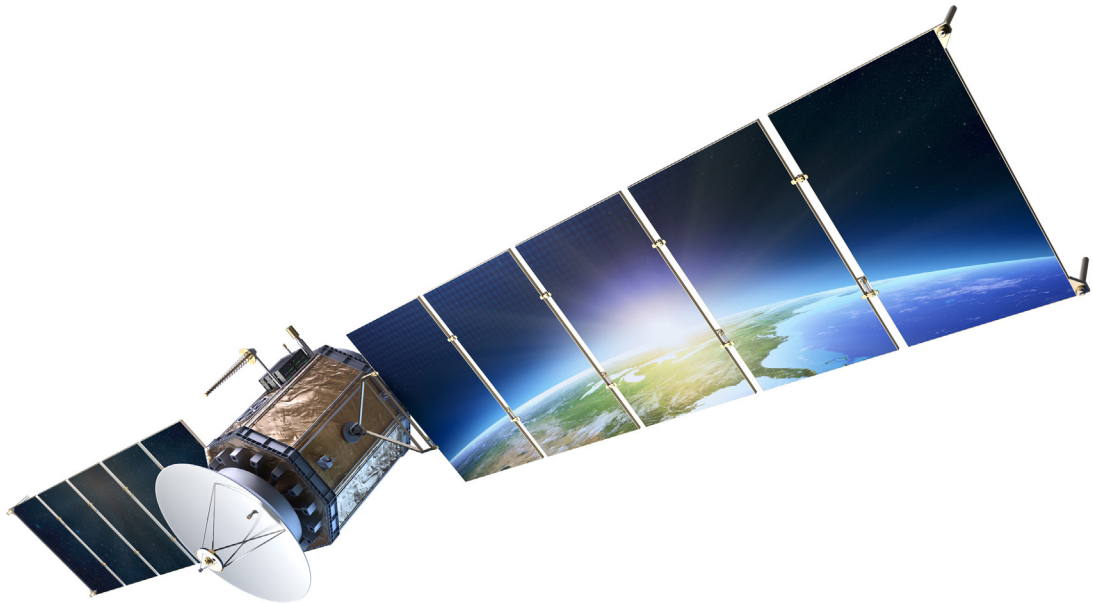


# What do we want from the next Prime Minister?



Policy ideas for new leadership: Space

Gabriel Elefteriu





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## Summary

*A policy programme for turning Britain into one of the leading space nations of the 21st century, by:*

- *Recognising the strategic importance of Space Power to Britain's future;*
- *Reforming the way government "does" space;*
- *Raising Britain's game in the global space race;*
- *Rebalancing Britain's space relationships towards a more global approach.*

### The next Government should...

1. Clearly articulate a strategic space vision for Britain in a dedicated keynote speech by the new Prime Minister. He should take personal ownership of this issue and declare space a core national interest.
2. Launch a UK-led global space alliance on space sustainability. Announce a Global Summit on Space Debris in London.
3. Implement the new UK National Space Council as a Cabinet Committee chaired by the Prime Minister (with BEIS and Defence Secretaries as Vice-Chairs).
4. Upgrade the ministerial representation for the space policy portfolio.
5. Create a central Space Systems & Services Acquisition & Procurement capability within a reformed UK Space Agency, to serve cross-government requirements.
6. Develop an integrated long-term National Space Strategy bringing together both the civil and defence areas of space policy. Undertake a National Space Review.
7. Double the budget of the UK National Space Agency by 2022 to approximately £800m to fund a strong National Space Programme.
8. Procure a UK-led PNT (positioning, navigation and timing) satellite system as a strategic capability funded as a standalone national project.
9. Procure a sovereign Earth Observation (EO) capability configured to meet cross-government needs.
10. Secure first-mover advantages in national space launch capabilities.
11. Establish a dedicated budget for bilateral space cooperation and missions to enable projects particularly with leading Commonwealth countries and Japan.
12. Seek a UK national participation (if necessary in addition to ESA) in NASA's Lunar Gateway.

## Recognise the strategic importance of Space Power to Britain's future

Signalling a step-change in top-level political support for space as a key element of the national interest

**Policy: The next Prime Minister should clearly articulate a strategic space vision for Britain in a dedicated keynote speech at the earliest opportunity, and take personal ownership of this issue. He should declare space a core national interest.**

Transforming Britain's position in global space affairs requires first of all strong political leadership that can signal a major shift in the Government's understanding of space. This type of messaging has been lacking, and this lack has held back the UK's space ambitions. A new Prime Minister should take this opportunity to place space power at the heart of his strategic vision for UK's long-term future.



