



HM Government

The National Space Strategy in Action

July 2023



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Foreword from Minister Freeman

The new space race has not just begun, it is well underway. More than ever, space is competitive, space is commercial, and space is crowded. Countries across the world have realised that now is the time when the future of the space economy will be decided, and they are acting and investing to stake their place in the stars.

We have made a good start. We have a rare heritage in space that only a few nations can match, we have some of the most innovative and exciting companies in the world, and we have some unique strengths in our space science sector, in our manufacturing capabilities, and in the financial services provided by the city of London. And we have a huge ambition that we set out with MOD in the National Space Strategy, the first ever joint civil-defence space strategy in the UK.



But the global race for investment means we cannot rest easy, with such fierce competition, and we must now deliver that ambition through active government steps to seize the opportunities around us. And I see huge opportunities in this next decade.

The Space Strategy sets out a number of specific tools with which we commit to help grow the global commercial UK space sector: from our significant investment in our space programme via UKSA/ESA, to LEO launch from our spaceports in Cornwall and Scotland to our share in OneWeb, regulatory leadership and MoD procurements. I want the UK to seize the opportunities at hand – such as OneWeb, whose recently completed constellation is poised to deliver high-speed internet anywhere on Earth, opening major new commercial and strategic possibilities is a key UK strength. Government contracts and procurement tendering, both civil and defence, are key to creating a vibrant UK market for space tech.

The UK will lead the pack on regulatory standards, promoting competition whilst ending the wild west nature of space today. We are creating an industry led Space Sustainability Standard; a framework of standards for measuring and managing debris, improving satellite repair and retrieval and benchmarking genuinely sustainable supply chains developed with Lloyds of London and leading UK space insurers and investors to make the City of London a global leader in commercial space finance.

That, along with the broader regulatory reviews I'm setting out in this document, will also enable us to make the most of our newest capability in UK launch. There too we have made a good start, but with better regulatory standards, harnessing the power of the city to provide better and cheaper insurance and finance for more launches from more parts of the UK; we plan to become a leading launch nation in the LEO European launch market by 2030.

And I want to maximise the return the UK gets from our historically huge investment in the European Space Agency - £1.84 billion for UK space sector participation in groundbreaking programs and missions– including with our three new astronauts.

This publication is all about putting the flesh on the bones of our ambition and our strategy, adding detail and deliverable policies and products, to give commercial business and investors the long-term confidence in UK space.

George Freeman MP

Minister of State (Minister for Science, Research and Innovation)

Executive Summary

We will build one of the most innovative and attractive space economies in the world, and the UK will grow as a space nation. We will protect and defend UK interests in space, shape the space environment, and use space to help solve challenges at home and overseas. Through cutting edge research, we will inspire the next generation and sustain the UK's competitive edge in space science and technology.

-The National Space Strategy, 2021

In September 2021, the government published the National Space Strategy (NSS) – our first ever combined civil-defence strategy for space jointly owned by the Department for Science, Innovation and Technology (DSIT) and the Ministry of Defence (MOD).

That publication set out an ambitious 10-year vision, and high-level policy framework to shape the way government supports the space economy. In the time since, government has announced more than £10 billion of funding for space activities stretching across a decade, including more than £1.75 billion to our key delivery agency the UK Space Agency (UKSA) in this Spending Review period. We have appointed a new CEO, Paul Bate, and chair, Lord Willetts, to UKSA; convened the National Space Council to provide ministerial coordination and leadership; and the creation of DSIT has brought together space policy and spectrum and space communications regulatory policy into one department. And we have seen significant successes including both the licensing and first launch from the UK's first spaceport, to securing 3 new astronauts through the European Space Agency (ESA).

The 10-point plan provided our initial steps, which we have seen significant progress in delivering, but we must go further to define our policies for growth, to define where we will acquire capabilities, and to maximise the return on the UK's investments in space.

The global space race for commercial investment is only speeding up. Our nearest competitor nations are significantly increasing their investment in space activities. And despite the long-term nature of space exploration, the speed at which the new commercial space economy from small LEO satellite design, manufacturing and launch to space traffic management, satcomms, EO and the lunar economy is evolving requires much more agile and innovative responses from government if we are to avoid falling behind.

This publication sets out just the first part of our response to that challenge and the concrete steps needed to deliver on the NSS ambition in the short term.

It defines the next steps we will take in delivering the NSS, moving from the 'ignition' phase into the 'thrust' phase. It sets out some concrete policy steps we are taking now and sets the direction for the work of government over the next 18 months – giving space sector businesses and innovators a clarity and confidence of where government is intervening, and where we will intervene in the future. And it sets out the key metrics we will use to track our progress.

Summary of the Commitments Made in this Publication

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Unlocking Growth</p>	<ul style="list-style-type: none"> • We are developing our Space Sector Plan, which we will publish in 2023, detailing specific interventions to promote economic growth and resilience in the sector in the medium term. • We will shortly set out our approach to Developing the UK Space Ecosystem, supporting space clusters to continue to grow and thrive. • Building on a £15 million Education and Skills Programme, we will publish a Space Workforce Action Plan in 2024 focused on resolving challenges facing the sector in accessing skills. • We will review the regulations governing space to ensure they're effective, beginning with the Orbital Regulatory Review. • We are developing a new Venture Capital Framework for Space to guide work supporting inwards investment and more private finance into the sector. • We will deliver a single narrative to better communicate the Government's ambitions and activities in the space sector across all our economic, national security, and diplomatic interests.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">International Collaboration</p>	<ul style="list-style-type: none"> • We will deliver on the record £1.84 billion commitment to the European Space Agency, including programmes like the UK-built Rosalind Franklin Mars Rover. • We will build on the successes of our memoranda of understanding with the Canadian Space Agency, Japanese Space Agency, and the United States. • We will continue to lead efforts in the UN to promote norms of responsible space behaviour.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Science Superpower</p>	<ul style="list-style-type: none"> • We are setting out our Long-Term Space Science and Exploration Goals in this document to help focus UK investment into the most significant areas critical to understanding the universe. • We will deliver science and innovation funding through the National Space Innovation Programme, the Science and Exploration Bilaterals Programme, Dstl Space Programme, and our investments in ESA.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Resilient Capabilities</p>	<ul style="list-style-type: none"> • Today we publish our Civil Capability Goals, statements of intent which outline the capabilities we will seek to develop and maintain in the UK, to provide industry with planning confidence. • We set out detail on the Defence Highly Assured Capabilities we need, building on the Defence Capability Management Strategy published last year. • We are publishing national priorities for civil Earth Observation (EO) – describing the outcomes for the UK EO sector that will deliver the NSS ambition over the next 5-10 years. • We will publish joint civil-defence Space Domain Awareness (SDA) requirements as an important first step towards a future National Space Operations Centre (NSPOC). • These elements will be used to drive our approach to building resilient, dual-use capabilities into the future, and we will set out further detail on how we will phase and prioritise them as part of the Space Sector Plan.

