

Submission to the Strategic Defence Review 30th September 2024

Threat picture – strategic and operational context

The MOD has clearly articulated the urgent nature of the space-based threats facing the UK but the Defence Space Programme has not kept pace with this change. Between 2025 and 2030 the UK will be overly reliant on allies while there is an enterprise-wide alternative approach that would not only include allies and partners but would also utilise civil and commercial solutions, bolster UK industry and promote growth and prosperity in the UK – The National Endeavour for Space Security.

Space derived services are critical to the daily lives of every UK citizen, so 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. Space underpins 16% of the UK's GDP - a day without space would cost our economy £1.2bn¹ and without the ability to connect, warn, guide and inform military decisions 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, all of which presents a significant concern and challenges the UK's interests in space. 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. Internationally accepted norms of behaviour remain dangerously elusive and the increasingly 'dual-use' nature of assets in space makes it more difficult than ever to predict and manage threats from space. Whether it is a collision with one of the other 10,000 active satellites, or 29,000 pieces of debris currently in space or a deliberate act of sabotage, our need to understand what is happening in space and our ability to mitigate any threats and aggressive actions has never been greater. Space must now be considered a war-fighting domain.

The UK has established UK Space Command and developed the Defence Space Portfolio (DSP). The Framework will deliver the £6.4bn defence space capabilities encompassing Satellite Communications, Space Domain Awareness, Intelligence, Surveillance and Reconnaissance, Space Command and Control, and Space Control assets which will be sourced via a mix of 'own, collaborate or access' arrangements. Position, Navigation and Timing and Launch have been allocated to other Government departments to deliver although they are very much part of the defence and security space landscape. The individual capabilities are currently stand-alone but should be integrated and networked in order to underpin integrated operations without which the force would be unable to connect, warn, guide, and inform military decisions.

The delivery window for these essential UK capabilities is 2026 – 2030³ and until then we will continue to rely heavily on our closest ally, the US, to protect and defend our interests in and from space. However,

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

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

³ [Space Capability Management Plan - GOV.UK \(www.gov.uk\)](#)

the US has indicated that their pacing threat, a conflict with China resulting from an invasion of Taiwan, is 2027 and consequently they are focused on being ready for a potential escalation at that time – a Countdown to Conflict. This has implications for the US defence space security relationship with the UK as they would seek to utilise joint capabilities which may not yet be in place. The US is already reaching out to the UK for support and this will increase in the near future as evidenced by the recent collaborations on DARC in the UK and the Arctic Satellite with Space Norway.

“When you walk into my headquarters building, there’s a shot clock (countdown timer) in the foyer when you walk in. It’s counting down to the year 2026. The plan in the Great Power Competition is we will be ready and with resilient space architectures to operate in a competitive environment by that time. We have the pacing challenge of China. We have the acute threat of Russia. Those threats are real. We can see what’s happening in Ukraine, we can see what’s happening in Israel, we can see what’s happening in the South China Sea and parts of INDOPACOM - some of those adversaries are putting up threats every single day.” [Lt. Gen. Philip Garrant (Commander US Space Systems Command in April 2024)]

It is clear that China has established significant strength in depth, resilience and scale in its industrial base in all strategic sectors, including its space sector. They continue to innovate at a rate that some believe is beyond even the US. As it is expected that the next conflict will be a long campaign, it is important that allied nations not only have the technology advantage against our adversaries at the outset, but that they also have the coordinated and combined industrial base that is able to maintain capability through attritional warfare. The National Risk Register⁴ cites ‘preparedness’ as key to a successful society and without the services that space provides to underpin our preparedness (monitoring and responding) we are in danger of not being ready for the next emergency.

The DSP seeks to reduce the reliance on the US as it undermines the UK’s freedom of action and must be seen as a security stop gap. We believe the plan to deliver the DSP is flawed because it is taking each element in isolation, in separate parts of MoD, and not working across the entire UK space enterprise towards a more clearly articulated end state. Many elements of the DSP have already been redefined or deferred and there is an over emphasis on key capability areas which has delayed progress in other capability areas. This not only deters industry investment but it also puts the UK in danger of being under-prepared for the next geopolitical events and the UK space industrial base will not be growing to support sovereign operations. We are already seeing a decline in the UK national security space industry as fewer companies have deep enough pockets to await selection in the very slow competitive processes and SMEs continue to be outside of the MoD’s supply chains. We must do more proactive planning for the delivery of these capabilities both with allies and as a sovereign nation with a mature space enterprise ready to support.

