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Better space:

Consolidating Britain's National Space Enterprise

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New geostrategic thinking for a more competitive age
https://www.geostrategy.org.uk

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Forewords

I highly commend 'Better space' as a thought-provoking analysis of the United Kingdom's (UK) space to date, with cogent ideas on how we might change that approach in the future. Gabriel is a passionate advocate for the UK's place in space, and generates a sometimes controversial debate, which may not please all. Nonetheless, there are some strikingly well-made observations.

While it is true that we have an excellent science base, an innovative ecosystem and a forward-leaning regulatory environment, we need mature national space infrastructure alongside this. We must recognise that every citizen in the UK already relies on space for their everyday lives. Space underpins 16% of the UK's Gross Domestic Product (GDP) – a day without space would cost our economy £1.2 billion 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.

In this context, the identification that we need to pull forward our prioritisation and delivery of national capability is excellent. We must identify what we need for the UK, by the UK, and bring this to our international partnerships, so we can be a valued and meaningful partner for our key allies. We've been showing up rather empty-handed too often, in both civil and defence relationships.

We have good people working in government on space programmes, but the lack of coherence in supply and demand, in civil and defence activities, stymies success. We have an opportunity to work in a strategic partnership with the new government to set a new direction for the UK space sector. We need to consolidate our efforts in public-funded R&D and have that ten-year funding horizon to encourage investment and build capability on the supply side.

Crucially, we need to cohere government requirements, and give a single body the heft to take decisions to pull through procurement of national space capabilities if we want to be a meaningful actor in space.

And we should, otherwise we will all be poorer without it; our dependence on space is growing, it's where our future should lie, and the opportunity is now.

Dr Alice Bunn OBE

President, UK Space (2022-)
Chief Executive Officer, Institution of Mechanical Engineers (2021-)
International Director, UK Space Agency (2018-2021)

A long time ago in a ministry far, far away, I held the Space Portfolio. It dawned on me then that the sector was becoming significant, so we commissioned the first strategic review, published in 1997. At Farnborough in 1994, I had remarked:

> One of my tasks as a minister is to persuade people how relevant the activities and work in space are to them. It is so often forgotten how many things that we now take for granted are space related…Making the public aware of what we are doing is a very important stage in under-pinning our space effort.

Fast forward to today, the enormous growth of UK based space sector activities and ESA and wider collaboration is hugely impressive and a tribute to those involved. Yet, successive governments have still not managed to create a coherent, integrated decision-making body for civil and military space priorities and delivery to do justice to what, since 2015, has become a Critical National Infrastructure.

This timely study proposes ways in which the new government can grip the problem and I welcome suggestions which may stimulate urgent discussion. Mission-driven industrial policy is back in favour. If priorities are more clearly focused and set with implementation made more speedily and efficiently, it can boost industry confidence, generate co-financing, and increase space foreign direct investment.

The author states 'The central problem in UK space affairs is organisation – not money.' Any minister would argue fiercely that in view of the overarching role diverse space assets and services play in preserving our daily life, plus competition from other countries and the current threatening behaviour of Russia especially, funding increases are needed.

Yet, better organisation is essential and this government must rise to the perennial challenge of overcoming cross-departmental silos more effectively than recent attempts. Having seen the way it makes an impact on visits to Toulouse, I understand the suggestion that emulating the French Centre National D'études Spatiales (CNES) organisation, which is solely responsible for safeguarding and advancing France's national space interests as a whole, is worthy of serious consideration.

This Policy Paper makes some wide-ranging, detailed and well-argued points for urgent consideration and I welcome its publication.

Ian Taylor
Minister for Science, Technology and Space (1994-1997)
Chair of the Parliamentary Space Committee (2005-2010)
Chair, European Inter-Parliamentary Space Conference (2009)

Executive summary

- This year's report by the National Audit Office (NAO) criticising the United Kingdom's (UK) Space Agency is an indictment of the failing status quo in British space policy. It should trigger a major reform of the government's entire approach to this area.

- These revelations come at a difficult moment for Britain's space prospects, both internally, as finances are tight, and externally, as the security threat picture in the space domain worsens, and commercial space competition sharpens.

- The new government ought to grip space policy decisively by re-asserting control, re-organising the institutional framework, cutting waste, and focusing on concrete space capability outputs tied to national interests.

- The concept of a '**National Space Enterprise**' – similar to that of 'Defence Nuclear Enterprise' – should be adopted as a focus and object of this reform agenda for British space policy.

- Cohering the UK Space Enterprise from a policy perspective should incorporate three key principles:

    - **Unity** of effort and vision across the breadth of government space activity;

    - **Speed** of delivery and implementation of the new space policy plans;

    - **Capacity** and ability to actually manage and deliver major space programmes.

- To create a strong National Space Enterprise the government should action a simple but bold four-point 'UK Space Plan':

    - Re-establish the UK Space Agency (after a full review) with new powers and authorities as the country's central

'three-star' organisation for national space policy and delivery (across both civil and Defence space), on France's Centre National D'études Spatiales (CNES) [National Centre for Space Studies] model. The new UK Space Agency should report directly to the National Space Council, ideally chaired by the prime minister;

- Consolidate all relevant, publicly-funded space research and development (R&D) activities, centres of excellence and labs (including from the Defence Science and Technology Laboratory (DSTL) and RAL Space) under a single **Space Missions Centre**, subordinated to the new UK Space Agency. This would function as the government's technical arm and main lab for building end-to-end space systems and missions, increasing national capacity for space programme management;

- Consolidate all sovereign civil and military orbital capability requirements under a single and clearly specified **Operational Capability Plan** aligned with UK's space interests and designed as a multi-orbit 'sovereign' space architecture on 'system of systems' principles, for maximum synergy. Effectively, this would become the heart of Britain's national space programme. It would not require new funding; costs would be met by slashing wasteful grants programmes and combining some of the budgets of existing capability commitments across both civil and defence space;

- Create a highly specific, ten-year **Space Technology R&D Plan** deliberately linked and designed to support both civil and defence end-point capability objectives (set by the Capability Plan). This would subsume existing space research projects across the public sector insofar as they are relevant to capability outputs, with the rest of the national space science portfolio left as is.

