission

28th February 2025



UKspace has been the industry led trade association for space for over 30 years. It is the only trade association dedicated to the UKspace sector covering the whole value chain and encompassing members of all sizes across all four home nations.

UKspace is focused on helping our members to grow the UKspace space sector and their businesses. We represent industry with the UK Government, Parliament and national and international stakeholders. Our team has over 40 years of experience in the space sector and we speak with one powerful voice on behalf of our membership.

Executive Summary

Tackling the world's geopolitical challenges and building a strong economy are complementary objectives. The UK's long-term prosperity must be resilient which requires building a secure supply chain for critical goods from a sovereign UK value chain to ensure the UK has freedom of action during any future geopolitical shifts. The space sector underpins this ambition in delivering critical UK space capabilities, which support the Ministry of Defence (MOD) in the execution of its space missions to Inform, Warn, Protect, and Defend. This ranges from secure, hardened satellite communication systems to the ability to track and monitor objects in space, support regulation and understand the threats to our nation. This submission will demonstrate how the UK space industry delivers security, prosperity and resilience to the MOD and the wider UK economy and is positioning itself for future threats and opportunities in the space domain.

UKSpace proposes that the DIS:

- 1) Reinforces the importance of Space in Multi Domain Operations, the associated funding to existing MOD programmes and leverages any space settlement from the SDR that allows UK to build on the growth in Defence Space investment from 2021 to deliver capability that ensures future UK operational independence across all 5 domains.
- 2) Adopts a whole of Government approach to Space investment and ensure funding is utilised across departments to co-ordinate funding and maximise dual use or multi-application opportunities in support of UK growth and meet 2.5% of GDP targets for UK defence spending.
- 3) Supports the creation of a National Space Enterprise, driving coherence across Government programmes, and promote a UK Space ecosystem centred on the Regional Space Clusters and Regional Defence and Security Clusters to drive innovation and take advantage of commercial benefits that come from an end-to-end UK space value chain.
- 4) Ensures that mechanisms are in place for MOD to leverage capabilities from SMEs, technology companies, and innovators, particularly in support of operations.
- 5) Explores opportunities to work closer with European allies through NATO, the European Space Agency (ESA); especially in areas such as Space Safety, Earth Observation and Science and Exploration. We also welcome ongoing efforts to seek a new relationship with the EU into initiatives such as the European Defence Fund (EDF) and the EU Agency for the Space Programme (EUSPA), especially on Space security topics.
- 6) Explores opportunities to work closer with global allies, including the US, Japan and Five-Eyes partners as well as bilaterally with partners in Europe, including joint delivery programmes, sharing of data, alerts and warnings derived from UK assets such as the National Space Operations Centre (NSpOC), and supporting Government to Government (G2G) export opportunities.
- 7) Supports a UKSpace seat on the newly formed Defence Industrial Joint Council supporting and prioritising Defence Space Exports

- 8) Advocates for regulatory positions (domestically and internationally) which drive UK space innovation and investment and prevent a space monopoly by one company or country at the expense of the UK national interest and freedom of action.

Background Information

Before we demonstrate how civil and military space can provide mutual benefit, a quick look at the numbers:

- Services from or enabled by space underpin £364bn of UK GDP
- £5.8bn is raised from exports including from assets such as Skynet
- £19.3bn has been invested in the sector in the last 10 years
- £18.9bn of revenues pa are generated by UK space companies

Space underpins 16% of the UK's GDP and a day without space would cost our economy £1.2bn¹. Furthermore, it would leave us without the ability to connect, warn, guide and inform military decisions and we could instantly lose operational advantage and the freedom of action to conduct military operations to protect and defend our nation. The UK is now far behind the US, France and German in terms of its investment in space².

Several countries, particularly Russia and China, have established forces devoted to the military use of space. There has been a proliferation of highly manoeuvrable adversary satellites, anti-satellite weapons and counterspace directed energy weapons, terrestrial and space-based, all of which present a significant concern and challenges the UK's interests in space. 70% of all Chinese satellites are less than 4 years old. Our adversaries regularly demonstrate their willingness to operate beyond normal behaviours which could lead to loss of critical capabilities that are dependent upon space technology and services. International agreement on norms of behaviour remains dangerously elusive and the increasingly 'dual use' (multi-application) nature of assets in space makes it more difficult than ever to predict, attribute and respond to threats in from and to space.

We also need to consider the impact of events in space on terrestrial activities (whether it is a collision with one of the other 11,000 active satellites, or 1.1m pieces of debris greater than 1cm currently in space³) or a deliberate act to interfere with another state's strategic advantage in space, our need to understand what is happening in space and our ability to mitigate, deter and react to any threats and aggressive actions has never been greater. Because of the severity of the impact of events in space on terrestrial activities eg the UK's Integrated Force operations, critical national infrastructure, financial transactions, commerce and the wider societal impacts of a loss of access to Position, Navigation and Timing (PNT), and satellite communications, space is now a war-fighting domain in which the UK Armed Forces must be postured and prepared to fight and win. This can only be achieved in partnership with an agile, vibrant and resilient space industry.

In this wider global context, we provide the following response against the six theme areas outlined in the DIS Statement of Intent:

1 Prioritise UK businesses

The UK space sector is home to around 1,800 organisations and 52,000 employees. It is situated across the country from the Lizard Peninsula to the Shetland Islands. It is served by 14 regional clusters with

¹ [the_case_for_space.pdf \(publishing.service.gov.uk\)](#)

² [Global governmental spending on space programs of leading countries 2023 | Statista](#)

³ https://www.esa.int/Space_Safety/Space_Debris/Space_debris_by_the_numbers

centres of excellence at the Harwell Space Campus in Oxfordshire and the National Space Centre in Leicester. A small number of larger companies (around 20) account for 75% of space-related income⁴ 90% of the sector is made up of SMEs with the remaining 10% by larger companies such as Airbus and Viasat. Other UK and US Defence primes have small but growing UK space footprints, such as BAE Systems, Lockheed Martin, and Northrop Grumman. We have universities among the ‘businesses and the sector is largely funded by public private partnerships with up to 12 different government departments. The MOD provides roughly 50% of the UK’s funding to the sector and is becoming increasingly aware of dual use or multi-application opportunities that lie in the civil and commercial parts of the sector.