Delivery of the National Space Strategy

Since the publication of the NSS, government and industry have worked together, taking significant steps forward, focusing on the initial priority areas we set out in our 10 Point Plan:

1: Capture the European market in commercial small satellite launch

We have taken huge strides in developing the UK's launch capabilities and regulation. In January 2023, the UK conducted its first ever launch into space from UK soil through Virgin Orbit at Spaceport Cornwall. Whilst the satellites did not make orbit, the mission secured UK leadership in European launch licensing, operation, and preparation. It was successfully licensed, including licensing of the spaceport, launch operator, range control, payloads and securing required international agreements to enable a launch to take place. We remain committed to becoming the leading provider of commercial small satellite launches in Europe by 2030, with a horizontal spaceport now established in Newquay, and more launches planned from Scotland at Saxavord and Sutherland Spaceports.

2: Fight climate change with space technology

We have demonstrated our deep partnership with the European Space Agency (ESA), investing a record £1.84 billion over the next five years. As part of this investment, we have recommitted to delivering the TRUTHS space climate laboratory which will set the standards for satellite climate measurements, delivering a ten times increase in the accuracy of measurements. We are also delivering the Microcarb joint mission with France, which will be the first European satellite dedicated to measuring atmospheric CO₂ from all around the world – the main greenhouse gas caused by human activity. In December 2022, the Microcarb satellite arrived in the UK for assembly, integration, and testing prior to its launch from 2024.

3: Unleash innovation across the space sector

UKSA's National Space Innovation Programme is investing in trailblazing technologies which use space to deliver for everyone. In November 2021 we announced an initial £6.7 million in funding to ten companies on projects ranging from satellite quantum key technologies to thermal imaging technologies to improve the energy efficiency of buildings¹. Further announcements about projects selected for funding will be made in due course.

4: Expand our horizons with space science and exploration

The UK's leading role in global space science and exploration missions has only grown, from the UK's contribution to the James Webb Space Telescope which is now giving us huge insight into the universe, through to the UK's role in ESA's PLATO mission to find earth-like planets and the UK-built Rosalind Franklin Mars Rover which is now set to launch to Mars in 2028. And as part of our ESA investment, the UK now has three new ESA Astronauts: Rosemary Coogan, our new career astronaut, John McFall, the world's first para-astronaut, and Meganne Christian, who has joined the astronaut reserve.

¹ <https://www.gov.uk/government/news/government-backs-ground-breaking-space-technology-to-tackle-climate-change>

5: Develop our world-class space clusters

Strengthening our clusters from Cornwall to Scotland is a top priority for building innovation and growth across the sector, through developing our national ecosystem. We have supported the space economy, investing in space clusters across England, Northern Ireland, Scotland, and Wales. These clusters support the growth of highly innovative companies across the UK as part of a diverse and growing ecosystem. In February 2023 we announced c. £5 million in funding to 18 projects which will help the UK space economy to grow and drive levelling up across the UK.

6: Lead the global effort to make space more sustainable

In June we launched our Plan for Space Sustainability to ensure that space remains open, safe, and accessible into the future.² Through our work with the industry we are developing a new Space Sustainability Standard, a framework of standards to manage and measure space debris, improve our ability to repair satellites, and providing standards for genuinely sustainable space supply chains which we plan to support with initiatives in our regulatory and financing framework to make the City of London and Lloyds a leading global hub for commercial space financing. The UK is also funding demonstrator missions for debris removal that will ensure we continue to play a world-leading role in promoting the responsible use of space. Bold steps like this demonstrate the UK's leadership and help manage the increasingly contested and congested space environment into the future.

7: Improve public services with space technology

We are continuing to support the Satellite Applications Catapult, which works with businesses to develop ways that space and earth observation technologies can have real impact on our lives. These stretch from monitoring infrastructure like bridges for damage, supporting farmers to get more from their land, and preventing and mitigating the impacts of flooding. Globally the UK continues to lead on leveraging the benefits of space for everyone, and we have maintained our commitment to the Disasters Charter which we will chair this year, helping respond to humanitarian crises globally, including the earthquakes in 2023 in Turkey and Syria.

8: Deliver the UK Defence Space Portfolio

Defence is playing a lead role in delivering the NSS goal to 'protect and defend national interests in and through space'. In February 2022 the Ministry of Defence launched the Defence Space Strategy³ to set out how it will do this and become a 'meaningful actor in the space domain'. This was followed up in September with the first space specific Joint Doctrine Publication on UK Space Power.⁴ In 2021 Defence took its first steps in delivering the Defence Space Portfolio, placing a contract for their first new generation Low Earth Orbit (LEO) laser communications satellite (TITANIA) and associated ground station (PUCK). This followed with award of a further satellite contract in early 2022 for TYCHE, an electro-optical earth observation (EO) system. Both satellites are expected to launch to LEO from 2024.

² [Plan for Space Sustainability, GOV.UK](#)

³ [Defence Space Strategy, GOV.UK](#)

⁴ [Joint Doctrine Publication on UK Space Power, GOV.UK](#)

In November 2022, the UK Space Command published the first defence space capability management plan, outlining how we will acquire and procure the capabilities we need to protect and defend UK interests creating commercial opportunities for the UK space sector.⁵

9: Upskill and inspire our future space workforce

As part of our ongoing commitment to supporting the skills in the space workforce, the UK Space Agency (UKSA) is investing £15m in education, skills, and outreach as part of its Inspiration Priority over the next two years, and in this document, we will set out the further steps that we are taking this year.