Gabriel Elefteriu  
Head of Space Policy, Policy Exchange

As political leaders look for ways of reasserting the UK's national ambition and drawing the country together after Brexit, space is an area ripe with opportunity. But there is an urgent need to address the lack of awareness and public debate on space, in Whitehall and beyond.

In many ways space is a great British success story, especially considering the comparatively small public investment. Figures published in January indicate a sector worth £14.8 billion, with Britain holding a 5.1 per cent share of the global market. The UK is also a world-leading space science and technology powerhouse and last year announced its first spaceport.

Yet there is a huge disconnect between the UK's standing in the world as a leading military and economic power and its comparatively weak position in the space domain.

This suggests a fundamental failing by officials and political leaders in Westminster in particular to grasp the full significance of space power, illustrated by the lack of a dedicated senior minister for space.

This must change. In the next few years Britain faces not only a highly complex and competitive strategic space environment but also immediate questions on how to proceed after leaving the EU-funded Galileo sat-nav project.



It's time to recognise space power as a critical component of the UK's grand strategy in the 21st century. The UK's entire space enterprise and ambition must be scaled up — and that also implies fostering a sense of national endeavour around this issue.

Above all, we need a joined-up vision that connects the economic and industrial aspects to the military-strategic requirements, so that Britain can secure a place among tomorrow's leading space powers and protect its long-term national interests.

*Gabriel Elefteriu, "Britain must scale up its space ambition", The Times, 23 April 2019*

### **Policy: Launch a UK-led global space alliance on space sustainability. Announce a Global Summit on Space Debris in London.**

As a topic, “the environment” is usually discussed in relation to the natural world around us. But there is also an “environment” beyond Earth, affecting the satellite “population” orbiting around our planet. Just as the effects of man-made climate change can lead to natural disasters and are already a factor in global economy and politics, the effects of man-made space debris can also lead to major disasters in outer space. In certain collision scenarios that trigger chain reactions, whole orbits can become unserviceable leading to incalculable disruptions in the global economy. ESA estimates that there are already 128 million sub-centimetre objects in orbit, with an extra 900,000 objects measuring between one and ten centimetres, and a further 34,000 objects larger than ten centimetres. And with the coming age of “mega-constellations” (SpaceX's Starlink project is set to deploy nearly 12,000 satellites by the mid-2020s, and recently launched the first 60 on a single flight), the risk of collision will inevitably increase rapidly.

The paramount (and globally shared) necessity of maintaining a safe operating environment in space is creating an increasing demand both for joint international regulatory action, and for new practical solutions for enhancing space sustainability. The latter include space technologies for debris-removal, in-orbit servicing, space surveillance and tracking (SST) and space traffic management. All these are also areas of potential strong growth for the UK space industry.

But global cooperation on space sustainability is crucial. There are ongoing efforts through the UN to achieve consensus on a number of regulatory measures that can help protect the space environment. Yet space diplomacy negotiations are notoriously difficult given the conflicting interests of the different leading space powers.

This presents an opportunity for the UK to take a global leadership role on this particular issue, as one of the few countries in the world which can move the dial in international affairs. The first step should be to convene a Global Summit on Space Debris in London. One precedent is the then government's London Conference on Cyberspace in 2011, addressed by the UK Prime Minister, US Vice President and other world leaders, which began a global dialogue on norms of behaviour. Another important parallel for a Debris summit, on a less ambitious or controversial

subject, is the 2014 global summit on preventing sexual violence in conflict, also held in London. This UK government initiative, founded in 2012, has succeeded in building global support for tackling this scourge, resulting in a number of UN resolutions and G8 declarations on the topic; it remains an ongoing project working to “foster collaboration between foreign governments, the UN, AU, international organisations and civil society to end sexual violence in conflict.”

The new government should look to replicate this approach with regards to space debris, seeking to place this item on the international agenda at the highest political level. This initiative would not only be beneficial on its own terms, but it would also further underline the government’s determination to keep the Global Britain at the forefront of international affairs, and to enhance the country’s reputation as a force for balance in the world.

# Reform the way government “does” space

## Consolidating national space policy decision-making across government departments and bringing it closer to the centre of government

**Policy:** The next government should implement the recently-announced UK National Space Council as a full Cabinet Committee chaired by the Prime Minister (with BEIS and Defence Secretaries as Vice-Chairs). This structure would be supported by a small secretariat to coordinate inter-departmental space policy, based in the Cabinet Office. This should be coupled with a National Space Review which should include a comprehensive reconsideration of the UK Space Agency’s institutional mission.