As a sector we would like to see developments which would deliver UK growth and competitive advantage:

- 1.1 Maintain funding to existing programmes and invest in areas of strategic need PNT, Space Domain Awareness (SDA) and space control functions), particularly where UK competitive advantage exists. (For example, the UK is a world leader in small Earth Observation/ISR spacecraft and payload sensors (VIS, NIR, MWIR, hyperspectral, magnetometry, SAR) which can equally be readily employed to space-based SDA as this capability area expands. These SDA sensors become particularly powerful with the UK’s world leading expertise in Rendezvous and Proximity Operations (RPO).
- 1.2 Lean in on dual-use or multi-application opportunities in key areas – Rendezvous Proximity Operations, hypersonics, responsive launch, telecoms network convergence, Direct to Device, and space domain awareness. HMG will also need to address the barriers to investment that certain banks and institutions place on companies engaged in defence activities, particularly at an SME level.
- 1.3 The speed at which the MOD procures can be detrimentally slow and must be addressed as a strategic priority. Additionally, make MOD procurement more accessible to SMEs who provide not only the ability for organic UK growth and sovereign supply but are also agile and can innovate at the pace of the threat. This will require significant change to procedures for commercial procurement to take account of the differences between mature primes and non-traditional supplier SMEs. We don’t believe the current Industrial Plan will do this.
- 1.4 Balance the industrial impact of buying space services direct from US companies (without substantial UK presence) and any consolidations within the European space industry
- 1.5 Recognise the consequences on the UK industrial base of buying services from companies who do not manufacture in the UK or who may not provide sovereign assurance in times of crises.
- 1.6 Use UK’s competitive advantage in emerging markets such as optical communication ground networks, Rendezvous and Proximity Operations, In-Orbit Servicing, Assembly and Manufacturing⁵ and other in-orbit innovations to develop sovereign capability

The UK Space Command Capability Management plan identified seven critical capabilities: Satellite Communications (satcom); Space Domain Awareness (SDA); Intelligence, Surveillance, Reconnaissance (ISR); Command and Control (C2); Space Control; Position, Navigation and Timing (PNT); and Launch

There has been a short-term focus on continuing to develop our independent Satcom capability through the Skynet programme, and an enhancement of the SDA and Space C2 programmes through Project Panoptes and Borealis, limited investment in Space Control, and significant investment in ISR capability. The future of all these programmes remains unclear heading into the Strategic Defence Review and Spending Review. Without this investment there will be continual decline in the number of Primes and SMEs in the UK; some SMEs have also gone into decline and there have been big manpower reductions in

⁴ [Size and Health of the UK Space Industry 2023 - GOV.UK](#)

⁵ <https://www.ukspace.org/iosm-market-opportunity-for-uk/>

2 of the primes. The industrial base is already shrinking which was highlighted by a number of major UK Primes at the Defence in Space Conference 2024. Many of these companies have invested heavily to meet the signalled MOD intent; this cannot be allowed to dissipate with UK industry taking financial losses, or the trust that MOD means what it says will inevitably ebb and the industrial base will not react to such indicators in the future. Position, Navigation and Timing is fundamental to UK Defence and is woefully underfunded.

The largest new investment in 2021 was in the UK ISTAR programme, which has not achieved its target dates as articulated in the Defence Space Strategy largely due to lengthy competitive procurement phases, although we have now seen all space assets under Phase 1 of this programme placed on contract and the concept appears to have fallen by the way-side with no further development past the current programmes, (Tyche, Juno, and Oberon and Titania). This programme should be resurrected and driven forward at greater pace to ensure the UK has the assets in the Space Domain to provide sovereign assurance during crises in an ever changing Geopolitical environment, whilst also building UK capacity in a growing Military ISR export market.

Without this investment there will be continual decline in the number of Primes and SMEs in the UK; some SMEs have also gone into decline and there have been big manpower reductions in 2 of the primes. The industrial base is already shrinking which was highlighted by a number of major UK Primes at the Defence in Space Conference 2024. Many of these companies have invested heavily to meet the signalled MOD intent; this cannot be allowed to dissipate with UK industry taking financial losses, or the trust that MOD means what it says will inevitably ebb and the industrial base will not react to such indicators in the future. Position, Navigation and Timing is fundamental to UK Defence and is woefully underfunded.

These programmes were subject to competitive award and as such have already been instrumental in shaping the UK space sector in ways described above. The MOD has clearly signalled a reform of procurement which could see the prioritisation of key companies and key areas. We would highlight the following points:

- 1.7 The implementation of the Procurement Act 2023 will make it easier for suppliers to have visibility of opportunities within the MOD and also enable new and non-traditional suppliers to take MOD contracts including SMEs. As 90% of our sector is made up of SMEs, we would be keen to ensure this is the case. However, much more needs to be done to leverage non-traditional suppliers to MOD. Space industry experience has been marred by onerous Professional Indemnity insurance pre-requisites, and unreasonable requests to commit hourly labour rates for multiple years without any account for inflation – these are simply not in line with commercial companies where these space companies are used to doing business. Space industry contractors are also still finding it difficult to engage with classified requirements without already having the work committed.
- 1.8 UK subsidiaries with a US parent should (and do) provide reciprocal access to US programmes of record both to foster innovation and shared security but also to meet the US strategic ambition of proliferated capabilities and ‘Allied by Design’. US players bring high levels of capability but also access to programmes such as F-35 and wider partnerships such as AUKUS. The UK government should capitalise on this to ensure that UK companies can secure workshare on US programmes, perhaps with a reciprocal strategy with more weight on areas such as social value. Access to US National Security space programmes from non-US companies is extremely limited - even for those European companies with a US subsidiary. However, we recognise that the circumstances under which arrangements would develop have recently changed but we would still urge the MOD to pursue this course of action in the interests of mutual benefit. The UK MOD needs to be

at the table so that they can leverage UK capability in support of US programmes, however it should be equally cognizant of export restrictions and limitations on satellite capabilities even to the UK