10: Use space to modernise and transform our transport system

We are committed to using space in innovative ways to support the future of transport. As part of our ESA investment, we announced £190 million of funding for innovative satellite communications projects, from services such as drones to driverless haulage. We are supporting activities such as the Satellites for Digitalisation of Railways project, which will demonstrate how satellites can improve data connectivity on the UK rail network, and the e-rental scooters pilot being carried out by the Department for Transport, which relies on satellite geo-fencing technologies.

Improving how government operates

Alongside delivering the 10 Point Plan, we have also made huge strides in improving the way we organise government to deliver on our space ambitions. DSIT and MOD have jointly brought together the responsible space departments into a single coordinated delivery framework overseen by a National Space Board. In July 2023, the Prime Minister established the National Space Council as a new Inter-Ministerial Group, to set cross-government ministerial direction for space policy and strategy. In addition, UKSA has outlined in its corporate plan how it is transforming into a world-leading delivery agency⁶.

As we enter the next phase of delivering the National Space Strategy, we will expand the range of activities we will focus on, delivering key enabling policies and interventions across every pillar of the National Space Strategy. Our joined-up approach to delivery will help us to identify and pursue opportunities for dual use capabilities and joint activity.

A key part of our approach to delivering the NSS is ensuring we can measure our progress. Alongside this publication, we are setting out a Technical Annex which details **our suite of key indicators to measure the delivery of the NSS**. In doing so we are setting out both Primary and Secondary indicators to give a holistic measure of our delivery. The main primary indicators we will track include:

- The total income of the Space Sector
- The percentage of Space Sector Income generated via exports
- The investment in R&D as a percentage of income

⁵ [Space Capability Management Plan, GOV.UK](#)

⁶ [UK Space Agency Corporate Plan, GOV.UK](#)

Pillar One: Unlocking Growth

Our ambition is to make the UK one of the most attractive countries for space businesses of all sizes to grow and thrive. We will use the full range of tools at our disposal to achieve that ambition. **We are committing to developing a joint civil-defence Space Sector Plan in 2023 building on the National Space Strategy, the Defence Space Strategy, and the Defence and Security Industrial Strategy (DSIS).**

The core principles of this Space Sector Plan will be:

- **Economic Growth.** This includes increasing the overall size of the space sector and broadening and deepening the distribution of space sector revenue across the UK; increasing the inflow of private investment into the space sector; increasing the number of space sector high paying jobs; and contributing to the UK's R&D investment targets.
- **Resilience.** This includes ensuring that growth is sustainable and well founded, resilient against economic shocks, and able to provide the UK Government and our allies with the assured capabilities and services needed in a competitive world.

The National Space Strategy outlined seven key enabling intervention areas where Government possessed the tools needed to achieve our growth and resilience ambitions: trade, regulation, the whole UK ecosystem, talent, finance, procurement, and innovation. We will use this framework in our Space Sector Plan. Taken together with the capability goals outlined in this document under pillar 4, the Sector Plan will provide clear demand signals to industry of what Government expects to need them deliver (by way of space services and technologies) in the future.

This cross-government plan aims to kickstart the 'virtuous circle' outlined in the DSIS whereby government funding increases the capacity of the sector, supporting inward investment and further growth. The next pages of this document set out the first steps we are taking to design and deliver this policy across the first five intervention areas.

OneWeb

To sustain the UK's competitive edge in space technology, we are supporting OneWeb in its ambition to roll out high-speed, low-latency internet and finally close the digital divide. Its second generation is a strategic opportunity for the UK and we are engaging with OneWeb and potential suppliers to ensure that the UK's excellent capabilities and expertise are recognised as the company lets contracts to build the next system.

OneWeb's 1st generation constellation is now complete. This UK company is the world's first operator to complete a LEO broadband constellation, less than 3 years after government invested \$500m to secure its future. OneWeb's constellation has made the UK one of the world's largest satellite operators, and has demonstrated the success of the UK's orbital licensing capability to support the scale and pace of launching a large, global constellation.

Nurturing Talent: growing our Space Workforce

The space sector needs a strong pipeline of talent to fuel its growth, but the supply of skilled and experienced professionals has not kept pace with the needs of the space sector. This has led to shortfalls and 51% of businesses report gaps or limitations in the skills of their workforce.

Space businesses benefit from many of the economy-wide interventions that the UK government has made in recent years. These include reforms to our immigration system, such as the Innovator Visa and the Global Talent Visa, and the work to embed Lifelong Learning for Opportunity and Growth in the education system.⁷ Through UK Research and Innovation (UKRI), a range of broader early careers support is available to STEM disciplines.⁸

Government is already acting to promote the skilled workforce we need. We plan to invest £15m in education, skills, and outreach as part of the UKSA's Inspiration Priority over the next two years, a near fivefold increase in funding this SR period. As part of this funding, we plan to invest over £4 million in the next two years to enhance access to training for current and potential space sector workers. The Ministry of Defence is also developing a UK Government Space Academy, to upskill the defence space workforce, and is working with wider government to improve Government's own skillset and explore opportunities to help address skill gaps.

To go further, we must understand the crucial skillsets underpinning our national capability goals (outlined in Pillar 4), in order to build the conditions needed for a self-sufficient and thriving space workforce. This requires the expert input of the sector, to ensure fast, impactful, and coordinated action is taken between government, industry, and academia. A long-term, holistic approach to education and workforce development for the sector is needed to ensure that the UK remains competitive in the rapidly expanding global space economy.

Space Workforce Action Plan

We will contribute to development of a shared Space Workforce Action Plan with the sector. Through the Space Skills Advisory Panel and Space Partnership, we will:

- Together with industry and academia, co-author an evidence-based report on the skills challenges facing the space sector. This will build on the findings of the UKSA Space Skills Survey, with the aim of identifying where intervention is most needed and by whom. We intend to make this report publicly available in summer 2023.
- Support the development of a long-term action plan focused on resolving the challenges facing the sector, clarifying the roles of government, industry, and academia in tackling these together.

We will publish this Action Plan in 2024.

