UK's Defence Space Strategy in Context

An analysis

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About the Space Policy Unit

Launched in April 2019 by the then US Secretary of the Air Force, Hon Heather Wilson, and then UK Science Minister Rt Hon Chris Skidmore MP, Policy Exchange's Space Policy Unit – founded and led by Gabriel Elefteriu FRAeS – is the first of its kind at any UK think tank. The Unit's mission is to champion a comprehensive development of UK space power as a critical component of the UK national interest in the 21st century. Our goal is to help lift Global Britain's space ambitions to the next level, and help build a strong, exciting vision for UK in space that can be taken up by Government and Parliament in the years ahead.

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Key points

- The MoD's Defence Space Strategy is a focused, strategic and credible document with an assertive, hawkish message about Britain's strategic intent in the space domain from a military perspective. It maps out a coherent and logical path towards space power.
- The biggest challenge for Defence will be to actually deliver its complex Defence Space Portfolio (DSP) quickly, effectively, and in an agile manner. Exactly *how* to do this is the Holy Grail for the MoD's space leadership.
- The available funding is a rather modest sum but a very good first step. The MoD will need several more such cash injections for space in the coming years.
- For all good intentions and rhetoric, meaningful integration of UK civil and defence space remains a distant prospect. But a unified, central policy-making "brain" and delivery capability is required, together with a Cabinet-level Space Minister.
- One key to achieving acquisition agility is a diversified and dynamic UK space industry. The MoD's procurement decisions can shape it in that direction: the DSP is also an economic tool.
- Geopolitics must be taken into account in the economics of delivering the DSP. In line with the Integrated Review and Global Britain vision, Government should look to tilt the international outlook of UK's space industrial base and supply chain towards cooperation with players from countries beyond Europe, particularly from the Five Eyes and the Indo-Pacific Region.
- How the Own-Collaborate-Access (OCA) framework will be used can make or break Britain's prospects of becoming a major space nation in the 21st century. The MoD has given itself maximum flexibility in this regard but the OCA mix should be a matter of wider political and strategic debate.
- The more Defence relies on private capability, safeguarding UK space-industrial competitiveness and making sure that key commercial suppliers remain in place is essential.
- The meaning of "sovereignty" requires careful attention. "Assuring" a space capability is not straightforward either, as it is often related to political factors.
- The DSS is at its best when articulating the strategic vision for UK Defence space going forward.
- A role in hypersonic missile targeting could be a valuable addition to combined allied defence.
- The DSS barely mentions PNT, with no commitments. There could be UK opportunities in providing additional layers of capability and/or resilience to GPS.
- The DSS could have gone a bit further on the subject of spaceflight. Having a sovereign responsive launch capability is fundamental to any space power.
- Not even mentioning *human* spaceflight is another missed opportunity. It reinforces the sense of a "terra-centric" space strategic vision.
- Deterrence requires a wider discussion grounded in a clear appreciation – a net assessment – of the global balance of space power. NATO, Indo-Pacific allies and AUKUS have a role.
- The messaging on Space Control is a hawkish signal to adversaries and allies alike that the UK does not intend to be a passive space player. No new international space law provisions should be allowed to foreclose any counterspace capability options to UK Defence.
- The DSS has effectively nothing to say about the future of UK defence space relations with friends and allies in the Indo-Pacific region such as Australia, Japan or even India and the UAE.

A new chapter in UK space affairs

The MoD's first Defence Space Strategy (DSS), launched on 1 February, is an excellent and serious document – the best that official UK thinking on space affairs has yet produced.[1] It is significantly more focused, genuinely strategic and credible (with real money behind clear capability objectives) than the civilian-led National Space Strategy published last year, which was itself a major step forward for the government's approach to space.[2] This rapid progress in a critical but long-marginalised area of public policy is heartening and a signal to the world that Britain is getting its space thinking in order.

"Integrated" on paper

The contrast between the DSS and NSS illustrates an important fact: that this country has always had **two distinct space policies**, military and civil. There is now – rightly – a major emphasis on integrating them, and the NSS itself was presented as an "integrated strategy" co-sponsored by Defence. But the launch of a separate DSS, with its own aims and budget, is a restatement of MoD space independence not integration. This only reflects reality, as Defence has historically been by far the biggest and most experienced space player in government.