Space support to Force Structure

We propose a National Endeavour for Space Security which would be led by a National Space Enterprise (NSE). This would be similar to the approach that was taken to cyber and it would draw on all existing UK space assets. The National Space Enterprise would incorporate industry and all the relevant Government departments. Its mission would be to deliver the security both of space and from space alongside growth and prosperity within the UK space industry. By amalgamating the key UK space delivery bodies there could be cost savings through synergies as well as an uplift in skills and capabilities as suitably qualified and experienced personnel (SQEP) would work on multiple aspects of the entire space enterprise. It would be essential to include the scientific and academic space communities within this model as well

⁴ [2023 NATIONAL RISK REGISTER NRR.pdf \(publishing.service.gov.uk\)](#)

as other stakeholders familiar with workforce planning such as the relevant trade unions. The NSE – which may be drawn from existing structures - would provide the ability to integrate developments happening in all parts of the space ecosystem. Specifically, the military potential of dynamic mobile space operations currently being explored by the US Space Force because of the opportunities for military use that arise from the ability to perform rendezvous proximity operations, in-space refuelling and active debris removal. The UK Space Agency is investing heavily in this area and it is sufficiently analogous to SDA and Space Control to be of interest to a national endeavour approach. It should be noted that UKSA funding is often matched which provides greater financial leverage for the Government.

The precise structure and operating model of the NSE should be informed by the Capability Management work already underway. We would recommend establishing two phases of effort. Phase One would focus on reprofiling the DSP and Space Industrial Plan in consultation between industry and government. Phase Two would be the implementation and delivery phases which could bring forward the relevant In-Service Dates if the pace of engagement with industry is speeded up.

The benefits to the UK are clear and this approach also aligns to the US Resilient Constellation strategy which calls for disaggregated, distributed and defence hardened constellations⁵ to be available to them. In essence we would establish a formidable, allied, federated security space architecture, not only serving national needs for participating nations, but also delivering combined capability that would be greater than the sum of its parts through aggregation. The capability would outmatch our adversaries and protect our assets in space while providing strategic advantage and international leverage.

Modernisation, transformation and productivity through the rapid and consistent application of Digital Age technologies.

Space is fundamentally characterised by the use and exploitation of digital age technologies. The overarching ambition is to own several national assured multi-satellite, multi-orbit capabilities supporting in-orbit activities and ground infrastructure to ensure the UK has the secure data needed. This may also include accessing commercial SDA and ISR data to support global operations and protect and defend our interests. Along with satellite communications, these areas are all seeing very rapid commercial developments which can be harnessed to support the integrated domain mission or which could seriously disrupt our ability to use and control space.

Skynet is a world leading satcom capability and an admirable example of the UK government acting as an anchor customer for essential sovereign capability. If there is a real concern that the UK may be on a war footing within the coming years, and the MOD would like to maintain sovereign satcom capability, it is essential to continue to invest in Skynet. The alternative may need to be a tolerance for UK troops communicating via Starlink and other commercial, non-sovereign providers. The ability for direct to device communications is a real game changer in a warfighting domain. Skynet's industrial footprint is also fundamental as a foundation for the rest of the space industry in the UK because it gives it critical mass. Cancelling it could cause an unintended domino effect of exits and divestments / bankruptcies as the supply chain is so intertwined.

Our Defence Forces can increase their resiliency and reliability by capitalising on the growing number of alternative, non-sovereign space assets that are available and should be exploiting more than one at any one time – not only for communications but also for Alt-PNT and other services. This requirement is outlined in the Defence Space Strategy through the Own, Collaborate and Access ambition and also within NATO's study of Hybrid Networks looking at requirements for terminals and gateways to

⁵ [The Satellite Breakup: Military's Push to Go Small - SpaceNews](#)

interoperate with a variety of different military and commercial waveforms. The UK is home to a number of companies with first mover advantage in these developments and they should be engaged in the reprofiling of the National Endeavour for Space Security.

The US Space Development Agency's (SDA) plan for a Transport Layer of low latency, high capacity data relay satellites in low Earth orbit is a critical future capability for them. The UK is very well placed to be part of this development. More resilient position, navigation and timing capabilities, including alternative methods to GPS, are another key area of operations and the US Space Force has already started studies into Resilient GPS. The UK needs to align with these efforts in order to continue to be relevant. Additionally, the US Space Development Agency Director Derek Tournear announced on 5th September that the agency had successfully demonstrated the ability of its optical communications terminals to link satellites together which now enables the planned mesh network of data transport and missile warning/tracking satellites in low Earth orbit. The on-orbit demonstration involved laser light terminals, built by German firm TESAT, carried on two of the four missile warning/tracking satellites built by SpaceX and launched last year as part of SDA's initial, experimental constellation called Tranche 0. This demonstrates a willingness to partner both with commercial and international partners to deliver capability.