⁷ [Skills for jobs: lifelong learning for opportunity and growth, GOV.UK](#)

⁸ <https://www.ukri.org/what-we-offer/developing-people-and-skills/>

Dynamic Regulation

The UK's Space Regulatory Framework, delivered through the Space Industry Act 2018 and subsequent regulations made in 2021,⁹ is world leading, setting out clear routes to enabling safe, secure, and sustainable UK-licensed space operations that comply with internationally agreed guidance and norms. Whilst the UK is at the cutting edge of many aspects of space regulation, other regimes are continuing to innovate and evolve, so an agile approach to our regulatory regime is essential.

We will ensure that our regulations keep up with advances in technology, changing practices, changes in the orbital environment, and evolving global standards. As part of this, we are conducting a **package of reviews of our existing regulations and guidance**.

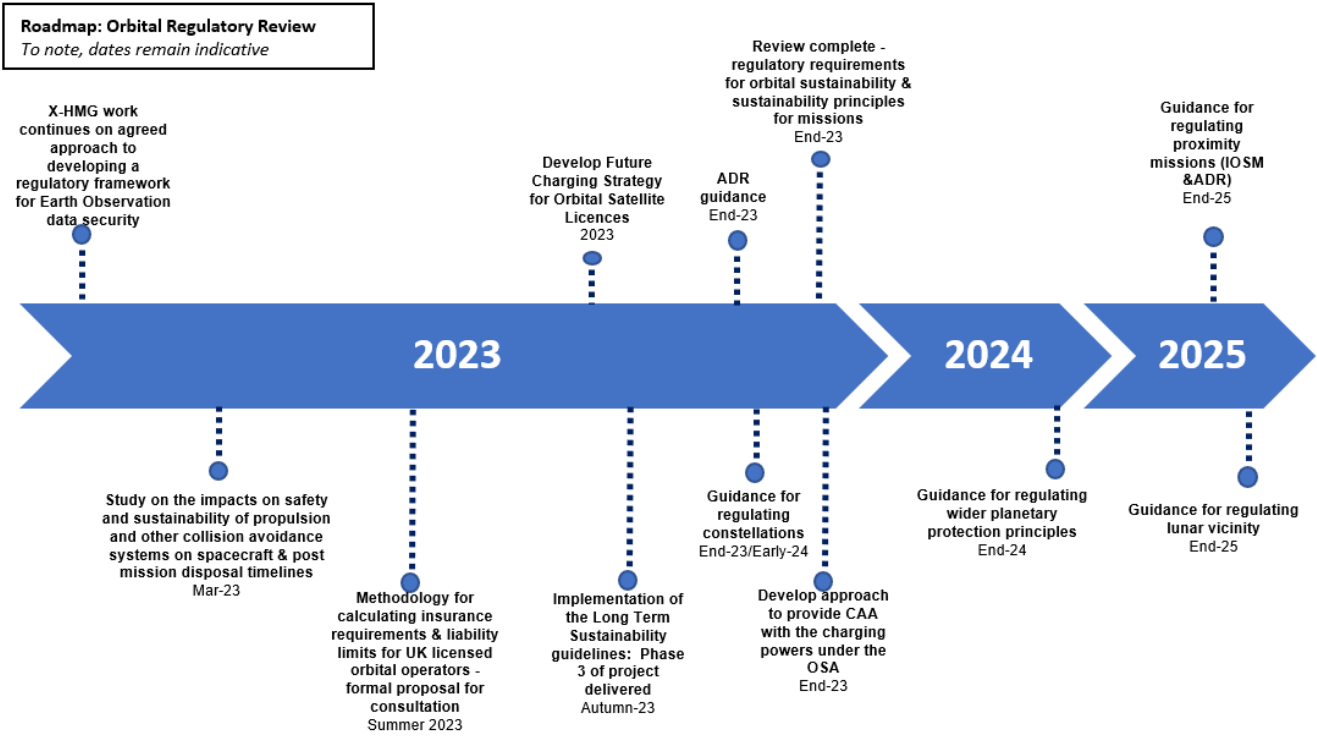
This comprehensive package includes:

- A review in 2023 of the regulatory frameworks governing orbital activities, announced in June 2022 as part of our Plan for Space Sustainability.
- A review of the Space Industry Act in 2023, in line with its five-year anniversary to ensure we keep leading the world in modern space regulation and setting a global benchmark – supporting innovation and unleashing the UK as a science superpower.
- Ensuring we learn the lessons from licensing the first spaceport and launch in the UK, to work towards becoming the leader in commercial small satellite launch in Europe.
- Working closely with the United States and other partners to minimise bureaucracy and duplication in our licensing systems.
- A statement of our strategic vision and principles for our policies governing the use of the electromagnetic spectrum.
- A wider review of the overarching regulatory framework for space across government, to ensure regulations work together to support our objectives, and that they are appropriate, proportionate, effective, and efficient.

In approaching these reviews, Government will ensure that space remains safe, sustainable, and secure. We will place safety at the heart of our approach, whilst ensuring that we always support innovation, entrepreneurialism, and economic competition and growth.

As part of this package, we are today setting out our high-level roadmap for the Orbital Regulatory Review announced as part of the Plan for Space Sustainability:

⁹ The Outer Space Act 1986, The Space Industry Regulations 2021, The Space Industry (Appeals) Regulations 2021 and the Spaceflight Activities (Investigation of Spaceflight Accidents) Regulations 2021



The Space Sustainability Standard

In June 2022, we announced the UK’s first ever **Plan for Space Sustainability**.¹⁰ The plan which encompasses a set of ambitious announcements focussed on ensuring that space remains safe, sustainable, and secure for future generations.

As part of that plan, we are developing a new, industry-led Space Sustainability Standard. It will bring together industry, academia, investors, insurers, government stakeholders, international bodies and other regulators and governments to ensure that space continues to support the environmental, economic, and scientific interests of future generations.

The key benefits of the standard will:

- Enable a better insurance risk to be established and support the availability of insurance for LEO missions.
- Help facilitate the raising of investment – unlocking investment and helping to make the UK a more attractive place to operate and invest.
- Provide transparency and confidence to investors as to what can be classed as sustainable space activities, applying effective practices.
- Add to the regulatory and international reputation of the UK licensing system.
- Allow for the expertise gained by the UK and knowhow generated to be exchanged with other space nations and training offered. This is important for new space nations or those seeking to upgrade their regulatory framework.