- Under new leadership, His Majesty's (HM) Government has the opportunity to grip the country's drifting space policy and reset the National Space Enterprise along more rational and effective lines of effort – thus laying the foundations for the UK to become a serious space power in the 21st century, with benefits to national security and economy, as well as strategic advantage.

1.0 Introduction

The United Kingdom (UK), once a pioneer in space technology, now lags behind global competitors in the rapidly evolving space sector. Despite the strategic importance of space in national security, economic growth, and technological innovation, Britain has struggled to maintain pace with leading spacefaring nations. Major policy documents in recent years, such as the 2021 *National Space Strategy* and the *Defence Space Strategy*, acknowledge the urgent need to elevate the UK's space capabilities.[1] However, the current fragmented structure of Britain's National Space Enterprise hampers the effectiveness and agility required to compete on the global stage.

The central problem in UK space affairs is *organisation* – not money. Accordingly, this Policy Paper argues that a reorganisation of the UK's National Space Enterprise is crucial to securing the country's space defence and economic interests – and, therefore, its strategic advantage. It proposes an ambitious agenda for reform, driven by the overarching idea of *consolidation* – both of governance and of public sector space activities. His Majesty's (HM) Government, now under new leadership, should reassert control over a policy area that is now adrift – according to the NAO report – and that has long failed to deliver the real, hard capabilities and the national space programme required by a major power with special status as a permanent member of the United Nations (UN) Security Council and as the leading European power in the North Atlantic Treaty Organisation (NATO).[2]

[1] 'National space strategy', UK Space Agency, 27/09/2021, https://assets.publishing.service.gov.uk/ (checked 11/11/2024) and 'Defence Space Strategy: Operationalising the Space Domain', Ministry of Defence, 01/02/2022, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024).
[2] 'The National Space Strategy and the role of the UK Space Agency', National Audit Office, 23/07/2024, https://www.nao.org.uk/ (checked: 11/11/2024).

2.0 Britain's main space challenge

For many years now, the British space community, especially on the government side, has been living a lie: 'celebrating' marginal or meaningless accomplishments, shaping a false narrative regarding the nation's performance in the global space competition, and papering over deep failures.

Britain does have important national strengths, such as its excellent science base and innovation ecosystem, or its advanced regulatory environment. It has been able to coast on these advantages throughout the relatively benign 'NewSpace' era, and to present its light-touch, low-funded and un-strategic approach to space policy as a successful model.

But the world has changed, the model is now untenable, and the pretence is now over. The recent NAO report into UK space policy making – focused on the UK Space Agency, but taking in other parts of government such as the Department of Science, Innovation and Technology's (DSIT) Space Directorate – paints a painful but accurate picture of the dramatic mismanagement of the country's space affairs.[3] It notes that the National Space Strategy 'did not set out specific aims' or priorities, and that it did not have any costs attached. Remarkably, it also reveals that DSIT – which sets the country's civil space policy, including Britain's activities within the European Space Agency (ESA) – does not know how much the government spends on space in total. The report also noted that over the past eight years 'the UK had generated the highest cumulative deficit of any ESA member', in other words the country has been investing more in ESA than it has been receiving in return as contracts for industry. And these are just some of the issues identified by the NAO.

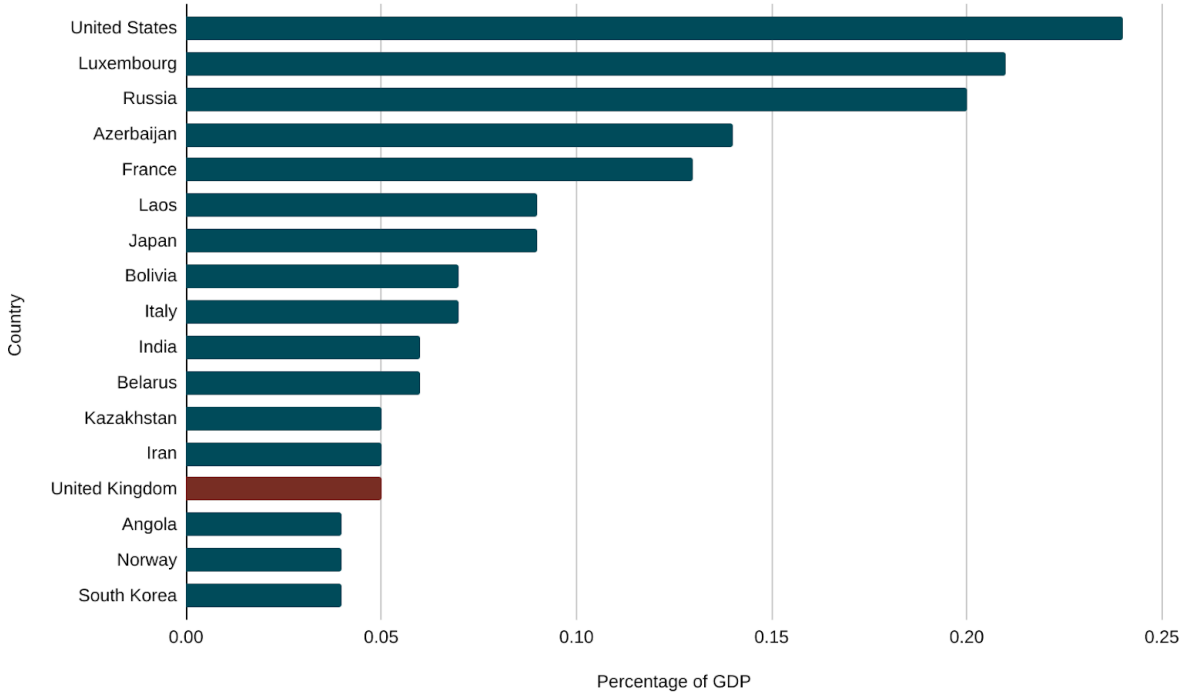
Britain's space future now hangs in the balance. Pressures on multiple fronts threaten to create a 'perfect storm' which could permanently relegate the UK to a marginal status as a space actor on the world stage.