- 1.9 UK subsidiaries of European companies play a similar role, particularly regarding ESA programmes. There is likely to be consolidation within the European space industry and the UK government will need to ensure that UK based subsidiaries are not disadvantaged by such restructuring but strengthened by access to international opportunities and collaboration. Workshare in the UK must be maintained if we are to award contracts for assured capabilities to companies headquartered in other countries. The Investment Security Act has clear guidelines for this.
- 1.10 Loss of PNT has been explicitly stated as MOD's greatest space-related risk. Loss of PNT has recently been included in National Risk Register given its widespread use across all 13 CNI sectors and throughout a multitude of civil and commercial applications, the estimated loss from GNSS disruption, particularly in timing capabilities, could be as high as £1.4 billion per day.⁶ New PNT systems are needed to keep ahead of the threat and will be based on optimal integration of assured space based, terrestrial and autonomous sensor technologies. PNT has also been highlighted within the National Space Strategy⁷ as the second fastest growing global sector (measured in CAGR) behind satellite broadband, thus PNT offers a significant contribution to increasing national prosperity as well as enhancing national security. PNT is identified as a key theme/area in the Space Industrial Plan, Defence Space Strategy and The Council for Science and Technology's 'Priorities for Strengthening the UK's Sovereign Space Capability' The UK is the only permanent member of the security council without its own independent space-based PNT system that provides resilience to global interests and the economy such as shipping and air transport. The UK space sector will also be key to delivering on the [previous] Government's Framework to Bolster Greater PNT Resilience (aka the PNT 10-Point Policy Framework). This is also a prime example of how CubeSat/Microsat can reduce this risk in the short term to complement a longer-term strategic approach. However, UK MOD and OGD are not investing in this area; there is no strategy, roadmap or clear way ahead being provided to industry.

2 Create Partnerships

Dual use (multi-application) will be a central plank of future strategies in both the MOD and the civil departments. In order to make this work attention will need to be given to potential contracting mechanisms for converting from civil to military application and MOD commercial officers will need to work closely with their civil counterparts.

2.1 Civil Partnerships

National Space Operations Centre

The National Space Operations Centre (NSpOC) is a dual use, or multi-application centre of operations for the military and civil mission sets including warnings for uncontrolled re-entries, space weather events, in-space collision), fragmentation warning, launch notifications and Near-Earth Object tracking for planetary defence. The UK is a world leader in the areas of weather forecasting and space weather forecasting. By combining operations at NSpOC the UK economy is able to derive benefit from a joint

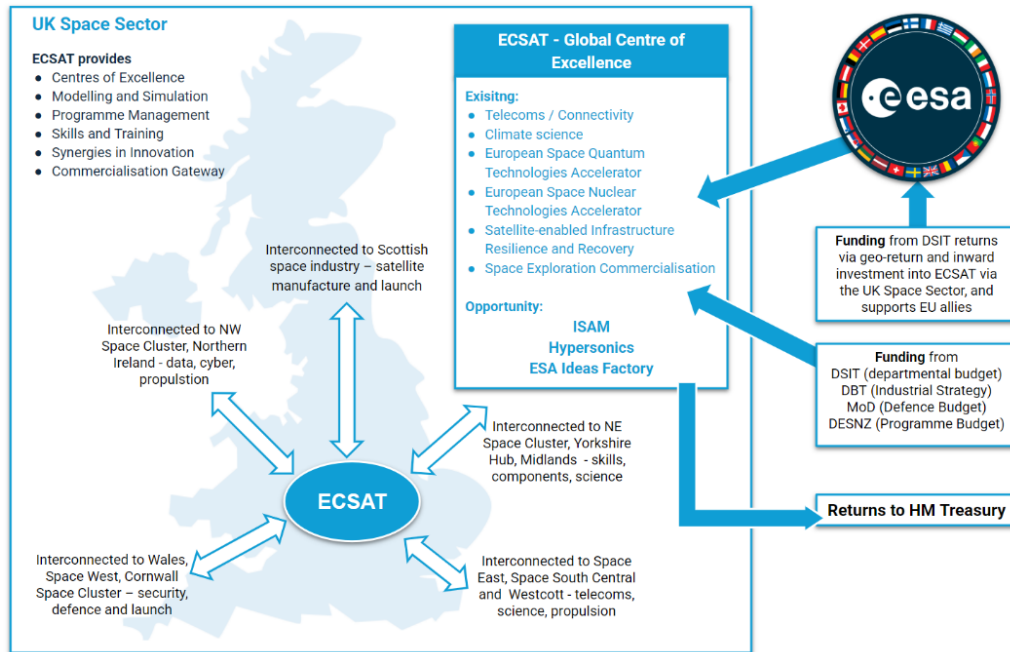
⁶ (The Economic Impact on the UK of a Disruption to GNSS - 2023).

⁷ [National space strategy - GOV.UK](#)

approach to operational streams of work, sensors, procurement of data, software, training and planning. This could be extended to provide exportable data sets, products and services and to reduce reliance on the potentially unstable supply of data from external sources. Developing exquisite UK knowledge from data will provide decision advantage and will enable the UK to transact with its closest allies for existing information in a changed geopolitical relationship.

Further expansion of a dual-use approach through the National Space Enterprise model would enable the MOD to access the significant and world leading capabilities that exist in the Earth Observation and Satellite Communications industries as well as the emerging capabilities in ‘new space’.

UK Space Agency and European Space Agency



ECSAT at the centre of the UK Space Sector

The UK Space Agency (UKSA) works with the MOD to harmonise UK space research and development but currently this is not working as well as it should be. In addition, through the UKSA, the UK works with the European Space Agency (ESA) on a variety of very large and significant space programmes, some of which contribute to our national security (eg space weather monitoring, climate monitoring, satcom and navigation). As the UK looks to reset its security and defence relationship with our European allies it is worth highlighting a proposal being made by industry for the Council of Ministers 2025. Although, post Brexit, the UK is not permitted to participate in EU security programmes, there are some ESA programmes under which we partner with French, German and Italian allies to supply dual use (multi-application) capabilities. We have an ESA facility in Harwell, co-located with the UK space campus which could provide a focal point for future space activities that help industry to pursue these key relationships. For example, ESA ECSAT (the centre for ESA secure telecommunications work) can leverage the key capabilities it already has; mission leadership, modelling and simulation, programme management, skills and training, innovation and commercialisation in support of the UK space programme. Keeping this as the hub for the UK, will also link up the regional space clusters, help to focus ambitions, and more importantly enable the delivery of the strategy set out in the National Space Strategy and the Defence Space Strategy.