One of the most urgent requirements for a new government intent on opening a new era for the UK in the space domain is a comprehensive overhaul of the top-level decision-making structures for UK space policy. A number of essential problems need to be corrected. Firstly, this policy area needs to be placed much higher on the national strategic priority list – not unlike the approach taken with respect to cyber after 2010 – and this necessitates bringing it within the centre of government. Secondly, there is a need for more coherence across government, and for a unitary, integrated vision on UK’s national space interests; at the moment aspects of UK space policy are dispersed across different departments and structures, while the UK Space Agency’s role remains less influential than that of its corresponding structures in other countries. Thirdly, there is a need for bringing both the civil and the military aspects of UK space policy within the same decisional framework. Fourthly, a high-level structure at the heart of government dedicated to the task of boosting the UK’s global space profile and harnessing space for national prosperity and security is also required in order to ensure that this new level of national ambition is backed by adequate resources and political commitment.

All leading space nations have powerful structures driving their space policy; while different national constitutions dictate different organisational arrangements, the net effect in each case is that national space policy is concentrated largely in one place and has top-level political backing. France and Germany have powerful national space agencies with cross-government

representation on their boards; the United States has a cross-government National Space Council chaired by the Vice President; while the locus of Japanese space policy is directly in the Prime Minister's Office.

The idea of a UK National Space Council was first put on the public agenda by the current Science Minister, Chris Skidmore MP, at the launch of Policy Exchange's Space Policy Unit on 23 April 2019. Subsequently, on 4 June 2019, the Government officially announced the establishment of a new National Space Council "later this year", to "provide strategic leadership on space across government". This decision is a very welcome development, but implementation is key.

There are a number of models that can be considered, one of them being the US National Space Council. Another is Britain's own National Security Council which functions as a Cabinet committee with a separate secretariat sitting in the Cabinet Office and with a National Security Adviser reporting directly to the Prime Minister. The next government should explore this latter model in particular, and consider standing up a small Space Secretariat (with personnel seconded from other Departments including the UK Space Agency) to service a new UK National Space Council. The Secretariat needs to have the convening power in order to drive decisions forward, but its relationship to the UK Space Agency will be critical.

Determining the final arrangements for the way the Council and Secretariat would operate should be made in conjunction with a comprehensive reconsideration of the UK Space Agency's institutional mission, undertaken as part of a wider National Space Review.

The government should strongly consider increasing the powers of the UK Space Agency and upgrading it to serve as the "central brain" of UK space policy and capability development.

Chris Skidmore MP  
Minister of State for Universities, Science,  
Research and Innovation



We look at civil contingencies, military, earth observational capacity, space exploration, satellite, commercial opportunities. But how can we make sure every department is aligned on these priorities? ... Should we be creating a national space framework as a government and should we be creating a national Space Council for the United Kingdom along the same lines as the USA?

*Speaking at the launch of Policy Exchange's Space Policy Unit*

Rt Hon Lord Willetts  
Former Minister of State for Universities,  
Science, Research and Innovation



A potential UK Space Council would be a means for the first time of directly integrating within the framework of a cabinet committee, both military and civil work on space, so potentially a very important initiative indeed.

*Also speaking at the launch of Policy Exchange's Space Policy Unit*

**Policy: The next government should upgrade the ministerial representation for the space portfolio to increase its profile and status within government.** Firstly, expand the official title of the BEIS Secretary to reflect his responsibility for Business, Energy, Industrial Strategy and Space – BEISS. Secondly, explore options for strengthening civil-defence cross-government space leadership as soon as possible by creating a dedicated post of Minister of State for Space, potentially as a joint portfolio.

Overhauling the practical decision-making arrangements for UK space policy in anticipation of a major UK “surge” in this area of national capability – by creating a National Space Council – needs to be complemented by a change to the overall political status of this portfolio.

At present UK space policy represents only one item in the very broad remit of the Universities, Science, Research and Innovation Minister, who does not normally attend Cabinet. This wide ministerial portfolio is in turn part of the Department for Business, Energy and Industrial Strategy (BEIS), which in aggregate covers a vast area of policy. The net result is that space, which is a complex area in itself and one of fundamental strategic importance for the UK, is only represented in Cabinet as a sub-sub item in the BEIS Secretary’s mandate.

This is a legacy of the government’s traditional low-priority view of space; it must be corrected, for two reasons. The first is the need to signal the new government’s determination to transform and scale-up its approach to space. The second is the need to improve the coherence and effectiveness of space policy decision-making at the ministerial level.

An immediate action that can be taken is to include “space” in the title of the BEIS Secretary. While this would of course be a merely presentational tweak, it would be seen both by industry and by international partners as an important signal from the government.