There is a major Whitehall power differential between MoD and the civil side of UK space – particularly BEIS. It makes integration – i.e. making Defence "play" more with other Departments on space – harder to achieve in the absence of major incentives (e.g. extra funding) or decisive political direction from the top of government. Indeed, this was one of the issues that have plagued the GNSS and SBPP programmes. Rhetoric aside, the **MoD will naturally dominate** any cross-Whitehall space coordination body where it needs to defend its interests; this mainly structural, stemming from the way Whitehall works, and not always to do with the personalities involved.

So the question of UK civil-military "national" space integration remains wide open but ever more pressing. Britain is unlikely to realise its full space power potential if it continues to run two separate policies in this domain. Positive noises about "dual use" capabilities are welcome but so far the only salient example of this working in the security field was with the cyber programme starting from 2010, run from the Cabinet Office and benefiting from its dedicated budget. A similar approach is required in space. The only way to remove barriers and cohere space policy-making at a national level is to have **a unified, central "brain" and delivery capability** in Government, ideally under a dedicated **Cabinet-level Space Minister** as Policy Exchange,[3] and more recently both UKSpace[4] and Major Tim Peake,[5] have suggested.

1. Ministry of Defence, *Defence Space Strategy*, 01 February 2022, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1051456/20220120-UK_Defence_Space_Strategy_Feb_22.pdf
2. See Policy Exchange's analysis on the NSS: Gabriel Elefteriu, *UK's space strategy: the boost is yet to come*, Policy Exchange, 01 October 2021, Available at: https://policyexchange.org.uk/uks-space-strategy-the-boost-is-yet-to-come/
3. See Gabriel Elefteriu, *What do we want from the next Prime Minister? Policy ideas for new leadership: Space*, Policy Exchange, 2019, Available at: https://policyexchange.org.uk/wp-content/uploads/2019/07/Manifesto-Space.pdf
4. House of Commons Defence Committee, *Oral evidence: Space Defence, HC 271*, 07 September 2021, Available at: https://committees.parliament.uk/oralevidence/2702/pdf/
5. House of Commons Defence Committee, *Oral evidence: Space Defence*, HC 271, 14 December 2021, Available at: https://committees.parliament.uk/oralevidence/3193/html/

Delivery questions

The DSS stands out through the 10-year Defence Space Portfolio it outlines, which gives a picture of how UK military space capability *might* look like if everything goes according to plan. But here details matter. The DSS notes that it has conducted an analysis that "*will* enable the creation of a detailed and prioritised capability plan out to 2030". Until that specific plan materialises, the extra £1.4bn (over 10 years) for space has been apportioned in the DSS to a number of "capability themes":

SATCOM (Skynet)	£60m (added to the core £5bn Skynet budget)
SDA	£85m
ISR (Istari)	£970m
Command and Control	£135m
Space Control	£145m
TOTAL	£1,395m

This is likely to be only a rough guide to how the MoD's space pie will be split. **The challenges of actually delivering this complex Portfolio and fielding real capabilities will be huge**, given that as little as two years ago the MoD was calibrated to sustain mostly only Skynet, elements of SDA (Space Domain Awareness) and ARTEMIS, the relatively small scale precursor to what is now called Istari. Adding to the pressure will be the knowledge that there is little hope of a further boost to the Defence space budget in the near future, so the margins for error in programme delivery will be tight. The RCO-style[6] "fail fast" approach to space procurement – otherwise rightly advocated in Defence – will only add to the challenge of keeping within budget.

Secondly, there is the **pressure of time**: the global space strategic picture – threats, technology, competitors – is changing rapidly. Is the ten-year £1.4bn spending profile front-loaded, allowing a full-speed capability buildup, as one would expect it to be given the increasingly high risk of war breaking out over Ukraine and/or Taiwan, as we can already observe?

The UK must first catch up with peers who have been investing consistently in military space capabilities as well as skills for many years. But to keep up, and perhaps even get ahead, **the MoD will have to do in space what it has hardly ever done in any other domain: to deliver complex capabilities quickly, effectively and with so much agility** that it can recast whole programmes at short notice in response to external developments. This challenge is well understood in Defence, and the DSS acknowledges it when talking about "agile acquisition and supplier management approaches to increase our experimentation with industry and rapidly evolve high-tech demonstrators into fast-paced capability programmes". **Exactly *how* to do this is the Holy Grail for the MoD's space leadership.**