¹⁰ [Plan for Space Sustainability, GOV.UK](https://www.gov.uk/government/consultations/plan-for-space-sustainability)

Access to Finance

In-orbit activities often entail high capital expenditure, significant risk and liability, and often long periods before return on investment can be achieved. The upfront costs for space-enabled applications and services may be lower, but this often means there is less tangible capital to offer as collateral. As such, access to the right kinds of finance, in the right timeframes and in sufficient volume, is critical for new and growing space businesses to be able to compete in the marketplace.

We are already acting to promote private investment in the space sector. UKSA has set out that its **North Star Metric**, the most important measure the Agency uses to ensure we remain on course, is maximising the total value of investment into the UK Space Sector. As part of achieving this, UKSA's funds, such as the National Space Innovation Programme, promote industrial co-funding of UK space activity through match funding.

One major barrier to investment in the space sector is that, as a newly emerging private market, investors lack the understanding and awareness they need to have the confidence to invest. To start to alleviate this, we will develop a Venture Capital Framework for Space.

Space Venture Capital Framework

We will develop a Venture Capital Framework for the Space Sector. The UK Space Sector is demonstrating a notable increase in the number, scope, and ambition of Space Tech companies, illustrative of the sector's global growth and increasingly focused Government and commercial intent. This Framework will support the prioritisation of specific UK Space sector capability goals and determine the mechanisms by which Government will pursue venture investment from overseas while also looking to increase the level of interest from domestic investors.

The VC Framework will determine how Government will ensure a vibrant space VC ecosystem in the UK through activities including:

- Using the identified capability goals and priorities to determine where investment from private sector VCs would be most appropriate;
- Mapping these priority areas against a global map of VCs that Government judges to have appetite, willingness and ability to invest in the UK space sector;
- Account managing these VCs in their exploration of the sector through the production of tailored prospectuses;
- Providing analysis and support to prioritised investable companies;
- Considering how to increase investment from VCs into UK space companies and encouraging more VCs investing in the space sector to be based in the UK.

We anticipate completing this Venture Capital Framework in alignment with the publication of the revised Space Sector Plan.

Developing the Whole-UK Ecosystem

The UK has a thriving space ecosystem, with space businesses and academia working across the whole country. As part of that network, there are currently 17 space clusters of differing maturities across the UK, spread across England, Scotland, Wales, and Northern Ireland. New clusters have formed in the North West of England and in the East of England following the publication of the National Space Strategy:



The UK's space ecosystem is broader than these clusters and includes a wide range of activity, from very small, localised clusters or hubs through to large-scale research infrastructure, academic institutions, and businesses. All of these elements play a vital role in delivering the UK's space goals and need to be supported according to their own needs and challenges, accepting that these may be different from one to another.

Clusters create opportunities for local businesses to come together, increasing engagement, highlighting where companies can win new business, attracting new domestic and international investment, and creating high value intellectual property and jobs. Clusters also provide the platform for companies and universities to create and share innovative products and services and form local partnerships to win business and collaborate on Research and Development.

Clusters exist and operate as part of a national ecosystem and they are not independent of each other, or the only target for growth interventions. Efforts to support growth should not be overly targeted to specific, siloed clusters, as this risks the space economy becoming fragmented with competition for staff, investment, and infrastructure, between clusters, as opposed to enhancing the competitiveness of the entire sector.

We already have in place successful national programmes to support the growth of clusters, with funding provided by UKSA and UKRI. These programmes aim to stimulate and drive economic growth through Space at the local level wherever there is opportunity and advocacy. UKSA provided £6.5m to 18 regional projects in February 2023 and have launched a Space Cluster and Infrastructure Fund worth £50 million that will provide significant match funding for the development of industrial R&D facilities that will enable companies to make space products mission-ready and launch them into commercial markets.

Space Clusters and Infrastructure Fund

We have invested in space clusters across the UK. Distributing infrastructure investment in this way helps to sustainably grow and spread the economic benefit from the space industry, creating new jobs, establishing new space-related connections across the UK, and accelerating the growth of our connected space clusters.

Through the UK Space Agency, Government is investing £50 million into a new Space Clusters and Infrastructure Fund. This will see up to £100m of matched investment from the private sector; building, connecting, and levelling up UK space R&D infrastructure.

The Satellite Application Catapult, working with the UK Space Agency, has developed the Capabilities Catalogue, that provides an open access tool that enables users to identify the capabilities and products offered by businesses and universities in a region.

This all helps create an agile, connected Space ecosystem that will provide the ideal environment for space business to start-up and flourish, and for bigger high-value, high-impact opportunities to emerge, such as large-scale, multi-sector technology clusters and FDIs. To maximise the potential for these opportunities to deliver economic impact and realise the ambitions of the NSS, it will require coordinated and collaborative interventions from across Government, ALBs and UKRI, led and managed by DSIT with support from UKSA.

As part of this approach, Government is considering how best to work with the regions and clusters to focus further on supporting them to mature and scale-up their space activities. Clusters will have full sight of the space capabilities that the UK will need in the future to deliver the National Space Strategy so that this can help shape local growth strategies. Later this year, we will publish how Government will achieve this to further highlight the success of clusters in the UK and setting direction to enable clusters to move to the next level.

Developing the UK Space Ecosystem

We will publish a plan on how Government will support the UK Space ecosystem to set direction for the sector. This plan will:

- Join Government departments, delivery partners, cluster stakeholders, academia, and industry to set out the best way for Government to support the growth of clusters.
- Highlight the excellent work happening across the ecosystem, sharing best practice.
- Outline the Government's ambition for clusters and how we will support to clusters to help us reach this ambition and deliver the National Space Strategy.
- Outline the roles and responsibilities of Government departments and delivery partners in achieving this work.