UKs Space Defence Capability often leverages innovation done under civil programmes, both national and international. Space EO technologies originally developed under funding within ESA (EO) and the national Centre for Earth Observation Instrumentation (CEOI) activity are on occasion adopted for ISR applications. Similarly, defence capabilities can leverage R&D in ESAs PNT and Telecom programmes. To better leverage multi-application/dual-use opportunities we would suggest the alignment of civil and military space budgets (noting that DSIT has a 3-yr budget cycle, but MOD works on 10 yrs). This alignment of space resources could be overseen by a National Space Enterprise model and could enable the 2.5% of GDP target to be reached in different ways. DSTL and UKRI should work closer together to take advantage of synergies and to guide R&D to areas of mutual benefit.

2.2 International partnerships

If we maintain the status quo the UK will be heavily reliant upon international partners and allies for our security and deterrence in and from space (even after the Defence Space Portfolio (DSP) has fielded all its funded programmes by 2030.) Consequently, there is a risk that there will be no related industrial sector growth, and the UK will be unable to secure its own freedom of action and decision advantage but is, instead, subject to the vagaries of geopolitical developments. Space is inherently a global business and the UK's demand signal is weak with development slower than other countries. The UK can secure greater advantage by taking a more strategic approach to the use of existing partnerships to get more industrial benefit out of them.

'Government to Government' (G2G) sales are increasingly sought by other nations. They bring benefits to both nations in terms of strengthening bilateral relations and strengthening the UK's industrial base. The UK is not well set up to respond to this model. There are several steps government could take to set the UK up to better compete with i.e. US and France.

Suggestions include:

1. Political commitment and signalling that G2G exports are a lever the UK can use to strengthen international partnerships and drive our industrial base. Possibly building on existing DSE and Export Finance activities, UK should invest in an 'open for business' strategic communications campaign.
2. MOD to work with industry on a UK "NATO 1st" industrial plan to help provide clear direction on alliance export so that companies can develop roadmaps with a "NATO 1st" mindset. Promote Alliance demand signal briefings to help advise companies where potential opportunities might exist would be very helpful and particularly crucial for SMEs without a larger footprint in other countries. This could be delivered through the UK NIAG.
3. A National Space Enterprise approach with a single Minister responsible for strategy, systems and campaigns design and execution, or a single authority and accountable entity which could be a CO committee (preferably at Cabinet level), supported through Collective Agreement at the National Security Council by the whole of government and accountable to Parliament for exports delivery.
4. A single interdisciplinary civil service team that pulls together technical, commercial, industrial and diplomatic expertise and that is empowered to drive campaigns to success across Whitehall and overseas, in essence bolstering the existing National Space Board
5. Integrated government-industry campaign teams building on a nascent model that is working well so government and industry representatives can build trust and negotiate with one voice.
6. A single IT interface between MOD and industry through which we manage a standardised information management, governance and reporting system.

Whilst we must develop sovereign capability where identified as necessary by Government, several of our international allies and partners have UK based subsidiaries that are valued members of our domestic

space ecosystem, and this value is currently underutilised. Their participation and workshare are essential not only for the skills and expertise they bring but also because they help to align our security strategies with our closest partners and allies. Similarly, any future security pacts with our European allies could be cemented by the workshare arrangements we currently have through defence space programmes such as Skynet which will be central to the UK's role in addressing the Russian threat.

In terms of defence and security the US is our most important ally and as such there should be a formalisation of US/UK defence space partnership to include specific and noble work for the UK space industry. We welcome the incoming trilateral agreement under the US Defence Procurement Act that will make both Australia and the UK 'domestic' suppliers in the US and we would like HMG to promote the interests of the UK space industry into US defence space programmes. This would have the benefit of leveraging the significant investment they have made in space technology which would then accelerate the capabilities in the UK. Growing the AUKUS, Combined Space Operations (10-Eyes), NATO and other allied partnerships will significantly enhance UK's position as a key contributor not just to policy but to leading capability too. For example, the CSpO initiative should be a key focus because Japan, in particular, has an advanced space procurement programme with key opportunities for UK defence space export and the Nordics, Scandinavia and France are also looking to develop 'own' capabilities which match our needs. There are therefore other opportunities for strategic alliance.

2.3 NATO

The Government has specified a NATO first approach, and we would recommend considering options from within the DSP for this. By way of illustration, the ISTARI programme which is currently in plan to deliver a UK space-based intelligence surveillance and reconnaissance capability could be reviewed and repurposed as an asset that can be made available to NATO. The UK has already stated its intent to participate in NATO's Allied Persistent Surveillance from Space, which enhances NATO's access to space-derived Earth Observation data. The NATO Space Operations Centre is growing in significance for NATO and the UK is well respected, and well placed, for thought leadership here which industry can support with credible capability in terms of C2, the potential for a UK Space Defence Centre being the only European above Secret hub for space information and Decision Support.

We believe there are sufficient UK companies providing multiple options for delivering such a capability in partnership with other NATO ally countries to ensure that this not only delivers a space based ISR constellation **for** the UK, and **by** the UK, but which is also international by design and so would enhance its exportability to partner nations. Alternatively, there is also the Aquila Network to which we could contribute data⁸. Either way, there are options within the DSP for the UK to play greater role in bolstering NATO's strategic advantage in space⁹. As defence of the "High North" is a strategic UK defence priority, enhancing collaboration within NATO allies such as Norway, Finland and Sweden should be prioritised.

3 Certainty and Stability

⁸ **Aquila equivalent for SDA to achieve Alliance Persistent Surveillance of Space** - Virtual constellation of national and commercial assets to achieve broader SDA picture. Could incorporate ground and space-based "search capabilities" to identify and track objects of interest, task-able "inspection / reconnaissance services", reactive and defensive SDA from attribution assets or existing assets. UK can contribute to ground based-SDA and has novel in-space sovereign SDA capabilities (particularly RPO).

⁹ **IOS Provision at an Alliance Level** Provision of IOS services across the alliance (e.g. refuelling, EOL, upgrade, repair, etc.). The economies of scale are great when it comes to In-Orbit Servicing and multiple collaborative clients would yield a more competitive price than purchasing alone – particularly in GEO, where minimal ΔV is needed to move between clients.