6. Rapid Capabilities Office (RCO). Similarly to the US Air Force's Rapid Capabilities Office, the RAF Rapid Capabilities Office seeks to ensure the swift deployment of capabilities through non-traditional models of procurement – essentially removing large amounts of red tape from conventional procurement methods, and often seeking commercial partners that offer technologies which are already mature. See Air Force Magazine, The Royal Air Force Adopts the RCO, Expects "Healthy Competition" in Future Aircraft, 14 October 2019, Available at: https://www.airforcemag.com/the-royal-air-force-adopts-the-rco-expects-healthy-competition-in-future-aircraft/

Two ingredients seem essential. The first goes back to civil-military integration: the UK needs **a single Space Acquisition & Procurement** capability similar to France's Toulouse Space Centre which delivers both its civil and military programmes. There is a great opportunity here to design from scratch a UK equivalent – starting small, of course – but tailored to our unique circumstances and strengths including the existing space scientific and industrial base, and international partnerships.

Defence needs it for the reasons stated above. UK's civil space programme needs it even more, not only because the UK should be able to send its own national missions to space (rather than merely making contributions to others' missions); but also because **Britain's long-term future in ESA is increasingly in doubt** and there is a need for a Plan B, for which a pre-requisite is a strong domestic space programme management capability.

The DSS has very welcome things to say about developing a "Defence space workforce", including a hint at "combined military and civil training", "reserve space squadrons" – an excellent idea, which can be a basis for more Army and Navy involvement as well, given that space is Joint – and a suggestion of a Defence space career path. Most encouragingly, there is a reference to a potential Space Academy in a "collaborative" setting with other Departments. Should the Government pair these DSS proposals with a dedicated space career stream within the Civil Service – recommended by Policy Exchange in 2019[7] – the effects would be transformative for the broader UK space enterprise. **The signal for reform and proper integration of UK space delivery can only come from Defence – but is the MoD sufficiently motivated to provide it, given all other issues on its plate?**

The second ingredient in achieving acquisition agility is a **diversified and dynamic UK space industry**. **The state of the UK space industrial base is a matter of national security** because it underpins and shapes everything that Defence is trying to achieve in this critical domain. At the same time, this is a two-way street: **Defence space programme decisions (e.g. contract awards) have a powerful role in shaping the industry**; in turn, the industry's capabilities and structure affect how Defence space programming evolves.

The MoD thus has a responsibility to think strategically about the UK space industrial landscape as well, to counteract monopolistic tendencies and **promote choice and healthy behaviours** in the industry, always with an eye on future requirements. (Skynet is a case in point.) But this can sometimes be tricky, particularly as MoD contractors can be involved with civil programmes as well, especially via ESA, which complicates the overall industrial calculus for a variety of reasons.

The other aspect that MoD space planners have to take account of as regards industrial relations is **geopolitics**. UK's space industrial base has historically been strongly tied to Europe via our ESA work. What was once a strength is now becoming a vulnerability as **Britain is increasingly seen in Europe as a competitor instead of a partner**. The fact is that as a third

7. Gabriel Elefteriu, *What do we want from the next Prime Minister? Policy ideas for new leadership: Space*, Policy Exchange, 2019, Available at: https://policyexchange.org.uk/wp-content/uploads/2019/07/Manifesto-Space.pdf

country in relation to the EU, the UK is at a critical disadvantage as regards space cooperation: Brussels funds the key multilateral space programmes on the continent, and UK industrial access to them – including via ESA – will always be subject to EU interference, direct or otherwise.

The only conceivable way Britain can restore leverage in our space relations with Europe is by a major increase in our ESA subscription – something that the Government should consider very seriously. This could change the balance of interests and political power within ESA with knock-on effects on the EU's calculus on these matters, especially in view of the developing EU-ESA relationship. However, this course of action would require tremendous political will and commitment.

In the meantime, the deterioration of our space position in Europe, the EU-UK political difficulties which are likely to persist for a long time, and the strategic guidance laid out in the 2021 Integrated Review (IR)[8], suggest that Government should look to **tilt the international outlook of UK's space industrial base and supply chain towards cooperation with players from countries beyond Europe**, particularly from the Five Eyes and the Indo-Pacific Region. As Policy Exchange argued in 2020, Britain should look to develop a multilateral Space Technology Alliance with such partners who might share some of Britain's capability requirements.[9]

Defence is surely aware that it has a tremendous power to signal – and indeed effect – a major UK industrial realignment through its capability plan and procurement decisions. The Defence Space Portfolio is an economic tool as well, and the MoD should wield it with care and with an eye on the long-term political and geoeconomic landscape in which the UK Space Enterprise will have to operate.