Building International Trade and Investment

To create one of the most innovative space economies in the world, it is vital that Government backs British business at home and abroad, promotes the UK as an investment hub, and champions trade opportunities globally. Exports from the UK account for 34% of the sector's total income, and at least £11.7 billion in inward investment has been secured over the past decade.¹¹ The space sector is a global sector by nature and so the UK needs to be globally facing. Trade and inward investment play an important role in creating jobs, spreading wealth, and enhancing our scientific and technological prowess across the whole UK and Government needs to further unleash the sector's potential.

As Government looks to support our sector to expand further into the global space economy, we want to increase international awareness and understanding of the UK space sector and our strengths and capabilities, especially when seeking to enter more markets. This is particularly true for Small and Medium Enterprises. To do this, government can draw on the wealth of expertise Government has supporting businesses to export and trade internationally.

This expertise and support is provided by a domestic network of International Trade Advisers working with central government and advisers based in our Embassies and Consulates worldwide. Overseas companies wanting to invest in the UK can access support from this overseas network, the Space Sector Team in DBT and our UK network of Investment Services Teams, which provide practical support for companies setting up in the UK.

One area where government can help support the sector is in global marketing. A single coherent narrative for domestic and international audiences conveyed through existing campaigns such as the 'GREAT' campaign for inward investment and 'Made in the UK' for exports can raise greater awareness of the sector and promote trade. These will work with accessible mapping of opportunities— a forward look of grants, EOIs and other opportunities.

Communicating the UK's Ambitions in the Space Sector

We will deliver a single sector narrative to enable every government department to consistently communicate our ambitions and activities in the space sector across all our economic, national security, and diplomatic interests. This will help the UK space sector understand how the whole UK government supports them and help us collectively promote the UK as one of the most attractive and innovative space economies, speaking with one voice across these diverse but interconnected areas.

In the longer term, we will aim to develop a dedicated, global marketing campaign to promote the UK space sector internationally, supporting UK space companies to trade, attract investment, export, and build productive international links.

As part of this, we will aim to be clearer in our mapping of future opportunities from across government for space companies to secure funding or collaborate with us.

¹¹ <https://www.gov.uk/government/publications/the-size-and-health-of-the-uk-space-industry-2022>

New markets such as space, and new entrants to those markets, can face barriers to international trade caused by a lack of a demonstrable trading track record and international familiarity with the UK market. This can make financing trade and guaranteeing contracts more difficult for space companies, particularly SMEs.

UK Export Finance helps businesses to unlock new markets, contracts, and investments by providing alternative and attractive financing terms to buyers. They allow businesses to access working capital loans to fulfil orders, and ensure they get paid by providing insurance against buyer default. This model of intervention has a strong record of success across many market sectors and is essential in helping the UK remain competitive on the global stage.

However, to date, space companies have rarely met the conditions to receive UK Export Finance support, due primarily to being early entrants into the market and thus often being pre-revenue, newly established, and lacking a clear track record. We will explore whether there are opportunities to tailor this, or similar existing interventions, to the needs of space businesses.

Export Finance for Space

UK Export Finance (UKEF) will work to raise awareness of how UKEF-backed support can mobilise private finance to facilitate international investment into the UK space sector and enable UK space companies to access export finance and working capital facilities to grow their business and seize global export opportunities.

To ensure that government is providing appropriate and targeted support, we will review existing support mechanisms including finance and funding and, if evidenced, will explore additional interventions to ensure that the UK space sector is adequately supported to enable business growth as part of the Space Sector Plan.

Pillar Two: Collaborating Internationally

Space is an inherently international endeavour, and the UK has placed international cooperation at the heart of our strategic approach to space. From global leadership on the peaceful, safe, and sustainable use of space, to leading cutting edge international projects, the UK is committed to becoming a partner of choice in all space activities.

Since the publication of the National Space Strategy, the UK has been making substantial progress in delivering the goals we set out.

Building International Partnerships

One of the most significant international space events in 2022 was the recommitment to our close collaboration with ESA. The UK committed a record £1.84 billion over the next 5 years,¹² securing:

- **Three new British astronauts:** Rosemary Coogan, who would be the UK's third astronaut in space after Tim Peake and Helen Sharman; John McFall, the world's first para-astronaut; and Meganne Christian who has joined the astronaut reserve.
- **The launch of the UK-built Rosalind Franklin Mars Rover:** which is set to launch to Mars in 2028 with UK industry playing a leading role developing a new landing platform.
- **The VIGIL space weather mission:** which will travel to a point in deep space and provide early warning of solar storms and supporting expertise delivered by the UK Met Office's Space Weather Operations Centre.
- **The TRUTHS climate laboratory:** which will set the standards for satellite climate measurements, delivering ten times increase in the accuracy of measurements.

This is alongside huge investment in core ESA projects, such as £315 million to support EO and climate projects and £618 million into mandatory programmes which include ESA's core space science budget.

The UK has broadened and strengthened our relationships with our strategic partners across the world. We have led trade missions to Australia, Israel, Japan, France, Singapore, UAE, and USA to develop deeper bonds with international allies as we become a partner of choice in space activities.

The Moon to Mars objectives workshop, hosted by UKSA at the Royal Institution on behalf of NASA, was held in July 2022 alongside development of the Artemis mission, which aims to send astronauts back to the Moon for the first time in decades.

¹² All subscriptions to ESA programmes are made in euros so GBP figures are subject to foreign exchange rates. The total figure includes £378 million to manage inflationary impacts and volatility in foreign exchange rates.

In October 2021 the UK and Canada strengthened our formal space ties through a Memorandum of Understanding between UKSA and the Canadian Space Agency.¹³ This agreement has renewed and deepened the relationship between our two countries in areas including research and development, space exploration, and the safe and sustainable use of space. And this model of cooperation has been extended to other partnerships. In April 2022, UKSA signed a Memorandum of Understanding with the Saudi Space Commission, building a framework for collaboration between the two countries and facilitating the exchange of information.¹⁴

International Bilateral Fund

Through UKSA, we are investing in an International Bilateral Fund, which will fund UK space projects with our strategic partners, as well as emerging space nations. This funding will help the UK build stronger relationships with international partners, increase exports and inward investment for the space sector, and help develop UK capabilities in collaboration with our international partners.

We are investing up to £20 million in this Fund over the remainder of the SR and the fund opened in April 2023.