SMEs are drivers for innovation and growth in the space sector, and benefits to society but need certainty of funding, visibility and consistency of long-term roadmaps and ongoing support to allow them to apply limited resources effectively and are typically less able to absorb changes in strategy into core revenue. SMEs need support to develop, grow and to work successfully and sustainably with the larger organisations in the sector and so need dedicated mechanisms especially around retaining core skills, integrating into supply chains, specific measures and targets within policy.

1. Skills –SMEs, especially those innovating around new concepts/methodologies/technologies, often invest significantly in their workforce but an over-emphasis stop-start funding can significantly damage this pipeline.
2. Procurement –Access to security and defence opportunities continue to present a barrier for SMEs. To ensure resilience in our economy we need to push for upskilling SMEs in security requirements both at organisation and delivery levels.
3. Regulation - As global competition has intensified in response to growing interests in space, the regulatory environment has become the critical means of ensuring equitable behaviour and that space remains accessible to all nations. The UK has an opportunity to actively wield its geopolitical influence to shape international space policy on topics such as space sustainability and spectrum allocation/interference and facilitate greater opportunities for UK space companies to compete on the global stage. The UK's economic and security interests in space will not be well served by a space economy dominated by US and Chinese mega constellations. Rather, HMG should align behind its strategic economic and security objectives and advocate for regulatory positions which drive UK space innovation and investment and prevent monopoly by one company or country.

4 Seize the Future

4.1 Satcom

As numerous customer and geographical markets require greater connectivity in a data-driven world – from transportation to financial services, logistics, energy and healthcare - there is massive potential to contribute to closing the global digital divide while realising significant exports-driven growth in the UK. Without UK investment in its own current market, there is likely to be a European consolidation with a single major prime in Europe. The UK needs to invest in its current Primes and open up further work through exports and GtoG opportunities. A satcom market comprising multiple service providers and systems, will support UK resilience and prevent an overreliance on one technology or one country or individual business owner. Further, it is in the UK's security interest to support the continued existence of in-country satcom capabilities and expertise which can support UK sovereign requirements. A healthy market will drive innovation, efficiencies and competitive pricing for customers.

Macro trends and evolving customer requirements are reshaping and creating economic opportunities in telecommunications. Issues such as geopolitical volatility and digital inclusion as well as increasing consumer demand for ubiquitous connectivity, resilience and security of critical communications are driving innovation and growth in satellite communications. The global satellite communication market size was estimated at \$83.29 billion in 2023 and expected to grow at a CAGR of 10.0% from 2024 to 2030¹⁰. Further, the global satcom services market was estimated to be \$31.22 billion in 2023 and is expected to grow to \$70.89 billion (a 9.6% CAGR) by 2032¹¹. The UK has the required expertise, technology and talent to capture a significant portion of the global satellite communications market over

¹⁰ Grand View Research: Satellite Communications Market

¹¹ Fortune Business Insights

the coming decade. Secure satcom services are expected to grow by a factor of 14 over the 2025–2040 period, to reach almost £190 Gbps in 2040.¹² satcom underpins £112bn or 5.4% of UK GDP.¹³ Exportability is a key enabling factor for the MOD to be able to do what it needs to do and satcom is a key growth area.

The space element of the Digital and Technology sector continues to innovate rapidly, bringing in new technologies for secure transfer of data and convergence of terrestrial and non-terrestrial networks, including optical communications and Direct-to-Device (D2D) functionality. These developments are both positive for growth and disruptive for existing arrangements. The UK cannot afford to ignore them.

An example of how the EU is exploiting it can be found in the OPTIMAS project, led by Navantia's Monodon, launched to develop a high-speed free-space optical communication system for defence applications. Funded by the European Union, the initiative integrates advanced encryption, including quantum key distribution, to ensure secure data transfer across satellite, aerial, maritime, and terrestrial military networks. The system will enhance satellite communication in low Earth orbit (LEO), with potential expansion to medium (MEO) and geostationary orbits (GEO). A prototype will demonstrate high-speed optical data transmission between a UAV and a satellite in LEO. The project involves a European consortium of 12 entities across seven countries, including CAILABS (France), GMV (Portugal), and MBRYONICS (Ireland). OPTIMAS is part of Navantia's broader R&D portfolio, which received EUR 520 million from the 2023 European Defence Fund (EDF). If the UK does not decide to pursue this, it is hoped that a reset of EU/UK relations will enable UK companies to participate in other programmes.

Existing UK strengths such as expertise in satellite payloads, buses, antennas, chipsets and ground station design and manufacturing, means that with the right interventions and partnerships, the UK is well placed to develop these new capabilities and take a leading global position in Terrestrial Network-Non-Terrestrial Network (TN-NTN) Convergence. D2D also represents a significant export opportunity to meet growing global demand for “always on” connectivity as well as providing innovation in the military operational environment.

Existing UK strengths and capabilities of interest to the MOD:

1. Multi orbit solutions providing enhanced resilience, increased capacity and efficiency and reduced latency
2. Network integration and service management technologies across domains, seamless integration and high data capacity across satellite and terrestrial networks
3. Onboard processing, optical communications and terminals, giving higher capacity at lower cost per bit and lower latency, and R&D support into photonics, quantum, IOT, RF/optical links including associated ground terminals.
4. Investment in software and hardware to create national advantage in AI and ML for payloads terminals and ground stations including D2D
5. Secure communications, Cyber Security and quantum networking including the transition to Post Quantum Cryptography within satellite infrastructure and supply chains.
6. On-orbit servicing of telecoms satellites to improve their competitiveness and sustainability
7. Space Forge is working with BT under the DSIT Future Telecommunications programme, developing new compound semiconductors for 5G + 6G communications.
8. Goonhilly Earth Station is currently the world's only commercial Deep Space Network node providing support to science and exploration missions to the Moon and beyond (key customers include NASA, ESA, UKSA and Intuitive Machines). In addition, Oakhangar, Colerne, Surrey,

¹² [EU Space market and users | EU Agency for the Space Programme](#)

¹³ *AstroAgency: An Evaluation of UK Global Space Leadership for the National Space Partnership February 2024*

Chilbolton, Menwith Hills, Fylingdales etc. All of this offers a significant capability boost to the UK if it is managed coherently within an accountable governance structure.