In addition, as soon as practically possible – and in conjunction with the creation of the new National Space Council and the development of a truly integrated national space policy, it is imperative to bring this entire area under a dedicated ministerial post that can give it adequate focus and a strong, unified voice in government.

This new post will have to bridge most of UK’s space activity, both in the civil and the national security areas of government. It is likely that the outlines of this future portfolio will be linked to the final arrangements that will shape the future National Security Council. One possible way to reconcile the different space interests across Whitehall is to have this new ministerial post structured as a joint appointment between either BEIS and MOD or BEIS and the Cabinet Office.

Dr John B Sheldon  
Chairman and President of ThorGroup and  
adviser to Policy Exchange's Space Policy Unit



A comprehensive UK space policy should at the very least account for a number of fundamental space issues. **First**, reliable and assured options for access to space must be addressed, and should consider a mix of domestic, commercial, and allied capabilities. [...]

**Second**, consider framing guidelines and options for the **UK space industrial base** that identifies capabilities and requirements vital for assuring British space interests. This is not to advocate for subsidies, but it is a call to systematically and rigorously identify commercial space areas that are essential for economic and strategic interests and find ways to nurture them and make them resilient against domestic and international shocks.

**Third**, assure space systems through a combination of industrial, military, and diplomatic means. [...] A comprehensive UK space policy should provide guidance on what is permissible under which circumstance using a variety of means separately or in combination to protect invaluable UK satellites in peace, crisis, and war, either alone or in co-operation with friends and allies.

**Fourth**, Earth observation satellites play a vital role in monitoring and measuring the impact of climate change in Britain and abroad. Given the grave importance of climate change to the British population, its economy, and national security, a comprehensive UK space policy should include provisions for ensuring satellite data is received by British officials and scientists whenever it is required.

**Fifth**, a comprehensive UK space policy should be framed so as to assure British **technological and scientific competitiveness** over the coming decades. Certainly not all technology research and scientific endeavour is dependent upon space, but a great deal of it is. Everything from excellence in geophysics and environmental science through to advances in Artificial Intelligence and 3D printing crosscuts with a robust space industrial base and assured access to space.

**Finally**, a comprehensive UK space policy should undergird our understanding of what is happening in the space domain by setting out the requirement for national **space situational awareness (SSA) capabilities**, and Britain's role and participation in global SSA activities. SSA involves the use of land-, sea-, air-, and space-based radars and telescopes that monitor the space environment in order to avoid collisions and maintain vigilance against purposeful interference with British and allied satellites. Without SSA we should be deaf, dumb, and blind in the space domain, and left needlessly vulnerable.

*John B Sheldon, "Britain's vital strategic interests in space", Policy Exchange, 2 May 2019*

**Policy: The next government should create a central Space Systems and Services Acquisition & Procurement capability to serve cross-government requirements.** This step should be accompanied by a Review of the UK Space Agency's institutional mission, which can be undertaken as part of a wider National Space Review.

Many departments across government, from MOD, FCO, DfID and DEFRA to DfT and BEIS, make use of commercial space data and services (from imagery to satcom) to support their activities. Yet they buy these services largely on an individual departmental basis. Creating a joint space services

procurement mechanism would pool the government’s bargaining power and result in better overall value for the taxpayer.

Furthermore, the government’s ambition to develop new national UK space capabilities – including a Global Navigation Satellite System and an Earth Observation system – entails a corresponding requirement for boosting the specialist capacity to manage such large acquisition programmes. A central organisation dedicated to this mission would provide a focus for building up this capacity – including through the creation of a dedicated space career stream within the Civil Service.

A new Systems and Services Acquisition & Procurement capability would address all government space needs on both levels – system acquisition and service procurement – within a single joint civil-defence organisation, with appropriate internal protocols and protections in place for sensitive national security space projects. Delivering this mission from a central point, especially in connection with developing large space infrastructure projects like the “triad” of PNT-SATCOM-EO, would also lead to new synergies and reduced costs.

The proper location of this capability within government, and its authorities, should be determined in relation to the final arrangements for the new National Space Council and a review of the role and mandate of the UK Space Agency.

This joint model would represent a key step towards overcoming the deep separation currently prevailing in government between the civil and defence areas of space policy. The integrated long-term national space strategy that Britain needs in order to flourish into a leading space power cannot be achieved unless silos are broken down (without prejudice to essential national security interests) and a more integrated civil-defence space partnership becomes the foundation for a restructured UK space enterprise.

In addition, this capability would serve as a national incubator for the critical technical capacity and expertise that will be increasingly required in the future as Britain scales up its space ambitions.