As part of the Trade and Cooperation Agreement, the UK agreed to seek to participate in the EU's Horizon Europe and Copernicus programmes. We are currently negotiating for fair and appropriate participation terms with the EU, talks are ongoing.

February 2023 marked the 2nd anniversary of the **UK-Australia Space Bridge**, our world-first partnership on space activities which focuses on building collaboration between our two space sectors above and beyond that of other partnerships. We have undertaken several exciting initiatives under the Space Bridge, including:

- The first funding call under the Space Bridge awarded a total of £250,000 to five collaborative research projects.
- A £1m commitment for EO in AgroClimate announced by UKRI to help farmers deal with climate change.

In the coming year, we will progress work to identify priority international partners for future collaboration, building deeper mutual links and addressing global space challenges. We will participate in prominent international fora such as the International Astronautical Conference and the Space Symposium, championing British businesses and helping to set the global agenda on space sustainability. And we will work to build strong bilateral relationships with countries, such as through the Joint committee for science, technology, and innovation with France, as agreed at the Anglo-French summit in March 2023.

¹³ [UK Canada MOU, GOV.UK](#)

¹⁴ [UK-Saudi Arabia MOU, GOV.UK](#)

Diplomacy for an Open and Stable International Order

The UK has played a leading role on the international stage to improve the global governance of space.

In December 2021 the UN General Assembly adopted a UK-sponsored resolution, which established a new UN Open-Ended Working Group to discuss threats to space systems and make recommendations to address them through norms, rules, and principles of responsible behaviours. Discussions have revealed that States are concerned about a broad range of space threats such as the harm to the space environment and strategic stability from destructive tests of anti-satellite missiles in space and the impacts on civilians of interference with space systems. Demonstrating our commitment to promoting responsible space behaviours, in October 2022, the UK made a commitment not to destructively test direct ascent anti-satellite missiles.¹⁵

The Open-Ended Working Group will conclude its discussions in August 2023. The UK will strive to secure a consensus report that sets out clear recommendations for norms, rules, and principles for consideration by the UN General Assembly in October. We will build on this work and continue to play a leading role within the UN and with international partners to promote responsible space behaviours and to reduce the risk of unmanaged escalation and unintended conflict between States.

The UK has also led the international community on the adoption of sustainability guidelines through the UN Committee On the Peaceful Uses of Outer Space. We have invested in programmes designed to share best practice across emerging space-faring nations and to improve the registration of space objects. Alongside this we continue to play a pivotal role in taking forward discussions on debris removal and prevention, dark and quiet skies, space traffic coordination and a range of other measures designed to ensure space remains a safe, secure, and sustainable environment accessible for all. Working with like-minded partners, we intend to accelerate steps to further improve the space operational environment, both through improved internationally adopted guidelines and through national leadership in regulatory reform.

¹⁵ <https://www.gov.uk/government/news/responsible-space-behaviours-the-uk-commits-not-to-destructively-test-direct-ascent-anti-satellite-missiles>

Broadening and Deepening Defence Collaboration

Since the publication of the NATO Overarching Space Policy in January 2022, the UK has been at the heart of NATO's efforts to integrate space into its deterrence and defence activities (including exercises and wargames). We have assigned UK personnel to the NATO Space Centre at Ramstein Air Base, Germany; we have committed to assign additional personnel to NATO's Space Centre of Excellence in Toulouse, France; and we are active members of NATO's Bi-Strategic Command Space Working Group. UK Space Command continues to provide space-derived products and space effects in response to Space Support Request from the Alliance; and UK Strategic Command (alongside France, Italy, and the US) continues to provide assured satellite communications capacity in support of NATO operations. These UK activities have directly supported NATO in strengthening the collective defence of its members, in optimising its use of resources and in enhancing its mission assurance and resilience. By doing so we have also enhanced our own ability to protect and defend our national interests in and through space.

The UK has continued to play a leading role in the Combined Space Operations initiative since its establishment in 2014.¹⁶ As Chair of the Policy and Legal Working Group over the last year, the UK has catalysed the debate on responsible military space behaviours, which has contributed to the debate in the United Nations on responsible space behaviours. This initiative has also brought to bear a greater exchange of information across our defence capability programmes and unlocked access to international training and development for our national staff.

The UK continues to take steps to engage on defence and security space matters with its Allies and partners through existing bi-lateral and multilateral frameworks. Several new Defence agreements have since been established following the publication of the National Space Strategy. In December 2021, and in light of the of our deepening mutual security partnership, the UK and the US signed an agreement to enhance cooperation in the space domain across policy, operations, and capability generation. This was followed up by the UK Space Command signing the Enhanced Space Cooperation Agreement with the United States Space Command in April 2022 for deeper cooperation and engagement on space operations. Key agreements have also been signed with Republic of Korea, Australia and Japan, which set the stage for cooperation in areas such as information sharing, collaborative training, and personnel exchanges.

¹⁶ This initiative aims to generate and improve cooperation, coordination, and opportunities to enable our joint operations in order to sustain freedom of action in space, optimise resources, enhance mission assurance and resilience. Members are Australia, Canada, France, Germany, New Zealand, UK, and US

Pillar Three: Growing as a Science Superpower

Government fully recognises how crucial science, research and innovation are to achieving our ambitions in space and in the wider economy. That's why we have set out our Science and Technology Framework in March¹⁷ and delivered the biggest increase in public R&D investment and have already committed to invest £20 billion in R&D in 2024/25.

As part of our ESA investment, the UK has committed £217 million over the next five years to the human and robotic exploration programme, which will support robotic missions to Mars and provide contributions to NASA's Artemis Moon Programme, such as the Argonaut programme to deliver a European Large Logistics Lander, the Gateway space station, and the commercial lunar communications systems. UKSA is supporting these efforts with over £50 million for UK companies to develop communication and navigation systems for lunar missions.¹⁸

To support and grow the UK's world leading earth observation (EO) sector, government announced almost £400 million of funding in November 2022. Over £315 million of this investment was through subscription to ESA EO programmes. In parallel with that ESA investment, government committed to fund a dozen national projects designed to benefit EO scientists and firms across the sector, with a range of activities from developing new sensor technologies to using EO data for improved understanding of climate change.