The most pressing problem stems from the difficult fiscal situation facing the new government and its consequent drive to cut costs, certainly in underperforming areas. Space is highly vulnerable

[3] *Ibid.*

budget-wise: partly because of the management failings highlighted by the NAO report, and partly because there is still no coherent understanding of its importance, within government. As a result, just when the UK should be investing much *more* in space in order to respond to a worsening international environment, it risks flat-lining or going in *reverse*.

FIGURE 1: THE TOP 20 COUNTRIES SPENDING THE MOST ON SPACE PROGRAMMES AS A PERCENTAGE OF THEIR GDP (2021)[4]



Secondly, global competition in space is quickly sharpening, both in the commercial and in the national security areas. In recent years, technological advancements have significantly reduced the barriers to accessing space, leading to over 80 nations now possessing some form of space-based capabilities. Emerging ventures could potentially multiply the number of active satellites in orbit by tenfold by 2030.

While the global space market is expanding rapidly, the growth rate of the UK's global share has been stagnating or even declining over the past four years. Even though the British space industry has seen some growth after Covid-19, the latest numbers indicate an overall

[4] *Ibid.*

contraction of the sector (£18.9bn for 2021/2022, down 0.7% on 2020/2021), and its share of the global space economy continues to fall (4.2% now, down from 5.1% reported in 2020).[5] In other words, Britain is not keeping up with global space market expansion even based on official government figures.[6]

In the security arena, meanwhile, the expansion of military space capabilities by Russia and the People's Republic of China (PRC) has intensified global security concerns, particularly regarding counterspace and satellite technologies. The PRC has significantly advanced its intelligence, surveillance, and reconnaissance (ISR) capabilities, deploying high-resolution electro-optical (EO) satellites such as the *Yaogan* series. These satellites enhance the PRC's ability to monitor global military movements and provide real-time data for targeting.

In addition to ISR, the PRC has developed sophisticated counterspace capabilities, including ground-based anti-satellite (ASAT) missiles and directed-energy weapons aimed at disabling or destroying adversaries' satellites. The PRC's *Shijian* satellites, capable of performing close-proximity operations, further underscore its ability to conduct offensive operations in space.

Russia has also bolstered its military space assets, such as the *Kosmos* series of military satellites, which support electronic intelligence (ELINT) and signal interception. Russia's *Nudol* ASAT system, tested in 2021, demonstrated its ability to destroy satellites in low Earth orbit, creating a significant debris threat. These advancements reflect a growing emphasis on space as a battlefield. Yet, the UK is the only major country without either a space-based ISR capability or sovereign access to a Positioning, Navigation and Timing (PNT) system.

[5] For further details, see: 'Size & Health of the UK Space Industry 2022', Know Space (for UK Space Agency), 31/03/2023, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024) and 'Size & Health of the UK Space Industry 2023' London Economics (for UK Space Agency), 26/07/2024, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024).

[6] These official 'Size and Health' reports on the UK space sector are often seen as over-optimistic by the British space community, given their questionable methodology (e.g., with respect to satellite TV revenues etc).

FIGURE 2: SWOT ANALYSIS OF UK'S SPACE POSTURE

Strengths

- World-class science and tech base
- Innovative and dynamic industry
- Competitive regulatory framework
- Competitive business environment
- Good public sector support platforms for new space companies

Weaknesses

- Industrial overdependence on Europe
- Waste and underinvestment
- Lack of space skills/expertise in government
- Space activity fragmented across government
- Lack of sovereign space capabilities
- Lack of strategic policy vision
- Incoherent space strategy
- Historical lack of top-level political support

Opportunities

- Inherent economic and security benefits
- Influencing the international space regime
- Supporting UK national security and resilience Supporting UK growth
- Increased national cohesion
- Countering climate change

Threats

- Increasing security threats from Russia and China
- Global commercial competition
- EU space policy, including on ESA
- Increasing safety threats from debris
- Foreign space investment funds

Thirdly, as the new government looks to 'rewire' Whitehall and organise policy delivery around the five mission boards to drive national economic growth, space seems set to fall between the cracks.

As the SWOT analysis (see: Table 1) shows, the UK still holds important advantages and many problems can be fixed. But the window of opportunity to reform this policy area and reposition space within government as a coherent national endeavour is quickly closing. This could mean at least several more years of status quo from a space governance point of view, which would well and truly end Britain's space ambitions as the rest of the world moves on. Ironically, this is an outcome that no one wants but that is set to emerge by default.

3.0 A National Space Enterprise

What is to be done? In simple terms, HM Government should move swiftly to *grip* the UK's space problem in a decisive manner, bring this policy area under control, and have a simple but coherent *joint civil-military* plan for developing Britain's National Space Enterprise and for securing the country's space future over the long term.

In other words, the key to success is effective *organisation* for managing the nation's space affairs in a *holistic* manner which maximises the *synergies* among all the (currently) disparate components of the UK public and private space sector, minimises waste and gets things done. This approach would aim at creating a whole that is greater than the sum of the parts – in line with the core precepts of building *strategic advantage*, as indicated in previous research by the Council on Geostrategy.[7] It would be a tricky policy challenge in a notoriously complex, disaggregated area, but one not without solution. The good news is that all of this is entirely within the powers of HM Government to effect, and none of it requires extra money.

A new approach often requires new concepts to support a different way of thinking about a problem set. In this sense, few terms can be more useful than that of '**National Space Enterprise**' to refer to the object of UK space policy. It denotes an integrated perspective applied to a country's space activities, particularly from a government point of view. It therefore takes into account all the actors and institutions, public and private, that are directly involved in supporting Britain's space posture and that are subject to, or impacted by, national policy.