**Policy: The next government should develop an integrated long-term National Space Strategy bringing together both the civil and defence areas of space policy.** *In connection to this, the government should consider conducting a comprehensive inter-departmental National Space Review.*

The government already has several flagship space policy documents in advanced stages of development or ready for publication. These include a new “defence space strategy”, a new “civil space strategy”, and a “new national space policy framework”. They would supersede, respectively, the current National Space Security Policy (published 2014), the UK Civil Space Strategy 2012 to 2016 (2012), and presumably the National Space Policy (2015).

It remains to be seen whether these upcoming strategies will amount to a truly joined-up vision that qualifies as a long-term national strategy explicitly charting a path for UK’s development into a front-rank global space player.

Should the result of this round of strategic space policy-making fall short of this requirement – either on account of scope and level of ambition, or on account of specificity as regards government commitments to key capabilities and funding – Downing Street should launch a dedicated Review of the UK’s space enterprise with the mandate to develop a long-term National Space Strategy. Such a Review should be managed by the new UK National Space Council, from the Cabinet Office, and it should include a distinct focus on the UK’s space industrial base.

The resulting National Space Strategy should therefore incorporate a cross-government Space Industrial Support Plan assess, protect and nurture the UK-based strategic commercial capabilities and companies that the country needs to prosecute its future space programme (as detailed below).



# Raise Britain's game in the global space race

## Backing a new level of national space ambition with appropriate funding and commitments to sovereign space capabilities

**Policy:** The next government should double spending on civil (and dual-use) space projects through the UK National Space Agency to approximately £800m by 2022. The extra money should be primarily used to fund a strong National Space Programme and a separate bilateral space missions budget. All major space procurement programmes should seek maximum engagement with close allies (particularly from the Five Eyes alliance) and be designed to encourage innovation in the UK space sector.

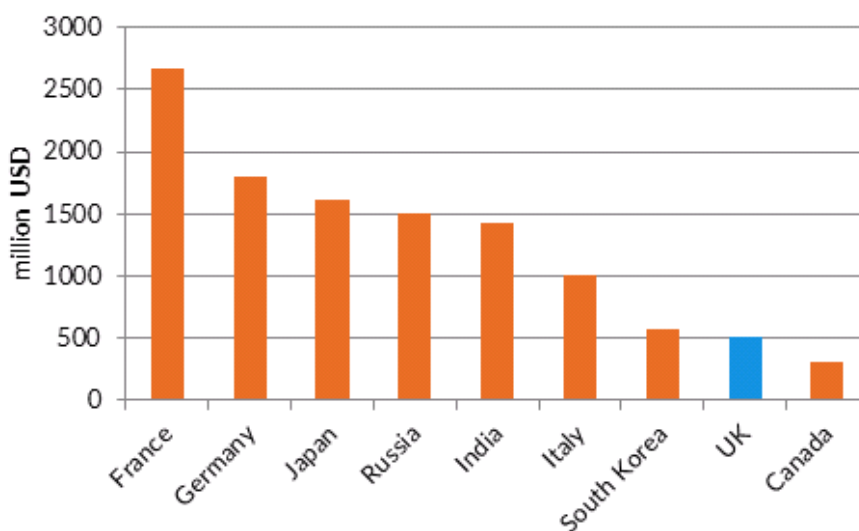
A commitment to secure Britain's future among tomorrow's space powers needs to be backed by appropriate investments. For a long time Britain has relied on a light-touch space policy model driven overwhelmingly by the private sector rather than by big taxpayer-funded space programmes in expensive domains such as domestic launchers or manned spaceflight. (In this context, it is often forgotten that successful private space companies like SpaceX grew on the back of large-scale public sector demand.) This UK model is becoming unsustainable in the face of a very dynamic and strong competition in the years ahead. And particularly in the context of Brexit, there is a case for an increased government role in supporting the UK space industry by acting as an anchor customer (as recommended by a 2018 report from the Space Growth Partnership) and through the acquisition of national sovereign capabilities which Britain lacks but other countries possess.

Three facts should help assuage fears that a bigger government role in space is a dangerous road to take. First, space is expensive – but not that expensive anymore. Indeed, the very reason for the current boom in the global space economy is the accelerated drop in costs driven by new technologies enabling cheap launch and ultrasmall, ultracapable satellites. Space is not an elite, costly game anymore. Secondly, the space sector is one of the most productive parts of the UK economy (with 2.6 times higher productivity than the UK national average), with a rate of return of £4 for every £1 invested. Thirdly, the overall sums involved in getting a scaled-up UK space programme off the ground are comparatively low because we

are already starting from a very low level.