The sovereign factor

One outstanding feature of military space capability is the apparent flexibility available in choosing how to meet it, from the point of view of government control. In the sea, air and land domains almost all frontline battlefield capabilities are Defence owned and operated, be they warships, warplanes or armoured fighting vehicles; commercial contractors are generally involved in support roles like logistics, although in recent years with the rise of drones and cyber the lines have become more blurred in some areas.

With space things are different. Traditionally entirely the preserve of governments, it is now the commercial sector that drives innovation and deploys most space systems in orbit.[10] There are already decades of experience with private space operators providing "frontline" space services to militaries, especially satcom and imagery. Who cares – the thinking goes – whether a certain piece of space-derived data needed for military operations comes from a government or a commercial satellite, as long as the data is trusted and the system has military-grade protections in place?

This logic gives rise to a number of military-commercial cooperative

8. Cabinet Office, *Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy*, 16 March 2021, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/Global_Britain_in_a_Competitive_Age-_the_Integrated_Review_of_Security_Defence_Development_and_Foreign_Policy.pdf
9. Policy Exchange, *A Very British Tilt: Towards a new UK strategy in the Indo-Pacific Region*, 2020, Available at: https://policyexchange.org.uk/wp-content/uploads/A-Very-British-Tilt.pdf
10. European Space Policy Institute, *The Rise of Private Actors in the Space Sector*, 2018, Available at: https://link.springer.com/book/10.1007/978-3-319-73802-4

options for meeting capability requirements at different degrees of sovereignty or government control. The DSS formally recognises and codifies this in the "**Own-Collaborate-Access**" (OCA) framework which will govern "what capabilities we must own on a sovereign basis, those for which we can collaborate with our allies and partners … and those we can access via the commercial market". But surely **the capacity of the existing industry to support a certain OCA mix will always pre-judge decisions** in this area to some extent. This points to the need to use procurement to increase inward investment and onshore manufacturing to give the UK defence space planners more choice across the breadth and depth of OCA options.

How this OCA framework will be used to drive programme decision-making has the potential to make or break Britain's prospects of becoming a major space nation in the 21st century. In absence of any stronger political direction from above, **the MoD has given itself maximum flexibility** in defining the shape of UK's space power according to its own internal "critical assessments" of the issue.

Here there will be **different schools of thought** in regards to what OCA elements should be emphasised – i.e. how much space sovereignty we should seek – and over what timeframes. Cost will always be a driver of short-termism for example. Some will be relaxed about leaning a lot on close allies, others might see a more prudent future in a higher level of UK space independence. But the point is that **the OCA mix should be a matter of wider political and strategic debate**, not just internal assessment, given its potential impact on Britain's national space interests going forward.

Beyond all this, there is a **fundamental risk** that needs to be discussed when it comes to government reliance on private providers: the fact that they **might fail commercially** or be interfered with by hostile actors in the future. If the MoD's capability plan, for example, chose to place significant emphasis on the "Access" leg of OCA for cost reasons, the question of **safeguarding UK space-industrial competitiveness** and making sure that those key commercial suppliers remain in place acquires a national security significance.

Any questions of this nature must be considered in a geopolitical framework because the space economy is global and interdependent – and the competition is sharp. As Policy Exchange's recent report on the Geopolitics of Space Technology noted, countries like China use strongarm geoeconomic strategies to build global corporate champions and secure business for its space sector.[11] In turn, "the UK and its friends and allies should **act more proactively in providing their respective space sectors support** in ensuring a level playing field in key markets abroad to counter China's aggressive economic approach".[12] This is the context in which choices about whether to own, collaborate or access a given space capability must be made. **The stakes go beyond simply the immediate defence space programme at hand.**

The meaning of sovereignty as applied to space assets requires careful

11. J. Sheldon, *Britain and the Geopolitics of Space Technology*, Policy Exchange, 05 November 2021, Available at: https://policyexchange.org.uk/wp-content/uploads/Britain-and-the-Geopolitics-of-Space-Technology-1.pdf

12. Ibid., Page 21.

attention, as does assurance. There is a form of sovereign control of a commercial satellite, for example, whereby the military uses confidential command arrangements with commercial satcom operators contracted for this scheme, allowing the military to control/steer antennas and transmit data on the contractor's satellites at a time of its choosing, with the contractor not knowing what the military is actually doing through their satellite, being unable read the data or see where antennas are pointed. But in a stricter understanding of sovereignty, a military might want to have full ownership and control of the satellites – and ideally not have to phone to a different country for technical support when things go wrong, which again goes against the idea of sovereignty.