HM Government's challenge in the space domain can thus be summarised as: **organising a strong, self-sustaining National Space Enterprise that delivers UK space power – and, consequently, UK strategic advantage – for security and economic growth.**

[7] See: Gabriel Elefteriu, William Freer and James Rogers, 'What is strategic advantage?', Council on Geostrategy, 23/11/2023, https://www.geostrategy.org.uk/ (checked: 11/11/2024).

3.1 Terminology

Although not often used in Europe, in the United States (US) the term *space enterprise* is strongly associated with the Department of Defence. The American *National Security Space Enterprise* is a well-established shorthand for the totality of space programmes and activities undertaken by the Pentagon, along with its associated resources, institutions and private sector entities. The term's reach includes not only the military services but also the intelligence agencies that report to the Secretary of Defence. Among the latter, the National Reconnaissance Office and National Geospatial-intelligence Agency have an overwhelming space domain mandate, but space-related analytical and even programmatic functions are found across most others, including the Central Intelligence Agency or Defence Intelligence Agency.

In a British context, the Defence Nuclear Enterprise (DNE) provides a good analogy, with HM Government describing it as 'the network of programmes, equipment and people, within the MOD and industry' that the nation's independent nuclear deterrent relies on.[8] Elsewhere, the DNE is seen as 'the overall umbrella term used to describe the federation of organisations and arrangements that enables, maintains, and delivers the continuous at sea deterrent (CASD) and submarine forces', including 'industry partners and other government departments, who in various ways support our shared mission.'[9] This same language and perspective can be translated and applied to the space domain, substituting 'space' terms for their 'nuclear' equivalents, but widening the concept from the *military* field to the wider perspective of a National (civil-military) Space Enterprise.

[8] 'The Defence Nuclear Enterprise: a landscape review', National Audit Office, 22/05/2018, https://www.nao.org.uk/ (checked: 11/11/2024).
[9] The Ministry of Defence, 'What is the Defence Nuclear Enterprise (DNE)', *Medium*, 04/01/2023, https://defencehq.medium.com/ (checked: 11/11/2024).

4.0 Principles for action

The task of cohering the wide range of Britain's space activities and stakeholders into a National Space Enterprise may appear daunting given the complexity and cross-cutting nature of this domain, but determined government action and strong political leadership can sort things out in relatively short order. On one condition: that the policy programme required is guided by a few sound principles ensuring a radical departure and improvement from the old, failed approach.

4.1 Unity

The first principle should be *unity of effort* and *vision* across the breath of government space activity. This means several things. From a *policy* perspective, it is vital to have a *single*, civil-military UK space policy. Britain cannot afford to operate two separate space policies, one for the civil domain overseen by the UK Space Agency, and one for defence, run by the Ministry of Defence (MOD).

The 2021 'National Space Strategy' – widely seen as a poor and decidedly *un-strategic* effort, and heavily criticised by the NAO – was presented as a 'joint' civil-military document, but it only paid lip-service to the idea. In practice, UK civil and defence space policies, particularly in the area of real capability, remain almost completely distinct worlds, with their own budgets and priorities. The National Space Operations Centre, launched in May 2024, is one of the few concrete exceptions that confirms the rule.[10]

As long as this structural separation and policy silos endure, Britain will be unable to take full advantage of the great opportunities for cost reduction in many non-critical areas offered by *dual-use* space technology. This can be used for civilian as well as for *some* military purposes or as part of certain components of military space systems – with no prejudice to mission-critical space warfare technology requirements which necessitate custom, military-grade solutions. In other words, the dual use nature of the foundational technology applied

[10] Launched in May 2024; see: 'New roadmap for pro-growth regulation in UK space sector launched as Science Minister launches new National Space Operations Centre', Department for Science, Innovation and Technology, 16/05/2024, https://www.gov.uk/ (checked:11/11/2024).

in space systems means that they are able to fulfil military and civil functions. By converging plans for these different use-cases, HM Government could deliver far more capable and resilient systems with available funding and begin to close the technology advantage that countries such as the PRC currently enjoy in the space domain.

One obvious capability area where UK space policy has stumbled has been Earth Observation. This category of satellites can provide environmental monitoring and thus help fight climate change, but equally they can detect military activities of interest to defence, as seen throughout Russia's war against Ukraine. Britain has a national requirement for both, and a dual-purpose system could be developed, as Italy has done with *COSMO-SkyMed*. Instead, the UK Space Agency (through the European Union's ((EU)) *Copernicus* programme) and the MOD (through the *Istari* programme) are pursuing separate efforts in this domain, with no incentive and higher authority in place to *make* them work together – and cut costs.[11]

The UK Space Enterprise requires unified (and simplified) space governance arrangements above everything else, with a single 'command chain' for national space policy that has authority over all government-linked elements of space, and can act based on a complete understanding of the British space landscape.

4.2 Speed

The second organising principle for UK Space Enterprise should be *speed* of delivery and implementation. In the space domain, the global competitive environment is registering rapid transformation and capability leaps by other countries.

Britain's approach to space is decidedly not set up to move at the 'speed of relevance' to keep up with the rest of the world. It is not that HM Government is getting worse at 'doing' space, or slowing down (even though failures are accumulating); on the contrary. The system is in fact improving, incrementally, as seen with the greater prominence of space in government thinking (such as the 2021 Integrated Review), or the flurry of attempts at space 'strategy' and new institutional set-ups (e.g., UK Space Command or the Department for Business, Energy and Industrial Strategy (BEIS)/DSIT Space Directorate). But the

[11] 'UK cutting-edge space defence backed by £1.4 billion', Ministry of Defence, 01/02/2022, https://www.gov.uk/ (checked: 11/11/2024).

issue is that these improvements are taking too long, meaningful progress comes too slowly and, in the meantime, global competition is speeding up.[12] Other countries are investing even more in their space industries and national programmes, and executing their strategies at a faster pace. One example is Italy, which in 2022 decided to invest an extra €1.3 billion (£1.1 billion) in space (via ESA) on top of its existing space budget.[13] Another is Australia, which did not even have a space agency until six years ago, but which is now one of the most dynamic space actors in the world, running several programmes of record in the area of space, from satellite communications to ISR and launch.