9. Archangel Lightworks is working with UKSA and InnovateUK to develop a truly deployable, lightweight and low-cost Optical Ground Station. This will enable secure, high data-rate comms around the globe for defence users and could provide part of the risk mitigation strategy for the current and ongoing threat to subsea cable infrastructure. The UK has an opportunity to take a world leading position in optical communications ground infrastructure. Market data on the growth in optical communications and satellite backhaul:
 - a. Laser Focus World described the optical communications market: “worth about \$1.13 billion in 2022, expected to quadruple by 2031, growing at nearly 26% per year.” Recent updates suggest this figure will be surpassed.
 - b. The Analysis Mason April 2024 report on satellite backhaul and trunking market forecasts cumulative communications infrastructure-as-a-service revenues: USD\$272B for the 2023-2033 period and CAGR of 10.8%

4.2 Space Safety and Sustainability

ESA's Space Safety Programme (formerly the Space Situational Awareness programme), is ESA's initiative to monitor hazards from space, determine their risk, make this data available to the appropriate authorities and where possible, mitigate the threat. The programme is split into three main segments, all of which involve companies, capabilities and technologies that Defence makes use of:

- 1) Space Weather: monitoring the Sun, solar wind, and Earth's magnetosphere, ionosphere and thermosphere
- 2) Planetary Defence: detecting natural objects, such as asteroids and comets, which can potentially impact Earth
- 3) Space Debris: tracking and/or removing/servicing both active and inactive satellites and space debris.

The UK has stood-up a dual-use National Space Operations Centre (NSpOC) which will position the UK at the forefront of international space operations, Space Traffic Coordination (STC), and threat and hazard risk mitigation. As the existing AURORA system (developed by CGI for UK Space Command and UK Space Agency) evolves into BOREALIS to sit at the heart of the NSpOC it is important that investment into existing ESA programmes is maintained. This includes the space-based SDA mission VISDOMS and the space weather mission VIGIL. Continued investment in these programmes will serve to develop key skills in the UK and also deliver data that can be shared with our partners and allies. Through UK support, ECSAT could act as a civil centre of excellence for SDA and ISAM as well as several other developing focus areas such as hypersonics and provide operational and technology development for the NSpOC. Further work can be done with the civil sector to take advantage of developments the UK derives through its partnerships with ESA. Continued investment in these programmes will serve to develop key skills in the UK and also deliver data that can be shared with our partners and allies. There is a role for NSpOC in exports of alerts, and warnings to a wider customer base.

The UK is already working towards world leading In-Orbit Servicing capabilities. Active Debris Removal (ADR) and End-of Life (EOL) services are the first step towards future refuelling, life extension repair and repurposing of satellite fleets, and the construction of space-based superstructures for R&D, data centres and power stations. ADR and EOL are critical services needed to make space operations safe and sustainable. They also require the development of technologies to achieve Rendezvous and Proximity Operations, which are highly applicable to both space-based SDA and space control aspirations.

In order to realise these opportunities, we will need to address barriers including skills shortages due to lack of domestic talent and restrictions on visas, as well as secure streams of government and ESA

funding – the inability to scale is the key problem. While other emerging technologies also face challenges in the commercialisation of their ideas, ISAM is an area that is already proving of great interest to commercial and government entities alike. Specifically, the ability to manoeuvre in space is of particular interest to the MOD and those relying on the resilience of satellites in space. It should be noted that 14M EUR has already been invested through ELSA-M, the world’s first commercial end-of-life service for prepared satellites¹⁴ and the UK Space Agency is investing through the Active Debris Removal (ADR) programme. PWC has predicted that the ISAM economy will be worth \$170b over 20 years

5 Spread Prosperity

The UK space sector is based right across the UK from the Shetland Isles to the Lizard Peninsula and from Ipswich to Derry/Londonderry. The mature space clusters in all parts of the UK bring together the space sector and adjacent markets to grow UK space related capabilities. These would be a valuable part of a National Space Enterprise approach to coordination of civil and military capabilities.

5.1 Northern Ireland

The space industry in Northern Ireland is a growing and dynamic sector with 62 sites across the province including several defence related establishments. Built upon a strong foundation of aerospace engineering and technological expertise. Key areas of expertise include:

- Lightweighting and materials technology for small satellites.
- Antenna design.
- Secure communications.
- Advanced data analytics.
- Electric Propulsion.

Northern Ireland also has a strong background in advanced manufacturing, which is very useful in the production of space related technologies. Northern Ireland is actively involved in national and international space initiatives. The region is also very involved in the development of technologies that have dual use in both the aerospace and space sectors. There is a focus on the development of small satellite technology and the use of satellite data for various applications.

5.2 Scotland

Scotland's space sector is vibrant and rapidly expanding, with a strong focus on innovation and growth. The sector is attracting significant investment, and the number of space-related organizations in Scotland is increasing. The focus is very much on continued and rapid expansion, with a target of reaching £4 billion by 2030

- Scotland is developing a comprehensive space sector, encompassing everything from satellite manufacturing and launch to data analysis and applications.
- Scotland is a European leader in the manufacturing of small satellites.
- Scotland is developing vertical launch capabilities with spaceports like Saxa Vord Spaceport from where Orbex will launch in 2025.
- Scotland has expertise in analysing data gathered from satellites, with applications in areas like Earth observation and environmental monitoring.
- Scottish universities, such as the University of Edinburgh and the University of Strathclyde, conduct cutting-edge research in space science and technology.

¹⁴ <https://astroscale.com/astroscale-uk-secures-contract-for-final-phase-of-elsa-m-in-orbit-demonstration/>

- There is a growing emphasis on sustainable space activities, including efforts to address space debris.
- Scotland's geographic location is advantageous for certain types of satellite launches.

In essence, Scotland is positioning itself as a major player in the UK and European space industry, with a focus on innovation, collaboration, and sustainable growth.

5.3 Wales

The space sector in Wales is developing rapidly, with a strong emphasis on innovation and sustainable growth. According to information from the Satellite Applications Catapult, Space Wales supported an estimated turnover of space-related activity in Wales of approximately £224,572,000 in 2023.