It is increasingly hard to operate a comparatively modest space policy and expect to be a front-rank space player in the long term. UK government spending on space through the UK Space Agency, about £400 million, is one of the lowest among large economies. For comparison, the industry-standard *The Space Report* noted that national space agencies of the US, China, Russia, India, Japan, France, Germany, Italy and South Korea each spend the equivalent of more than £1 billion on space. There is a huge disconnect between the UK's standing in the world as a leading military and economic power and its comparatively weak position in the space domain.

### Government non-military space budgets, 2017



Source: *The Space Report*

Furthermore, at present, around 75% (some £300m) of the UK Space Agency's annual budget is transferred directly to the European Space Agency to cover Britain's participation in ESA projects. Britain receives a good return on this investment, as the money finds its way back into our domestic space industrial and research base in the form of ESA contracts.

Nonetheless, this arrangement means that the UK Space Agency is left with only around £100m under its direct management for national projects and investments at home.

Britain needs to at least maintain its current levels of spending through the ESA (subject to a realistic assessment of ESA's own institutional trajectory with respect to the EU over the coming years), but it also urgently needs a strong UK National Space Programme to complement that. This would only bring the UK in line with current practice in leading European space countries like France, Germany and Italy which boast significant domestic programmes separate from the ESA. A national space programme allows a country to pursue specific national priorities and develop distinct national capabilities whereas major ESA projects are by definition agreed multilaterally.

The government could use the new funding to: expand national

capabilities in space science and exploration; help grow the domestic space sector, primarily through increased grants via the National Space Technology Programme (aimed particularly at early Technology Readiness Level (TRL) stages, and for close-to-market technology demonstration); contribute in part to the acquisition of national capabilities such as a UK-led PNT system (which should also be financed in part directly by the Treasury); support the development of innovative spaceflight-related technologies; finally, it would also support a UK budget for bilateral space missions (see below).

Finally, to get best value for increased public spending in this area, the government should ensure that all major national space procurement programmes (such as Skynet 6) are premised from the beginning on supporting wider strategic national interests. This includes encouraging innovation in the UK space sector as well as seeking as open a procurement process as possible in order to support strategic engagement and export opportunities with close partners around the world -- and particularly Five Eyes and NATO allies. One model to consider in this respect is the successful US delivery of the Wideband Global System (WGS) in which the US has secure participation and significant funding from a number of other nations.

**Policy: The next government should procure a UK-led PNT (positioning, navigation and timing) system as a strategic capability.** *This should be funded at least in part directly by the Treasury as a standalone national project, rather than by any single or combination of Departments of State including the UK Space Agency's budget. The government should also enhance its initial guidance to assess specifically a GNSS (Global Navigation Satellite System) solution, and expand the scope of this assessment to also explore a number of other potential future PNT options (with GNSS still being one of them).*

Following the government's decision in December 2018 to no longer seek access to secure aspects of the Galileo system after Brexit, work is currently underway to "explore options" for building a UK sovereign capability in the area of GNSS (Global Navigation Satellite System). Technical scoping for the project is being conducted by the MOD and the UK Space Agency. There is, as yet, no final business and strategic case available to inform a firm decision on whether to proceed with this acquisition.

The government should make a strategic decision to approve the procurement of a UK-led PNT system for two main reasons. First, a trusted and reliable PNT (positioning, navigation and timing) signal is critical for Britain's national security requirements (including infrastructure resilience and economic prosperity). The key reason why Britain joined the Galileo project in the first place was to obtain a secure back-up to the American GPS. From a UK point of view, the question of signal security is inextricably linked to the level of access the government has to the technical details of that signal. The government has assessed that once Britain is shut out (on account of Brexit) from its existing complete access to the Galileo signal, that signal, including its "military-grade" PRS version, ceases to meet the government's requirements; therefore, the original pre-Galileo need for a back-up to GPS reasserts itself at a time when PNT technology becomes

ever more pervasive across the economy and society. This critical national security gap must now be bridged through some version of a PNT system that is either fully UK sovereign or a UK-led multilateral project involving close allies from the Five Eyes intelligence alliance. In either case, the UK must ensure it develops a PNT capability that complements those of its key allies, particularly the world-leading GPS system.

The second main reason to proceed with a UK-led PNT alternative to Galileo is to support the British space industrial base. Full UK participation in Galileo has been an important driver of the strong growth achieved by the British space sector in recent years. The net loss to industry from UK's exit from the EU's Galileo programme (and potentially also from Copernicus) must be compensated in order to retain unique space engineering skills in the UK and to maintain the sector's upward trajectory at a time of increasing global commercial competition. As independent studies have shown, every £1 invested in the space sector generates £4 in revenues: in economic terms, public investment in space pays for itself.