When it comes to practical projects overseen by UK space authorities, the picture is even more awkward. A good example is the Spaceflight Programme, which has not only been the UK's national flagship space initiative since 2018, but became the chief prime ministerial priority on the space agenda between 2019 and 2022.[14] It took years to get the regulations right, get industry players aligned, and advance a number of spaceport projects in the face of complex bureaucratic challenges. All the while, the date for the much-vaunted 'first launch from UK soil' was delayed over and over again. When the event did eventually occur in January 2023 – using a US launch provider – it ended in failure. Now the UK Space Agency is funding German and other foreign rocket companies to attempt another launch from British soil – hopefully before some other European country succeeds where Britain was not able to in almost seven years.

The painfully slow pace of progress is also, sadly, evident in the defence area, with UK Space Command needing a full three years to stand up and organise itself internally, while major programmes announced in the Defence Space Strategy, such as *Istari*, have barely advanced to the stage of sending demonstrator satellites in orbit.[15] The

[12] 'Global Britain in a competitive age: The Integrated Review of Security, Defence, Development and Foreign Policy', Cabinet Office, 16/03/2021, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024).
[13] 'Investing recovery and resilience funds in space projects', European Space Agency, 17/12/2021, https://www.esa.int/ (checked: 11/11/2024).
[14] 'UK Launch' started under then Science Minister Jo Johnson, with initial funding provided in 2017. See: 'Government announces boost for UK commercial space sector', Department for Business, Energy and Industrial Strategy, 09/02/2017, https://www.gov.uk/ (checked: 11/11/2024).
[15] Tyche, the first demonstrator satellite of the Minerva project, was launched in August 2024. Meanwhile, Minerva is now at risk of cuts. See: Ben Riley-Smith, 'Labour "to cut millions" from budget for modernising Armed Forces' *The Telegraph*, 13/08/2024, https://www.telegraph.co.uk/ (checked: 11/11/2024).

Skynet 6 programme has also suffered from long delays across its different components.

When recalibrating the UK Space Enterprise, it is crucial to stress the importance of speed. The new governance mechanisms and strategic approach should be *designed for speed*, particularly from a national security perspective – this is far more important than attempting to eliminate risk. Throwing more money or policy directives at this sector without addressing the chronic problem of delayed implementation as a matter of priority, upfront, serves little point.

4.3 Capacity

The third principle which should guide a new vision for the UK Space Enterprise is the need to increase national *capacity* and ability to actually manage and deliver major space programmes. This hardly exists at the moment in the public sector.

There is no getting away from the fact that government space procurement expertise – vital for Britain's future space development – can only be built around major UK space programmes. A wider debate is required here as to the exact way this expertise should be built and integrated across government – the creation of a dedicated space career stream within the Civil Service should be part of it. But the main point is that the policy options for resetting the UK Space Enterprise should be assessed with an eye to this critical requirement.

Technical support from ESA – which is what Britain has traditionally relied on – may be an option in the short term, but it should only be used as a stepping stone towards a proper UK space project management capability within HM Government. Ultimately, for a sovereign Britain looking to confirm its status as a pillar of the open international order and as a key Group of Seven (G7), NATO, Five Eyes and UN Security Council member, the ability to run its own national space programme is certainly the only mature and responsible solution which must be made to work, one way or the other.

5.0 A programme for action

5.1 Command and control

Britain needs new space governance arrangements designed to achieve two clear goals:

1. **Define** specific national space interests and the R&D and operational capability requirements that flow from them.

2. **Direct** the UK Space Enterprise in a coherent and effective manner towards meeting the national space interests. (including delivery, R&D, international, defence, supporting UK public services).

The new government has a great opportunity to completely reset the institutional structure responsible for Britain's space affairs, and move to a rational, streamlined and effective model. The UK Space Agency, heavily criticised by the NAO, has been through several 'transformations' over the past decade. As a mere 'two-star' organisation with few spending powers, divested of its policy-making functions in 2021 and ousted from Whitehall, the UK Space Agency is beyond saving in its current form.[16] It should be scrapped and then re-established on a completely new basis – together with the DSIT Space Department which holds much of the responsibility for the pervasive dysfunction in the system.

[16] Being pushed away from the centre of power is a clear indication of diminishing status and influence, regardless of how it is being dressed up. See: 'UK Space Agency announces new headquarters and regional offices', UK Space Agency, 25/03/2024, https://www.gov.uk/ (checked: 11/11/2024).

BOX 1: CURRENT UK SPACE GOVERNANCE

At present, British space policy making is dispersed and deeply inefficient, with several centres of decision and activity spread across government – reflecting the haphazard evolution of this area of policy over time. This landscape includes:

- The UK Space Agency and its parent department, DSIT, with its space directorate;
- The MOD with a space policy team functioning within the strategy directorate, and a UK Space Command which is supposed to have full responsibility for Defence Space but nonetheless has to take account of sometimes differing views (and even requirements) regarding space capabilities by Air Command, Strategic Command and other elements;
- The FCDO and the Department for Business and Trade (DBT), each driven by certain wider strategic priorities which may not always fit with UK's space interests;
- The Department for Transport, which sponsored the Space Industry Bill 2018 and has now taken over spaceflight regulation via the Civil Aviation Authority (CAA);
- Department for Digital, Culture, Media and Sport (DCMS) through its digital connectivity mandate – at least until 2023, when part of that portfolio was shifted over to DSIT;
- Department for Environment Food and Rural Affairs (DEFRA), which leads on Earth Observation requirements;
- The Met Office has a leading role in shaping the UK's contribution to the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) – the European agency dedicated to developing satellite technologies for Earth weather forecasting. Additionally, it is the key British authority on *space* weather (and associated monitoring technology requirements) which is one of the most important national-level risks indexed by HM Government on the National Risk Register;
- And finally, at the centre of government, the Cabinet Office, which is supposed to support the National Space Council (initially, in 2021, headed by the prime minister but lately relegated to an inter-ministerial committee) and tends to act as

a cross-departmental joint task force convenor on certain space issues, as was the case with the PNT Strategy.