By incentivising the 'fail fast' approach to procurement, as the US SDA have done, schedule becomes the most important driver. To deliver this acceleration process, we recommend the use of testbeds, in-orbit experimentation and proving grounds not only to derisk elements of the programme but also to provide safe environments for the exploration of potential collaborative elements.

Rideshare to space is becoming more accessible and the UK has its own spaceports which could form part of the wider ecosystem of scheduled and responsive launch capability within 5-Eyes and NATO. Commercial launch providers based in the UK are national assets and we must explore opportunities to prioritise launching of national satellites through our own companies. Whilst not currently capable of GEO, the UK is well placed for the rapid insertion of LEO and MEO capability in times of crises.

Strengthening international partnerships and alliances

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 until the DSP has been delivered. This will result in a period of 5 years (or more) during which there will be no related industrial sector growth and the UK is unable to secure its own freedom of action and decision advantage and is 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.

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 is essential not only for the skills and expertise they bring but also because it helps 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, 5- 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. The benefit for the US is that they have a close ally who is able also to support their capability needs during times of conflict and this is similar to the F-35 and TEMPEST programmes.

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. 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 data. Either way, there are options within the DSP for the UK to play a key role in NATO.

The approach to be taken to acquisition and support

The procurement of space is currently uncoordinated across the MoD and further across government. A coordinated, cohesive approach is required to eliminate duplication and to take advantage of synergies that already exist. This can only be done by appointing a centralised body or 'Tsar' to break down institutional barriers and capitalise on the advantages space brings to government.

The UK space sector is uniquely characterised by public private partnerships including industry, academia and Government and already operates in clusters focused on regional expertise. The sector is highly skilled and much of this talent is currently not being brought to bear on the DSP because of acquisition and R&D approaches that put exclusive competition at the heart of decision making and which are too slow for the high pace of development needed for sectors like space strategy. Related programmes in other departments that involve the sharing of data and collection assets have not been canvassed and the bespoke nature of Defence acquisition structures makes such cross-government cooperation very hard to do.

We believe that a radical overhaul of the way the DSP is procured will enable Defence to work with industry, academia and the rest of government to accelerate the innovation, design and deployment of the elements needed for the National Endeavour for Space Security. A national taskforce similar to the ones developed for TEMPEST, ship-building and complex weapons could be brought in alongside changes in acquisition processes:

- Differing Prime Contractors (not a single prime to lead)
- Reform the approach to SMEs to allow them to hold significant MoD contracts noting that they already regularly prime complex civil and commercial missions
- Enhance Supply Chain Management Strategy to avoid bottlenecks and conflicts by sharing build plans against other civil and national build plans for space projects.
- Involvement of target demonstration programmes, CommercialX and RCO to speed up procurement in priority areas
- Simplify the front door access points into MOD by cohering Crown Commercial Service, Defence Digital and Defence Equipment and Support. There are currently too many front doors to MoD, Mod procurement is uncorrelated within the MoD.
- Build on this strength with new, faster procurement approaches not hindered by current Government Bureaucracy.

- Establish a UK National Reconnaissance Office (like that in the US which would have the benefit of:
 - 1. Giving the UK MoD (and HMG) a single portal for contracting EO and SDA data from UK companies.
 - 2. Giving the UK MoD (and HMG) a Mil-CEOI ability, allowing for companies to bid for development of Reconnaissance products and solutions.
 - 3. Giving the UK MoD (and HMG) the ability to define and contract curated or processed EO and SDA data and analysis against National Requirements.
- More effective use of the Own, Collaborate, Access policy to include technologies, and assets and capabilities held elsewhere across UK government, industry and academia.
- Adoption of 'national champions' policy – companies that may hold a specific set of skills required for national security which will underpin our assured capability and provide the nation with technological capital. They may not necessarily be British owned companies but must have significant UK presence and allow profit and IP to stay in the UK
- Bring in agile contracting to secure best value for money through risk sharing, gain sharing and elimination of the wastage of waiting time etc to get the capability into the hands of the end users as quickly as possible.
- Ease of talent movement between US, UK, Australia and key European partners to ensure that we can transfer knowledge and expertise when needed.

Recruiting, educating, training and retaining the people needed for One Defence.

The development of a skilled workforce is dependent on having meaningful projects to work on and the National Endeavour for Space Security approach would deliver that. The MoD itself has a need to upskill and train its space staff and this could be done in conjunction with industry. There is a requirement for a centralised Skills Strategy to create an agile workforce, suitably qualified to work on the DSP (and related civil programmes) at the time and place of relevance – similar to the Type26 workforce planning. These skills would be transferred in and out of the programme and in the periods, they are not required could be redeployed to civil or dual use programmes.