- Companies like Space Forge are leading the way in in-space manufacturing, developing technology to produce materials in microgravity. This is a significant area of focus for Wales.
- The Welsh Government is actively supporting the growth of the space sector, providing funding and other resources.
- There are plans for spaceport development, such as the Snowdonia Space Centre (formerly Llanbedr Airfield), which aims to facilitate horizontal satellite launches.
- Welsh universities are engaged in space-related research, contributing to the sector's growth.
- The CSA Catapult, based in Wales, is a key player in the development of compound semiconductors, which are essential for space technology.
- The Wales Space Strategy emphasizes sustainability, aiming to develop a responsible and environmentally conscious space sector.

In essence, the Welsh space sector is characterized by its focus on cutting-edge technologies, strong government support, and a commitment to sustainable growth.

5.4 Harwell Space Campus

A central plank of the strategy should include strengthening the relationship between MOD, UKSA, industry and ESA's ECSAT facility to build and sustain the pipeline of satcom innovation, including support for start-ups and SMEs alongside major incumbents. When ECSAT was initially established, it included the ambitions to act as ESA's focal point to drive development in telecommunications, downstream applications and space commercialisation. UKSA should work with ESA to develop the ECSAT facility into a strategic hub for the Regional Clusters that have a focus on satcom and other technologies of use to Defence. Physically connecting ECSAT to the regional clusters' and others' facilities would create a distributed infrastructure that delivers scale and capability diversity. The resultant links into the wider supply chain and academic community around each cluster, especially SMEs, would act as the foundation to drive innovation. It would also enable different technology activities to be brought together, e.g. connecting facilities focused on RF technologies, optical technologies, network management etc., to develop comprehensive end-to-end solutions. Such a facility would encourage more ambitious collaborative projects to develop and demonstrate scale solutions in support of the commercialisation objectives described above.

6 Deterrence

Deterrence in the Space Domain comes from having a distributed and resilient SDA capability (ground and space-based, including in all relevant orbits) to detect and characterise - and importantly predict the

intentions - of threats to strategic assets PLUS strategic assets with the ability potentially to defend themselves against threats PLUS the ability to hold an adversary's strategic assets at risk.

The MOD recognizes the importance of integrating space into their deterrence planning to ensure the protection and resilience of the nation's space capabilities. A critical component of an effective deterrent strategy is 'credibility' in the eyes of our adversaries, which the UK Armed Forces lacks when it comes to its ability to fight and win in the space domain. To close this gap will require a much more ambitious approach to the Defence Space Portfolio and a significant uplift in funding for those space capabilities that support deterrence activity across all operational domains. From a space perspective, these activities are twofold: space support to [terrestrial] operations (ie PNT, satcom, ISR and Missile Warning); and control of the space domain (ie, SDA, space control and space C2).

The UK's ability to deter hostile actions in space requires more than passive monitoring and awareness. The evolving threat landscape—characterized by adversary deployment of highly manoeuvrable satellites, cyber and electronic warfare capabilities, and direct-ascent ASAT weapons—demands a proactive deterrence posture that integrates both defensive and offensive counterspace capabilities.

To establish a credible deterrence framework, the UK must focus on deterrence by denial (denying adversaries the ability to degrade UK space assets) and deterrence by retaliation (ensuring adversaries face consequences for hostile actions in space). This approach requires investment in both resilience and active defence measures, alongside seamless integration with NATO and coalition partners within the US-led Operation OLYMPIC DEFENDER deterrence strategies.

Disaggregation of large GEO satellites and their payloads into a cluster of smaller satellites split between GEO and potentially lower altitude orbits is a risk mitigation strategy. This makes a large and expensive target into a much more difficult target set, adding resilience for the owner/user. We should consider it for future Skynet capability. The UK is well placed with a plethora of small-sat manufacturers to do this and soon, with the introduction of the UK small-sat launch capability from Scotland, we also have the ability to launch these assets into LEO/MEO boosting to GEO via space-tugs etc.

6.1 Satcom & Deterrence

Secure military satellite communications (satcom) remain a fundamental pillar of deterrence, enabling assured command and control. A lethal force needs the ability to integrate sensors, commanders, data and fires to be effective. And without comprehensive and secure space, cyber, network and data services, that won't happen. The Skynet 6 constellation provides protected and resilient communications for UK and allied forces, ensuring continuity of operations even in a contested space environment. However, as adversaries develop jamming and cyber capabilities, additional investment is needed in next generation satcom resilience, including proliferated constellations, frequency diversity, and hardening against electronic warfare threats. Further, defence data networks are being placed under increasing stress through technological advancements in the battlespace. For example, the number of Autonomous Vehicles (AVs) on Land, at Sea and in the Air is increasing rapidly. AVs will exchange vast amounts of data for surveillance, targeting and command.

Senior officers have recently voiced concern that current allied information networks are increasingly unfit for use in conflict. They are too fragile, too exquisite, too un-survivable against most forms of attack. One way in which they should be made more resilient is by incorporating commercial space communications more effectively as part of a comprehensive strategy which embraces new ways of contracting for that capability as is being done with the US Commercial Space Integration Strategy. Further, core defence networks may be now too complex and too fast changing to be any longer manageable only by military communicators. They need continual involvement by their commercial data network providers alongside military professionals. This illustrates the need for closer relationships

between HMG and the space, information, cyber and network industries which build, operate and upgrade critical capabilities.

Optical Communications offers a robust pathway for secure, high data-rate communications. Low cost, lightweight, deployable Optical Ground Stations are becoming available for defence use cases. These OGS may be forward deployed as expeditionary capability e.g. to FOBS, overseas bases and will provide resilience in the face of threats to traditional RF comms systems. Optical communications (lasercom) systems do not suffer the same vulnerabilities that RF systems suffer. Modern OGS such as the TERRA-M from Archangel Lightworks will be interoperable with recently deployed US satellites, using the Space Development Agency (SDA) standards; a vital capability for HM Forces in scenarios where the country expects to be working alongside our closest ally.

Building on the civil satcom developments outlined earlier in the document, we have significant technology development in the UK around LEO satcom, including true digital satellite technology and 5G Direct-to-Device. pLEO satcom can rapidly distribute, add resilience to and enhance the timeliness of communications and data transmissions across all the domains – as relays for strategic assets like Skynet, for military capabilities like ISTARI, or in their own right (if coupled with SDA sensors, AI-enhanced on-board processing, encryption etc).