Finally, **assuring a space capability is not straightforward, as it is often related to political factors**. At the technical level, assured means having full knowledge of exactly how the technology (including software) works, where all components are sourced from, and how they are assembled, so that the system can be completely trusted. (This was the key and unsolvable reason why the UK pulled out of Galileo after Brexit: because while we might have negotiated access to the PRS signal, we would not have been able to assure it any longer, as a third country.) At an operational level, as the DSS notes, "assured access … is the ability to conduct military operations as we choose without external political interference, and to protect the sensitive technologies that underpin those capabilities".

There are many challenges, therefore, in assuring a space capability made available by an ally or a commercial partner. In this highly technical area, it is **easy for mistakes to be made, for terms and definitions to be misapplied or misinterpreted**. MoD space leaders – and ideally UK political decision-makers – must ensure the highest and strictest standards of assurance through the OCA framework. It is hopefully not a bad sign that the DSS mentions in passing that "there will be differing national levels of assured access requirements".[13]

Strategically speaking

The DSS is at its best when articulating the strategic vision for UK Defence space going forward. Efforts in this area – as with the DSS overall – go back to at least 2018 when the DSS was first announced.[14] A look at the original "DSS headlines" drafted in 2018 shows how far the MoD's space thinking has come in the almost four year since.[15] The most significant change is the introduction of "**Protect and Defend**" as a core pillar of the strategy, which gets strongly-worded treatment in the 2022 DSS. This reflects the marked worsening of the space threat picture and geopolitical environment in the intervening period, as well as **the influence of the new US Space Force** on allied approaches to space.

What comes out of the DSS is the image of a Britain which in 2030 has an **almost full complement** of military space capabilities, from SDA and Command and Control through to Satcom and ISR. The plan outlined in

13. Ministry of Defence, *Defence Space Strategy*, 01 February 2022, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1051456/20220120-UK_Defence_Space_Strategy_Feb_22.pdf
14. Ministry of Defence et al., *UK poised for take-off on ambitious Defence Space Strategy with personnel boost*, 21 May 2018, Available at: https://www.gov.uk/government/news/uk-poised-for-take-off-on-ambitious-defence-space-strategy-with-personnel-boost
15. Ministry of Defence, *Towards a Defence Space Strategy*, 2018, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712376/MOD_Pocket_Tri-Fold_-_Defence_Space_Strategy_Headlines.pdf

the document, particularly for the ISR constellation and its associated data transport or "digital backbone" Minerva project bears some resemblance to the multi-layered National Defense Space Architecture (NDSA)[16] overseen by the US Space Development Agency (SDA).[17] Perhaps the MoD will also look to incorporate the rapid acquisition processes of SDA – which was built for speed – as well as those of the US Space Force's Rapid Capabilities Office.[18]

The mention of secondary payloads for the Skynet raises the prospect of linking these GEO assets with the LEO-based Istari in a space "**system of systems**" which can open up a range of interesting operational possibilities. A **role in hypersonic missile targeting** – and thus a potential integration with the US NDSA which has the same mission – could be a valuable addition to combined allied defence. But fundamentally, having its own military ISR system will allow Britain to become a **contributing nation** to allied space sensing capability, with operational but also political benefits. On yet another but related level, Istari, with its promised new high-tech sensors, will help boost UK's **GEOINT** (Geospatial Intelligence) capabilities and further increase the effectiveness of our world-class intelligence services which are a key element of **British influence** in global security affairs.

But **the immediate capability focus – already underway – is SDA**, which both the NSS and DSS have identified as an area of potential comparative UK advantage and priority funding. Recognised in the strategy as "a fundamental enabler of all other space capabilities", SDA can also be construed as the space equivalent of GCHQ and MI6, thus raising the prospect of UK becoming an orbital intelligence power with all the strategic and diplomatic benefits attached to that status – again, similar to the leverage that "classical" intelligence affords Britain in global affairs.