There is a national shortage of systems and network architects and systems integrators, and this would be a way of sharing those skills across the entire UK space ecosystem. A cadre of security cleared workers could be formed within that strategy. These skills are essential to the resilience of all our national security space systems because it is the ability to network but also disaggregate and distribute that ensures the survivability of the downlink in any eventuality.

State of defence technological and industrial base and the contribution of Defence to the governments Growth Mission

There is latent opportunity within the amalgamation of the various space delivery agencies. By bringing them together under a banner of National Endeavour there will be significant growth opportunities.

The UK has significant space advantages located in civil and dual use labs all over the country. Defence could extract additional value by utilising what is already in motion in the civil and commercial sectors. Better and diversified use of the Defence Estate in conjunction with Commercial space site /suppliers provision will enable UK to be a more resilient to physical and cyber-attack.

As part of the National Endeavour for Space Security we would recommend taking into consideration the activities going on in the labs and testing and proving grounds of the Satellite Applications Catapult, Science and Technology Facilities Council and RAL Space at Harwell, among others.

By taking a strategic view to developing and connecting existing and new infrastructure the UK could develop a national integrated testbed that opens up opportunity, through the national network of space clusters, across the country. This would galvanise new opportunities and maximise the benefits of existing investments in both civil and defence space:

- **Inter-cluster/facility connection** in order to catalyse industry investment. There are several industrial or research organisation facilities across the UK that are focused on future capabilities (both satcom and terrestrial). These facilities need to be upgraded in terms of being physically interconnected by fibre and satellite links to achieve scale and draw in all relevant stakeholders. There is a similar requirement in other domains including Quantum Key Distribution (QKD), space-ground optical communications, and converged space-terrestrial infrastructure management and the MoD could be a partner in this.
- **Facility creation**, i.e. specialist satcom labs and testbeds in quantum, optical and AI for system and service management, advanced fabrication capabilities for processing payloads, antennas and optical telescopes etc. Recent investments in space infrastructure are very welcome, but more needs to be done to strategically fill gaps and increase accessibility across the UK. Where these facilities are created, industry players will invest in infrastructure (equipment), resources for collaborative projects that use the new facilities, and education & training programmes with academia to develop the skilled workforce.

These actions would unlock the wider potential across the UK supply chain and deliver a step change in our ability to respond to future challenges and global opportunities. It would create opportunities for new players to enter the supply chain and develop new growth channels for the established players in other strong UK industry sectors such as photonics and software.

Stronger industrial partnership with our world-class academia to ensure that their early-stage low TRL research has a route to commercial deployment (and potentially defence use) embedding stronger links on training, education and knowledge exchange.

- Investment in regional Space Clusters has already enabled engagement with academic institutions in each region and has drawn-out local capabilities and interests that would otherwise have remained hidden. This should continue, especially in relation to building new lab and testbed capabilities that support education and training facilities.
- This should be further built on by creating development programmes that span the domains of the research councils (primarily EPSRC) and Innovate UK to provide consistent pathways for developing concepts (TRL1-3) through industrial development (TRL4-7), to commercial markets (TRL8-9), without losing focus or momentum in the transition between the domains.
- UKspace's SME committee has made proposals to Government that the roll-out of a national space knowledge exchange programme would increase connectivity between our world-leading universities and SMEs in the space sector and support the translation of academic expertise and know-how into commercial (and potentially defence) products. This engagement with SMEs would be welcome because of the current restrictions on their participation in MoD programmes.

Civil space enjoys high levels of inward investment as the UK provides a stable regulatory environment in which to carry out space related activities. ESA and UK Space Agency funding is recognised as a key catalyst for growth and as it is based primarily on the public private partnership model of grant funding, it can be easily steered towards outcomes that favour the National Endeavour for Space Security. MoD funding, on the other hand, is largely based on a 'winner takes all' competitive model which can result in harsh financial outcomes for those that do not take the prize. By using the total pot to partner with and

incentivise different suppliers we believe the National Endeavour for Space Security could back a larger number of winners.

Ends

About UKspace

UKspace is the trade association for the UK space industry, representing approximately 90% of the sector. It works in partnership with ADS and TechUK to provide one powerful voice for the sector and its issues and interests. The UK space industry accounts for over £18.9bn per year, underpins £364bn of UK GDP with over £5.8bn per year in exports. It employs 52,000 people and is located all over the country from Scotland to Cornwall and Kent to Wales.