Importantly, a UK-led PNT project should be financed as a national strategic capability and the costs borne at least in part by the Treasury, as has been the case in the past at times with the nuclear deterrent. The government should avoid burdening the MOD with the full costs of this new satellite system; a UK PNT system must not come at the expense of other much-needed defence capabilities.

Finally, the government should give itself more flexibility over the kind of PNT system it wishes to procure. Its current guidance specifies it is aiming for a full GNSS – the same class of system as Galileo. Core UK national security requirements might also be met by less expansive system architectures in conjunction with new technologies, particularly if some of these are integrated with other UK space infrastructures such as Skynet in Geostationary orbit and/or a potential Earth Observation system deployed in Low Earth Orbit. In this sense, it is particularly important to understand the future PNT capability requirements alongside a strategic space technology roadmap to inform long-term procurement decisions.

Critically, the final decision on the type of system Britain will procure must be grounded in a clearer vision of UK's long-term interests in space, and of the kind of space power it wants to become. The government should therefore ensure a wider range of inputs into this debate and seek as much as possible and sensible a joint assessment of eventual solutions.

**Policy: The next government should procure a sovereign Earth Observation (EO) capability configured to meet cross-government needs.** This should be conceived as the third leg of an integrated UK strategic 'space Triad' of PNT-SATCOM-EO systems.

Leaked details of the government's yet-unpublished new Defence Space Strategy suggest that the MOD has decided to create a constellation of EO satellites based on Carbonite-2, a small satellite that has demonstrated full-motion colour video imaging from space.

The extent to which this defence capability can also service the needs of other (civil) departments across government is unclear; certain civil and military requirements can differ or even be incompatible. All leading space countries have developed sovereign EO capabilities which support growth in their national economies, aside from military uses.

A particularly important use of EO satellites is linked to environmental policy and fighting climate change. This is an area in which the UK can take a global lead; designing and building its own systems tailored to its own needs will boost Britain's ability to leverage space in support of national and global economic and environmental development and protection. Another key consideration here is the possibility of important Brexit-related restrictions on UK participation in the development of EU's flagship EO programme, Copernicus – this potential gap would need to be addressed at the national level.

Finally, a sovereign EO capability – which can expand over time with the addition of other types of remote sensing satellites – would complete a UK strategic “space Triad”, alongside PNT and Skynet satcom. This would constitute the foundation of UK space power in the 21st century – developed via the proposed new UK National Space Programme – and give it a vast competitive advantage in the global commercial space race as well.

**Policy: Secure first-mover advantages in national spaceflight capabilities.** *Accelerate the development of vertical and horizontal space launch infrastructure at designated spaceports. Give particular attention and support to indigenous R&D of novel spaceflight technologies with strategic long-term applications.*

Assured domestic access to space is a fundamental strategic requirement for any major space nation in the 21st century, for two key reasons. Firstly, it is a national security imperative: as we become increasingly more dependent on space infrastructures, the UK must be able to independently deploy space assets in a crisis when allies or the international commercial market might not be able to assist. Secondly, rapidly advancing spaceflight technology will enable wholly new commercial and military applications, which in the long term will likely become of primary national interest. It is therefore essential to develop elements of an autonomous national capability in this domain in order to remain strategically competitive in the decades ahead. This involves both investments in infrastructure and in novel space access technologies that can give Britain a strong advantage in this critical field.

But most immediately, the British interest in supporting the development of a domestic space launch industry is tied to the booming global space launch market. This is why the government has already committed to enabling space launch from UK soil, and in July 2018 it greenlighted the first UK vertical launch spaceport at Sutherland in Scotland.

However, final public funding agreements for horizontal launch sites at Newquay Airport in Cornwall and Glasgow Prestwick Airport are still being delayed. A new government should take quick, bold action to support the accelerated development of these two sites in order to ensure Britain will

be “first to market” in European space launch, ahead of competitors such as Italy or Norway who are determined to catch up with us.

The new government should also dedicate particular attention and support to innovative spaceflight-related technologies developed domestically that could help give the UK assured space access and a strategic advantage in the global space competition over the coming decades. Considering the absolutely critical role of this capability for UK national security, the government’s pursuit of such novel technologies should be decided within the National Security (not Space) Council, and integrated with a comprehensive long-term vision for the future of British space power.