In addition, the wider British space ecosystem includes arms-length bodies such as the Satellite Applications Catapult (with a growing network of regional space hubs), the Geospatial Commission, UK Research and Innovation (UKRI) linked research and grant-making institutions, the Defence Science and Technology Laboratory, as well as local enterprise partnerships and devolved administrations – with the Scottish Government, in particular, conducting its own form of industrial space policy.

The UK's tangled web of institutional responsibilities for space is not only complex and confused in its own right – thereby making it all but impossible to achieve clarity, coherence and consensus on UK space priorities – but it also gives rise to bureaucratic conflicts which undermine the policy making process.

There are a number of foreign models to consider when it comes to space decision making arrangements, but two stand out as particularly relevant to the UK. The first is that used by **Japan**, which maintains a dispersed set of space responsibilities across different government ministries. Crucially, though, the Japanese model also features a clear central coordinating authority – the 'Strategic Headquarters for National Space Policy' – situated at the heart of government, in the Cabinet Office, directly under the prime minister's supervision.[17]

The other alternative is the **French** model, that concentrates all space strategy, policy (including industrial space policy), plus R&D and programme delivery functions within a single central space agency, CNES. It represents a powerful, unified decision-making and executive authority, with a €2.3 billion (£1.9 billion) annual budget, which is solely responsible for safeguarding and advancing France's national space interests as a whole.[18]

[17] 'Space Policy', Cabinet Office (Japan), No date, https://www8.cao.go.jp, (checked: 11/11/2024).
[18] 'Budget', Centre National D'études Spatiales (France), No date, https://cnes.fr/en/budget (checked: 11/11/2024).

The last point is particularly important: although it is a civilian agency, CNES has a standing agreement with the French Ministry of Armed Forces' General Directorate for Armaments and acts as the delivery body for France's military space programme.[19] Civil-military space integration is so close in the Hexagon that the French Space Command (which falls under the Air and Space Force) is co-located at CNES's main R&D and programme delivery Space Centre in Toulouse.

The advantages of adopting the CNES model in a UK context are clear – and HM Government should proceed in this direction as a matter of priority. This major reform would bring Britain's Space Enterprise under control and would fix the chronic problems of waste, policy disarray and strategic drift. It is also the only way to create the environment for running a real national space programme.

All the necessary elements for implementing this institutional shake-up are already available; it is just a matter of policy design and implementation. In brief, the 'transformation package' could take the following form:

- Following a complete review of its operations and staff performance, the UK Space Agency should be dismantled in its current form and *re-established* as the central organisation of the UK Space Enterprise, responsible for all national space activity from policy to delivery;
- The new UK Space Agency should be upgraded to 'three-star' status and set up for maximum independence, while retaining only *formal* sponsorship from DSIT (whose Space Department should be abolished);
- The new UK Space Agency should be given powers and authorities similar to the Submarine Delivery Agency, whose Framework Document can provide a useful starting template.[20] These new powers would enable the UK Space Agency to act as HM Government's central Space Systems and Services Acquisition and Procurement authority, responding to cross-departmental capability requirements, and acting as the government's focal point for technical and delivery expertise in space – including for the MOD, which would have

[19] Funded separately through the defence budget.
[20] 'Submarine Delivery Agency: Framework Document', Ministry of Defence, 01/04/2018, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024).

representatives on the UK Space Agency's governing board. Secondly, the new powers will allow the UK Space Agency to operate its own national R&D laboratory, in the form of a Space Missions Centre (as described in the following section);
- The Agency would also retain formal responsibility for some of the other activities that currently fall within its remit, where absolutely required – for example in the management of some grant programmes to support innovation in the space sector, or elements of its 'inspiration' and educational mission. However, the UK Space Agency review (indicated above) would seek to: (a) transfer as many of these functions as possible to other bodies, in particular the Satellite Applications Catapult; and (b) to orient all other remaining programmes towards supporting practical capability goals as set by the capability and R&D plans (see below);
- The last major part of this National Space Enterprise reform should be a stronger, streamlined connection between the UK Space Agency and the centre of government, reflecting the strategic importance of space and the need for top-level political support. In this sense, the prime minister should again chair the National Space Council. Its work – focused on reconciling departmental space interests across government, and setting out headline goals for national space policy – should be supported by a small Cabinet Office-based Space Secretariat, whose executive secretary would act as space adviser to the prime minister, providing the highest point of contact for the UK Space Enterprise.

5.2 National capability: Technical

There is a chronic deficit of space-technical expertise within HM Government. Simply put, there are relatively few people with real knowledge and understanding of space science and technology, space programme management and – to an almost non-existent degree – space strategy.

This is a debilitating problem for Britain's space development, and largely accounts for the country's reputation as a 'laggard' in global space competition.

Traditionally, HM Government has dealt with this problem in two ways, particularly in the civil domain: by avoiding decisions when possible, and by outsourcing them when needed. Contractors are used even for the most basic tasks that involve technical expertise, including assessing the returns from industry to UK Space Agency-issued Requests For Information (RFI).

This is a chicken-and-egg problem: HM Government cannot build technical expertise without actual space projects to drive that requirement; and it cannot set up space projects because it does not have the technical expertise in the first place.

The solution to this conundrum is no mystery. It has been applied successfully by every other serious space nation from the beginning of the Space Age. The UK needs its own Space Missions Centre, which would function as the reformed UK Space Agency's in-house end-to-end R&D centre for both civil and military projects, covering all areas of space – but with likely concentrations on Science and Exploration (including human spaceflight), propulsion, PNT, robotics, in-space servicing, assembly and manufacturing (ISAM) – and project management of large space systems.