SDA draws on established UK strengths in data processing and AI technologies and benefits from the US-owned radar at RAF Fylingdales. The only question here is: **given how important SDA is, and its potential, does the DSS go far enough?** The focus in the DSS (and NSS for that matter) seems to be on building up **analytical** capability in SDA, taking advantage of UK's exceptional assured access to allied – mainly US government but also commercial – SDA data sources. But is there a case for improving *as quickly as possible* UK SDA data **collection** capability as well, both on the ground – taking advantage of UK sovereign territory around the world – and in space?

Regarding the former, a new ground-based **BMD radar** which would also double as an SDA sensor has been announced as far back as the 2015 SDSR[19] but it is not clear when or indeed where[20] it will materialise. The DSS is silent on this count as on the prospects for a future DARC site[21] in the UK, arguably because both projects would fall under Air Command's remit than that of Space Command. There is an interesting proposition to explore, however, in regard to the latter category of SDA collection infrastructure. The DSS hints at the fact that the UK Space Operations Centre already uses data from US on-orbit space-monitoring satellites

16. The National Defense Space Architecture (NDSA), is resilient military sensing and data transport capability via a proliferated space architecture primarily in Low Earth Orbit (LEO), overseen by the US Space Development Agency. See https://www.sda.mil/home/about-us/
17. Space Development Agency, *About Us*, accessed February 2022, Available at: https://www.sda.mil/home/about-us/
18. The Space Force Rapid Capabilities Office was established through the National Defense Authorization Act for Fiscal Year 2018, Available at: https://www.congress.gov/115/plaws/publ91/PLAW-115publ91.pdf; with subsequent authorities defined in the National Defense Authorization Act for Fiscal Year 2019, Available at: https://www.congress.gov/115/bills/hr5515/BILLS-115hr5515enr.pdf
19. HMG, National Security Strategy and Strategic Defence and Security Review 2015, 23 November 2015, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/478933/52309_Cm_9161_NSS_SD_Review_web_only.pdf
20. A new UK radar should be located in a place where it can fill in gaps in the global space surveillance coverage, such as in the Ascension Islands or the Falklands. See M. Hilborne and M. Presley, Towards a UK space surveillance policy, August 2020, Available at: https://www.kcl.ac.uk/dsd/assets/towards-a-uk-space-surveillance-policy-final.pdf
21. J. Beale, *US wants giant radar in UK to track space objects*, BBC News, 16 July 2021, Available at: https://www.bbc.co.uk/news/uk-57866734

– but **perhaps Defence should invest in a UK surveillance/inspector satellite system as well**. Again, this would be a niche capability useful in an allied context but that can also dovetail with UK's interest in Active Debris Removal.

Defence collaboration with the civil and commercial sector on SDA will be critical, and the DSS commits to working "in conjunction" with the UK Space Agency's Space Surveillance and Tracking programme. The test will be a successful establishment of the civil-military-commercial **National Space Operations Centre**; the main difficulty will be in keeping up with the rapid change in the space operating environment driven by the accelerated deployment of megaconstellations like Starlink or OneWeb.

One missing piece in the Defence Space Portfolio is PNT, a crucially important service that underpins large chunks of the economy as well as the UK Armed Forces' warfighting capability.[22] The DSS barely mentions it, with no commitments. The story of how we came from the original UK GNSS programme started during Theresa May's premiership to the now-moribund SBPP[23] merits its own monograph, but one constant throughout has been the MoD's reluctance to back a global, sovereign, assured, high-precision UK solution to this critical vulnerability. Despite the fact that **the UK is the only permanent member of the UN Security Council without sovereign access to a PNT system**, the subject only gets a brief mention in the DSS. This no doubt reflects the MoD's confidence in its continued privileged access to GPS M-Code as well as in the system's resilience. But it is an increasingly risky bet. It also perhaps overlooks opportunities that might be available to the UK in **providing additional layers of capability and/or resilience to GPS through GEO-based assets** for example.

The other area in which the DSS could have gone a bit further is **spaceflight**. As the national Launch programme is in the hands of the UK Space Agency – as is PNT, in effect – the MoD is perhaps rightly limiting its contribution to a "support" function. This is unfortunate because the long delays and the unsatisfactory state of the civil-run programme suggest there may be benefits in **a stronger Defence involvement** to help sort things out, particularly given the MoD's heritage this area. Assured access to space – in particular, **having a sovereign responsive launch capability** that can be relied upon at all times – is fundamental for any space power, so one would have expected Defence to take more interest in this issue.