6.2 Space Domain Awareness (SDA) & Deterrence

Space has never been more congested, contested, and competitive. Sensors in space, radars, and telescopes are essential to enable the UK to be fully aware of the hazards and threats impacting the systems and services that we rely upon.

To maintain decision advantage and deter adversaries, the UK must:

- Expand SDA capabilities, utilising on-earth and in-space sensing to track both natural and adversarial threats in space.
- Actively deploy in-orbit inspection and in-space bodyguarding services for Skynet and other assets of allied interest.
- Actively invest in and demonstrate on-orbit orbital space control capabilities able to achieve reversible and irreversible effects capable of kinetic and non-kinetic ("soft kill") effectors—a critical gap in Western defences—to deter adversarial cyber, jamming, and directed-energy attacks on allied space infrastructure. This capability positions the UK to lead in closing NATO/AUKUS technological shortfalls while strengthening deterrence through actionable, alliance-ready solutions.
- Enhance deception and survivability measures via bodyguarding satellites and autonomous defensive manoeuvres.
- SDA plays a significant role in underpinning an ability to carry out effective Space Control and C2.

Again, the UK has significant expertise in sensors that have SDA utility in space, as well as the more well-known terrestrial capabilities currently in use and planned for in the near term. Utilising future UK Government space assets, not just Mil ones, to act as carriers for such sensors could also create a level of deterrence with potential adversaries knowing that the numbers of our 'eyes in the sky' for space are increasing with every launch.

6.3 Command and Control (C2) & Space Control

A key pillar of the UK Space Command strategy is ensuring command and control (C2) dominance and technology exportability to allies. To maintain international relevance and achieve its ambitions in space, the UK must ensure that it has access to sovereign C2 solutions, which are developed to account for

emerging technologies, such as being able to react to adversary space control activity including aggressive proximity operations.

Ensure a sovereign Space Control capability is of critical importance to the UK. To achieve this, it is essential to retain control over the development of space control payloads (from temporary denial effects to permanent kill) and the development of manoeuvrable platforms that will be able position these payloads, particularly against highly mobile aggressor assets. By securing IP control over space control payloads and manoeuvrable (RPO enabled) platforms, the UK ensures its role in allied deterrence architectures.

The UK should also look to leverage its developing ISAM capabilities to support Space Control. A lot of services being developed in the civil/commercial domain can often be viewed with a defence lens. By way of example:

1. Refuelling and life extension capabilities allow defence assets to manoeuvre without regret.
2. ADR and EOL services will help maintain defence orbits of interest clear.
3. Taskable inspection services can support space domain awareness and attribution deterrence.
4. Upgradeable and repairable spacecraft can respond to emerging threats and battle damage.

By leveraging world-class robotics and advanced manufacturing, Britain can develop and retain IP-rich, UK-owned systems to support ISAM for both civil/commercial and defence applications.

6.4 Launch

Launching nations such as USA, China and Russia leverage their launch capability for significant defence activity to support missions on the ground, surveillance of Earth and space assets etc. The UK could become a European NATO site for launch (initially to LEO); the UK will have independent launch capability to support defence objectives. UK and German launchers will be using Saxa Vord, a location covered by the TSA agreement with the USA, so we have the capability to support US activity, and also independent European capability to act without the US if required in the case of changes in US policy where Europe will do more for its own defence.

Unless the UK nurtures an independent launch (in-space logistics) capability, we will be wholly reliant on allies and partners for assured access to space at a time when their 'assuredness' is debatable. The current civil launch market represents an opportunity for MOD to engage with, support, and encourage this capability through programmes such as MOD's HTCDF, while not bearing the full developmental costs, allowing these to be further addressed through the provision of commercial launch services. Such an approach will allow for the sovereign deployment of Space Control platforms, and missions, giving the UK a coherent but discrete voice in the development of threat identification, avoidance, and deterrence. Longer term a hypersonic launch capability could provide high launch cadence and flexibility, while potentially being competitive on cost due to semi-reusability and this would provide significant economic and defence advantages for UK industry. This would also allow responsive launch in times of crisis or conflict, bolstering capabilities for strategic advantage or reconstituting capabilities in response to adversarial actions.

6.5 Intelligence, Surveillance, and Reconnaissance (ISR)

The proposed ISTARI constellation will include Oberon SAR satellites for ISR, building on the success of NovaSAR (developed by SSTL), and Juno, a high-resolution EO satellite offering improved capabilities over Tyche, the first UK Space Command ISR asset launched in 2024. These platforms will:

1. Enhance real-time awareness of adversary activities, contributing to deterrence by denial and deterrence by retaliation.

2. Support allied intelligence-sharing, strengthening NATO and allied deterrence architectures.
3. Provide actionable insights for UK counterspace operations, ensuring rapid decision-making and response.

In the commercial environment, companies like Spire and Clyde Space have demonstrated innovative ISR solutions, highlighting the potential for dual-use capabilities that blend commercial and defence applications. The UK should develop a sensor suite for a wider client base, learning from commercial leaders to ensure ISR capabilities remain cost-effective, scalable, and exportable, all of which are underpinned by PNT

The UK's world-class expertise in robotics, sensors, and advanced manufacturing positions it to pioneer sovereign, IP-controlled space systems—capabilities urgently sought by NATO and AUKUS to counter adversarial advancements. By aligning with the UKSA's dual-use ISAM/SDA strategy and UK Space Command's pillars of exportability, these effectors would not only close a critical deterrence gap but also strengthen collective defence through scalable, alliance-ready solutions. Exporting such innovations cements Britain as a leader in orbital defence, transforming its technical prowess into geopolitical influence while ensuring cutting-edge, UK-owned systems remain central to Western security architectures.

Conclusion

Space derived services are critical to the daily lives of every UK citizen; equally allies and adversaries alike are highly motivated to secure their interests in the domain. The ability to reach and use space for economic, scientific and military purposes has expanded in the past decade from 15 to 86 countries. Space has never been more congested, contested and competitive and this is set to continue as technology evolves and proliferates, enabling space-based assets to ignite huge economic growth and deliver a strong strategic capability advantage.

MOD must partner to take a Whole of Government, Whole Force approach and use space to assure freedom of operation and decision advantage in multi-domain operations while also ensuring a resilient, sustainable and long-term sovereign, if necessary, supply chain to keep our nation safe.