# Rebalance Britain's space relationships towards a more global approach

## Moving gradually beyond an over-emphasis on European collaboration and seeking new space alliances to parallel Britain's defence and foreign policy outlook

**Policy: The next government should establish a dedicated budget for bilateral space cooperation and missions to enable projects particularly with leading Commonwealth countries and Japan.**

Apart from developing a strong UK national space programme, as recommended above, the next government should also provide adequate funding to the UK Space Agency to establish a dedicated, sustainable budget for bilateral space cooperation missions. This is required in order to enable Britain, once it leaves the EU, to link up with other countries around the world.

At present, without a bilateral missions budget, there is little scope for practical, enduring collaboration and joint space technology projects with close allies overseas: most joint work is limited to the area of regulation and other non-industrial forms of cooperation.

The French and German space agencies (CNES and DLR respectively) both have bilateral missions budgets. This, for example, means that the DLR has a £3m/year space technology development agreement with Australia – something which the UK Space Agency cannot afford to do.

The government needs to evolve its understanding of space from the current prevailing notion that this is simply a branch of technology policy or a field of scientific research. The increasing global dependence on space technology is transforming space into an instrument of foreign policy in its own right. As the US defence secretary said recently: “The next major conflict may be won or lost in space.” Within our lifetime space power will become as significant in shaping human affairs as classic geopolitical power.

As such, as geopolitical competition intensifies, there is an increasing premium on developing strategic space relationships around the world to complement the broad lines of British global strategic posture. At present, Britain's non-military space posture is overwhelmingly focused on (or

locked into) Europe. As the UK leaves the European Union, it should not necessarily reduce its existing levels of cooperation with its European partners, but seek to *add* an strategic international dimension to it.

In this sense, the next government should seize the geopolitical opportunity provided by Brexit and the Global Britain concept, together with the current forward momentum enjoyed by the UK space industry, and seek a central leading space role in the Commonwealth. The UK Space Agency already enjoys a good reputation with countries like Australia which are now developing their own space agencies; there are strong premises for Britain to become the Commonwealth's "space pivot", but this requires a clear strategy and a dedicated budget.

Britain's global space rebalancing needs to look beyond the Commonwealth, however. Apart from the United States, one of the most important space relationships to foster in the coming years is that with Japan. Japan is a leading global space nation in its own right, and the UK-Japan strategic partnership has been expanding and deepening in recent years; boosting its space dimension would create further synergies and also benefit UK's space industry in the long term.

**Policy: The next government should seek a UK national participation (if necessary in addition to ESA) in NASA's Lunar Gateway.**

Britain has traditionally had a very close special relationship with the United States in the field of military space. This has not been paralleled by anything like a similar relationship in terms of bilateral civil space cooperation, on account of Britain's strategic decision to focus its civil space efforts (particularly space exploration) on the ESA. The latter offers the advantage of pooling and sharing resources from larger number of countries, thus enabling the UK to participate in ambitious space exploration missions at an affordable cost.

While the ESA is not part of the EU, some of its flagship programmes such as Galileo are EU-only, and EU officials have held up the prospect of the Union forming its own separate space agency. In the medium-long term this is very likely to happen, given the EU's stated ambition to achieve "strategic autonomy".

In this context, if the next government agrees to Britain executing a step-change in its space ambitions – as advocated by Policy Exchange – a gradual diversification of our high-end space exploration cooperation partnerships is highly recommended. A national UK participation in NASA's Lunar Gateway – similarly to what Canada has decided to do – offers an important opportunity for enhancing UK-US civil space cooperation. This can be a major first step towards a NASA-UKSA partnership for the 21st century, backed by significant new investments, with a positive knock-on effect on Britain's domestic space industry.



**Policy: The next government should seek a second ESA mission to the International Space Station for a UK astronaut.**

A significant scaling-up of British involvement in the global space race requires a sense of national endeavour – alongside clear strategy, political leadership and material resources. Winning a leading place in the international “space order” of the 21st century, on which the security and prosperity of future generations of Britons will depend, cannot be done without enduring, strong public support.

Major Tim Peake's *Principia* mission to the International Space Station in 2015/16 demonstrated the symbolic power and mass popular appeal of distinctly British exploits in outer space. Major Peake's space adventure captured the imagination of the public and especially the young.

The next government should recognise the full value of this type of experience and explore options for a sustainable British programme of human spaceflight, starting with a second ESA mission to the ISS. Similar opportunities should be sought in collaboration with other countries developing advanced human spaceflight programmes.



What do we want from the next Prime Minister? New ideas for the UK's future are plentiful. Brexit has increased the number of potential futures for our country. But as yet a new national consensus – a governing philosophy with a broad basis of support and an exciting policy agenda to match – has proved elusive.

Policy Exchange believes that such a consensus is within our grasp and is the only basis for a process of national renewal. This publication forms part of a complete set of policy ideas on these issues and more.

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