A British Space Missions Centre would serve as a national incubator for the critical technical capacity and expertise, across civil and defence, that will be increasingly required in the future. Developing – gradually, starting small – a UK equivalent of the National Aeronautics and Space Administration's (NASA) or CNES's space centres is absolutely critical to growing that national space project management and delivery expertise and reducing Britain's dependence on ESA.

A Space Missions Centre is also the only way in which Britain can ever get to build its own end-to-end, fully-owned space exploration missions – something that even countries such as Israel or the United Arab Emirates have been able to deploy for years – and take British space science and tech research to the next level.

The good news is that a national space R&D, design, engineering and programme management capacity, under the Space Missions Centre umbrella, could be organised mainly by aggregating existing UK centres of space excellence, facilities and research institutions. The components are available already: what is lacking is the policy, authority and seed funding to cohere it into a single system. The foundations for the Space Missions Centre could be laid by combining the UK Space Agency's technical resources with those of DSTL and RAL

Space, while extending the latter's remit to deliver a national technology and missions procurement programme. RAL Space brings technical expertise across the space programme domain (design, operations, budgeting, technology development, etc.). The Satellite Applications Catapult could be also brought into the mix if it is decided that Space Missions Command could take a more hands-on approach to space services and market development.

In sum, under the UK Space Agency as a network of facilities plugged into a new flagship Centre, with common oversight and aligned to a single multi-year space tech R&D plan, the Space Missions Command would become the focal point and 'crown jewel' of the UK's National Space Enterprise. It would be a world-class concentration of space scientists, technologists and programme managers, providing space expertise in support of HM Government's objectives but also offering a high-performance 'docking platform' for commercial entities involved in advanced space R&D and innovation and for increasingly ambitious bilateral science and exploration partnerships with other nations.

5.3 National capability: operational

There is no such thing as *national space power* and UK strategic advantage in space without major national space capability in orbit – quite apart from ground-based systems, whether in areas such as Space Domain Awareness (SDA) or launch. It is only through *sovereign* operational capability – principally orbital satellite systems – that Britain can meet its national security requirements in the space domain, support resilience and competitiveness across entire sectors of the economy, and assert its national interests on the global stage as a major space actor. The meaning of 'sovereign' in this context is discussed in Box 2.

Operational space capabilities acquired on a national basis – procurement programmes of record – are also the absolutely *vital* foundation of the UK Space Enterprise because they also function as an engine for growth for the domestic space industry (including skills). Currently, only the *Skynet* system qualifies as such – which is precisely why the UK is so *weak* in space and so far behind its peers such as France.

BOX 2: WHAT DOES 'SOVEREIGN' MEAN?

The concept of 'sovereignty' as applied to space capabilities is not as straightforward as in the case of assets in other domains and remains subject to debate and interpretation. Rather than the more familiar idea of assets that are 'government-owned, government-operated', in a space context, sovereignty is more nuanced and is often tied to questions of service access and assurance, not to mention commercial protections and security clauses.

Sovereignty, therefore, does not require outright government ownership, nor corporate or operational control. Instead, government authorities may have privileged and assured access to certain parts of a commercially-developed satellite system (which might even have been designed to government requirements in the first place) and/or may have overriding corporate rights – e.g., 'golden shares' – to protect national interests in relation to the company's business operations such as ownership changes.

Skynet 5, for example, was originally set up as a private-owned, private-operated system, with HM Government effectively buying the secure satellite communications capability (and other deliverables) as a service under specific terms.[21] In the US, there are even 'confidential command' practices where it is possible for a 'private' satellite system (for example, run by an operator such as Inmarsat) to have a completely separate exploitation chain for government users, allowing them to task the spacecraft for certain missions – for example, imagery collection at certain times and places – through separate channels, without the owner of the satellite having access to any of this information.

A comprehensive and specific **UK space capability** plan should be framed with a long-term *strategic intent* in mind, to serve both technological, scientific, security and geopolitical goals of the country.

[21] 'Skynet 5 takes PFI into space', Project Finance International, 12/03/2013, https://www.pfie.com/ (checked: 11/11/2024).

Defining the details of this capability plan is beyond the scope of this paper, but three broad *features* should be outlined.

Firstly, as previous research by the Council on Geostrategy has shown, it is imperative that HM Government adopts a defence-centric understanding of space affairs and the national interest in this domain.[22] This would have implications not just for policy priorities and funding across the National Space Enterprise, but for the fundamental design and integration decisions that would shape new UK space programmes.

Secondly, future UK space operational capabilities must ensure maximum synergy between civil and military *requirements*, as well as technology. In some areas, such as launch, SDA, EO/ISR or communications, and even PNT, there are obvious overlaps and potential for deploying dual-use solutions or taking a dual-purpose approach. In others, such as ISAM or specific military areas such as missile defence or counterspace, requirements and the underlying technologies will be quite different.

Thirdly, the Capability Plan must take a holistic approach framed in terms of building a **multi-orbit national space *architecture***, where the different systems and constellations built or acquired for different mission-sets (regardless of whether their main purpose is civil or defence) are able to interface with and enhance each other's operational utility in a 'system of systems' approach. For example, certain systems in one category, such as satellite communications, can be designed to carry extra payloads from a different category, such as EO/ISR sensors, if the requirements for both missions are specified properly in the Capability Plan to begin with.

Fourthly, it must not be forgotten that such a Capability Plan – and the resulting National Space Programme, with its different streams – would effectively become HM Government's main instrument of *space industrial policy-making* as well. This crucial aspect must be factored into the planning from the very beginning, and used to expand space manufacturing and service delivery capacity across the UK Space Enterprise, with both security and economic benefits for the nation.