The DSS also missed an opportunity in **not even mentioning human spaceflight** as a subject of interest. This is perhaps understandable given the limited resources available and the need to prioritise more pressing requirements, but it does reinforce **the sense of a "terra-centric" space strategic vision** that only looks at what satellites can do for us here on Earth, and at how to protect those satellites. But **the future is coming fast** and the years and decades ahead will inevitably see increasingly more human activity in orbit and cislunar space[24], enabled by more space stations, cheap crewed spacelight and most importantly, spaceplanes. **Other space nations are thinking seriously** about how to prepare for these incoming changes to the space strategic environment which are set

22. Government Office for Science, *Satellite-derived Time and Position: A Study of Critical Dependencies (Blackett review)*, 30 January 2018, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/676675/satellite-derived-time-and-position-blackett-review.pdf

23. The Global Navigation Satellite System (GNSS) Programme started in 2018 with a mission "to look at options for a British Global Navigation Satellite System"; see https://www.gov.uk/government/news/space-sector-to-benefit-from-multi-million-pound-work-on-uk-alternative-to-galileo. The Space Based PNT Programme (SBPP) is a UK Government programme launched by the UK Space Agency in October 2020 to explore innovative ways of delivering PNT services to the UK. See UK Space Agency, Space Based PNT Programme, 10 February 2021, Available at: https://www.gov.uk/guidance/space-based-pnt-programme

24. For example, the 2020 US Space Force Doctrine notes that "commercial investments and new technologies have the potential to expand the reach of vital National space interests to the cislunar regime and beyond in the near future." See United States Space Force, Spacepower: Doctrine for Space Forces, June 2020, Available at: https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf; and a CSIS analysis stressed that "strategic interest in cislunar space and the moon is growing as launch capabilities and commercial ventures proliferate" and that "lunar and cislunar domains may become prime targets for national security investment in the 21st century" Spencer Kaplan, Eyes on the Prize: The Strategic Implications of Cislunar Space and the Moon, 13 July 2020, Available at: http://aerospace.csis.org/wp-content/uploads/2020/07/20200714_Kaplan_Cislunar_FINAL.pdf

to challenge terra-centric perspectives. The MoD should do so too, at least to some extent, perhaps starting with a focus on human spaceflight – particularly astronaut training, which is the theme of an upcoming Policy Exchange report.

One of the most welcome features of the DSS is the assertive, no-nonsense messaging around the hard-edge security questions in space. These have become an urgent priority, given that in recent years governments have awoken to the extraordinarily damaging consequences to modern society of a coordinated attack on space services; the closest equivalent would be the impact of a nuclear attack. On this, two inter-related aspects are worth noting in particular. One is the mention of **deterrence, which is a notoriously difficult concept to theorise in the context of space**. The DSS draws NATO into the deterrence framework, suggesting that space attacks might trigger a collective allied response under Article 5. This is in line with MoD thinking[25] that what is needed is a concept of integrated deterrence – combining potential elements from all domains – rather than a narrow "space" deterrence. Nonetheless, **there are specific space-domain elements of deterrence – such as responsive launch and resilience that should be overlooked just because a wider lens is used.**

A wider debate is necessary here, which should be grounded in a clear appreciation – **a net assessment – of the global balance of space power**. But there is clearly a large scope for the role of allies in collective deterrence, and especially that of NATO – through its new Space Centre of Excellence in Toulouse. This should perhaps be taken a step further by including **Indo-Pacific allies** and structures – for example, **AUKUS** – into a more powerful international space deterrence network. This may also generate opportunities for **coalitions of the willing on the question of orbital debris management.**

The other key security-related aspect outlined in the DSS is **Space Control** – first flagged in the IR – which is also identified as a funded priority theme within the Defence Space Portfolio. This area remains entirely classified, but the mention of it alongside new funding of £145m is a **hawkish signal** to adversaries and allies alike that **the UK does not intend to be a passive space player** and that it is willing to deploy counterspace effects when required. These are likely to include reversible actions such as cyber or jamming, rather than permanent-kill capabilities – for now.