Switching to an operational capabilities-led approach as the true 'North Star' in UK space policy need not impose new costs on the nation's finances. This new way of doing business would cut *waste* and

[22] Gabriel Elefteriu, 'Why space matters to the United Kingdom', Council on Geostrategy, 24/04/2024, https://www.geostrategy.org.uk/ (checked: 11/11/2024).

by replacing several aimless grants programmes – that mostly serve to generate 'buzz' and keep a cottage industry of very small space firms busy – with strategic procurement programmes of record that can boost industry confidence, generate co-financing, and increase space foreign direct investment. The technological synergies outlined in this approach would also drive considerable cost effectiveness, as would the potential consolidation of different government programmes – for example, *Istari* and *Copernicus*, or *Minerva* and aspects of UK Space Agency's current activities in 'LEO connectivity' – under a single capability stream. More broadly, it remains a fact that while Britain spends *much less* on space than it should – and certainly less than other peers – the annual outlays are still over £1 billion, which is not an inconsiderable sum. The fact that Britain does not derive any operational capability (apart from *Skynet*) from this is deplorable, but it also shows that there are resources available in the 'system' – they just are not allocated and managed effectively.

5.4 Long-term R&D plan

Sound policy making and strategising is indispensable in government; indeed, it is what departments and agencies should do. But HM Government generates too much 'strategy' documentation that often leads nowhere and is superseded within two to three years by new iterations of these official papers which only re-arrange the deck chairs and provide new buzz-words – but no real progress.

What is needed, certainly in the space policy area, is a concrete, **ten-year space technology research and development plan**, with clear funding and milestones, specifically designed to support *both* civil and defence end-point *capability* objectives (per the Capability Plan suggested in the previous section). The wider UK space science community, as well as other government R&D projects that incorporate space tech (e.g., digital connectivity), might well generate their own space research requirements. But these should not be mixed and allowed to interfere with the specific set of space technologies needed to meet *strategic* national space goals as set by the country's political leadership.

The key point here is to link strategic space R&D activity to actual capability outputs in a *deliberate* way as a matter of priority, and separate it from 'all other' space research.

The current official approach in this area (inherited from the previous government) could not be more different. The 'best' that Britain's space establishment has been able to produce to date in terms of space R&D planning is the *Space Exploration Technology Roadmap* published in 2023, which merely lists technologies 'of interest' to the UK Space Agency from a civil space-science perspective.[23] It is entirely unconnected to any actual capability programmes, entirely devoid of any prioritisation or funding indicators, and only very loosely tied to general objectives listed in the 2021 National Space Strategy (which the NAO has already criticised precisely for not setting clear goals for UK space policy). The Roadmap's own text admits that the document is only a 'brochure' to 'highlight' areas where the UK has a 'high aptitude.'

Another way in which the government pretends to have a 'policy' for space technology development is exemplified by the UK Space Agency's *National Space Technology Programme* which ran for over a decade until 2022. As with most other HM Government space activities, this was merely a grants programme unconnected to any strategic national goals. Its main function – as is still the case for successor programmes and the majority of UK space expenditure – was to simply help fund generic 'growth' and the 'development of capabilities' in the British space sector.[24]

The new government should suspend all these programmes and policies and completely *reset* the entire approach to UK space R&D with a view to orient it towards actual national needs, per the Capability Plan. A good perspective on how a *real* space technology plan can be obtained is by consulting NASA's strategic framework for space technology development, which features very specific technical goals for each particular category of space technology selected for the Agency's R&D pipeline.[25]

[23] 'Space Exploration: Technological Roadmap', UK Space Agency, 20/07/2023, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024).
[24] 'UKSA National Space Technology Programme', UK Space Agency, 10/2021, https://assets.publishing.service.gov.uk/ (checked: 11/11/2024).
[25] 'Strategic Framework: Charting the horizon of NASA technology development', National Aeronautics and Space Administration (US), no date, https://techport.nasa.gov/strategy (checked: 11/11/2024).

6.0 Conclusion

Space is of vital national interest, and a core component of UK strategic advantage. The global competition in this domain is sharpening – and Britain must respond accordingly, to meet both short and long-term objectives. At a time of strong pressures on public finances the need to *rationalise* the functioning of key policy areas and make the most of available budgets is particularly important. Much of this can be achieved in space if the right policy interventions are pursued with determination and framed by the right principles.

With strong political leadership, Britain can take bold and innovative steps towards integrating its civil and defence space establishments into a single **National Space Enterprise** that, at its core, designs, develops, procures and delivers capabilities, missions and services for both military and non-military HM Government needs. This new British approach to institutional space integration can become a world-leading model in its own right, providing an example of 21st century policy-making innovation. By bringing together civil and defence space, HM Government will not only maximise synergies and reduce costs, but it will create a compelling proposition for **foreign partners** looking to do business or develop joint allied or coalition capabilities with the UK. Not only is this approach also cost-free, but Britain cannot afford the status quo; something must change.

About the author

Gabriel Elefteriu FRAeS is the Deputy Director at the Council on Geostrategy, where his research focuses on defence and space policy. Previously, he was Director of Research and Strategy and member of the Senior Management Team at Policy Exchange, where he also founded and directed the first dedicated Space Policy Research Unit in the United Kingdom. Gabriel is also an Associate of King's College, London, an elected Fellow of the Royal Aeronautical Society, and a founding partner at AstroAnalytica, a space consultancy.

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The Council on Geostrategy is an independent non-profit organisation situated in the heart of Westminster. We focus on an international environment increasingly defined by geopolitical competition and the environmental crisis.

Founded in 2021 as a Company Limited by Guarantee, we aim to shape British strategic ambition in a way that empowers the United Kingdom to succeed and prosper in the twenty-first century. We also look beyond Britain's national borders, with a broad focus on free and open nations in the Euro-Atlantic, the Indo-Pacific, and Polar regions.

Our vision is a united, strong and green Britain, which works with other free and open nations to compete geopolitically and lead the world in overcoming the environmental crisis – for a more secure and prosperous future.

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