Over the next decades it is inevitable that global counterspace arsenals will expand and diversify, and Britain might well have to evolve its space control capabilities accordingly. But down this road now opened by the DSS lie **potential clashes with the more liberal vision for space sustainability** and transparency – and arms control – promoted by the Foreign Office. The MoD will undoubtedly keep this concern in mind and **ensure that no new international space law provisions will be allowed to foreclose any counterspace capability options to UK Defence**.

25. Comments from MoD representatives at the DSS launch event at King's College London, 1 February 2022. Available at: https://www.kcl.ac.uk/news/first-ever-uk-defence-space-strategy-launched-at-kings

Conclusion

The UK's Defence Space Strategy is an impressive document. It is clear, coherent and detailed, well balanced and in step with the latest thinking on strategic space affairs especially in the US. This reflects the exceptionally close relationship between the MoD and Pentagon in the space domain – through things like Op OLYMPIC DEFENDER or the CSpOC[26]. By contrast, **the DSS has effectively nothing to say about the future of UK defence space relations with friends and allies in the Indo-Pacific region such as Australia, Japan or even India and the UAE.** This is surprising in light of AUKUS and the Indo-Pacific "tilt" mandated by the Integrated Review: space policy, especially in its military dimension, can bring an important contribution to that agenda.

There are a few other points in the DSS that remain of some concern. The headline issue is of course the **overall funding available**: an average of £140m/year to deliver a complex Defence Space Portfolio (minus Skynet) is a rather **modest sum** compared to what other allies and competitors are investing – and bearing in mind their *previous*, accumulated investments in this area. In 2020, US spent $24bn on defence space programmes; China 2.8bn; Russia $1.6bn; Japan $1bn; France $832m. This £1.4bn addition to the UK defence space budget over ten years is a **very good first step**. But if the UK Government wants Britain to develop into a serious space power in the 21st century – and it should, for a variety of political and strategic reasons – and to compete effectively in the space arena, then **the MoD should receive several more such cash injections for space in the coming years**.

Secondly, the critical **PNT** question is skimmed over and Launch is likewise summarily dismissed – in both cases, for understandable and defensible reasons, but these are nonetheless areas where Defence should lean more into because they are, after all, *strategic*. A forward looking DSS could also have engaged in some way with the topic of **human spaceflight** and future **cislunar** operations, at least to put them on the map and open a debate.

Lastly, the **main challenge with this strategy is delivery**. The drafters of the DSS clearly recognise this issue: while articulating an ambitious vision for agile, fast-moving and "redefined" procurement processes, the language around all this is carefully hedged, particularly as regards to what the MoD is actually committed to. This is no doubt a wise approach, but it must be stressed that the **Own-Collaborate-Access** framework as well as a yet-to-be-defined "guidance" on what technologies and industrial capabilities "should be maintained on shore" leave the parameters and meaning of "UK space capability" **wide open to interpretation**. A robust debate is required on this topic, going forward, because the OCA mix chosen by Defence has the potential to shape the industry itself at a time when these decisions should take into account the geopolitics of capability and industrial collaboration as well.

The most valuable aspect of the DSS is its strong, assertive message

26. See US Strategic Command, Fact Sheet: Combined Space Operations Center / 614th Air Operations Center, 2018, Available at: https://www.stratcom.mil/Portals/8/Documents/CSpOC_Factsheet_2018.pdf

about Britain's strategic intent in the space domain from a military perspective. It comes at a critical juncture, when this country is recasting its position in the world as Global Britain, in the context of escalating military-strategic tensions with adversaries at opposite ends of the Eurasian landmass, Russia and China. Space will play an increasingly important role in this **geopolitical competition** which will inevitably extend in very material ways to Earth orbit and beyond in the years and decades ahead.

The UK must build up its space power in preparation for that future, and **Defence has now mapped out a coherent and logical path** towards that end. It must maintain momentum and **be bold enough to ram the necessary institutional transformations through the system** in order to give itself a chance to deliver on this vision at pace.

In final analysis, this is a powerful document and the start of a new era in UK space affairs.

Policy Exchange

The UK's first Defence Space Strategy is an excellent document with an assertive, hawkish message. It maps out a coherent and logical path towards UK space power. But delivering a range of complex space capabilities quickly within tight budgets will be a major challenge for the MoD: real civil-military integration and a unified space decision & acquisition authority at the heart of Government is required. The Defence Space Portfolio is also an economic tool that can shape the industrial landscape, so the way the new Own-Collaborate-Access framework will be applied should be a matter of wider debate and geopolitical consideration as well.

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