We are also investing up to £18 million this SR in a Science and Exploration Bilaterals Programme to support research and innovation for space science and exploration which partners with wider international partner countries beyond ESA, such as NASA, JAXA, or the Canadian Space Agency. This funding reflects the National Space Strategy's intent to build sustained multi-year collaboration with global partners and improve our wider relationships.

Defence Science and Technology Laboratory

The Defence Science and Technology Laboratory (Dstl) Space Programme continues to be a significant contributor to UK space research and innovation. We are investing £100M over the next five years to exploit the full potential of space technology for UK Defence and Security, underpinned by a growing UK Industry and Academic technical base. In addition to supporting the Defence Space Portfolio, it has made progress in ionospheric forecasting modelling, provided payloads and missions to the first UK space launch from Cornwall, and organised and led an observation campaign on the growing issue of space debris. It continues to fund technology innovation through the Defence and Security Accelerator and invest in advanced technology demonstrations for Space Domain Awareness (SDA).

¹⁷ <https://www.gov.uk/government/publications/uk-science-and-technology-framework>

¹⁸ <https://www.gov.uk/government/news/uk-companies-to-provide-services-for-future-moon-missions>

Space Science Goals

Space science, research and development is a hugely collaborative and international endeavour, which is reflected in the UK's place at the heart of ESA and our wider relationships. But as we set out in the National Space Strategy, we recognise that international collaboration requires us to be long-term and dependable partners, which requires the UK to be clear on our long-term plan for national space science and exploration.

This section sets out our strategic goals for national space science, exploration, and human spaceflight, which have been developed through close engagement between DSIT, UKSA, and UK Research and Innovation. They set out at the highest level our objectives and ambition, and the underlying research capabilities the UK will need in order to achieve them and will be used over the longer term to help prioritise our research investments.

Space Science and Research – Increasing our knowledge of space and the environment around us for the benefit of all.

Our Goal:

To develop our world-class space science research base to understand the wider universe, our Solar System, and the space environment in which we live:

- To underpin future scientific and technology advances that can be applied across many disciplines, and especially in understanding our own planet and the near-Earth space environment.
- To provide scientific and technology foundations for space domain awareness and mitigation of space hazards, such as the impacts of space weather on human activities and systems
- To inspire younger people to take up STEM subjects through the excitement of space research.
- To target and use the results from space science research programmes to inform and improve operational modelling capabilities.

To achieve this goal, we will:

- Maintain world-leading UK roles across a wide range of space science missions, and space instruments, working with ESA, NASA, and other key organisations.
- Maintain world-leading UK roles and leadership of major ground-based space science facilities and instruments, working with the European Southern Observatory and other key organisations.
- Maintain the UK's leading research strengths in astrophysics, planetary physics, solar and heliospheric physics, and magnetospheric and ionospheric physics.
- Foster a "R2O2R" (research to operations to research) paradigm in the UK, to better connect research and operations together.

Exploration and Human Spaceflight – Joining the global effort to explore the Moon and Mars and participating in human spaceflight.

Our Goal:

To develop our world-class programme of exploration of bodies such as the Moon and Mars:

- To underpin future scientific and technology advances that can be applied across many disciplines, and especially in understanding the history and development of the Solar System and our own planet.

To develop a continuing UK participation in human spaceflight as part of a multi-national collaboration to exploit scientific advances across many disciplines afforded by projects such as the International Space Station:

- To exploit the benefits of microgravity in R&D related to drugs nanotechnology, materials science etc.
- In both cases, to inspire younger people to take up STEM subjects through the excitement of space exploration and human spaceflight.

To achieve this goal, we will:

- Maintain UK leadership and involvement in exploration instruments and missions to the Moon, Mars, and other Solar System bodies.
- Continue and expand a UK involvement in human spaceflight, focused on ESA human spaceflight programme.

Pillar Four: Developing Resilient Capabilities

Space capabilities are central to any nation’s prosperity, security, and global influence. Such capabilities are diverse – they are many combinations of skills, technology and infrastructure that are used to carry out a particular task or mission in, through or from space, all of which fall into five major capability categories:¹⁹

Space Domain Awareness	Space Transport	Earth Applications	In-Orbit Applications	Science & Exploration ²⁰
The capability to study the space environment around earth, the objects travelling through it, and the actions and interactions of those objects. Sub-categories include Space Surveillance & Tracking; Spaceflight Regulation; Space Traffic Coordination; and Severe Space Weather Monitoring	The capability to move payloads and people to, through and from space. Sub-categories include launch; in-space transport; and Earth return	The capability to deliver data and services generated and/ or provided from space, to enable terrestrial applications for users on earth. Sub-categories include Satellite Communications & broadcasting (Satcom); Earth Observation (EO); Position, Navigation & Timing (PNT); and on-orbit computing	The capability to provide services to customers in space, and products made in space for use in space or on earth. Sub-categories include Sustainability services; in-space assembly and manufacturing; and space energy and resources.	The capability to study natural phenomena and physical bodies in space beyond earth, and to send robotic and crewed missions to destinations in the Solar System. Sub-categories include Astronomy & Cosmology; Planetary science & Exploration; and Human Spaceflight & habitation

There is significant national capability development in progress today, for instance on space transport and space domain awareness (SDA). This is summarised below together with the full range of national capabilities for the UK in a long-term plan to the 2030 and beyond.

Current national capability development progress

In **SDA**, UKSA and UK Space Command are developing a joint National Space Operations Centre with cutting-edge SDA technologies at its heart to improve national space surveillance and tracking and space traffic coordination capability. We will continue to develop this capability, including through the development of our joint civil-defence space domain awareness requirements. The UK is collaborating with ESA and NASA on a flagship Severe Space Weather monitoring capability called Vigil, which will help protect people and infrastructure from solar activity.

In **Earth Applications**, we are developing space-enabled services, including investigating options for a space-based PNT augmentation service (Satellite-Based Augmentation Service). MOD has placed on contract the creation of two R&D satellites: TITANIA, a space to Earth laser communications system, and TYCHE, an electro-optical EO system. We continue to maintain world leading satellite communication services for Defence through the next generation SKYNET 6 system.

¹⁹ UK Defence space capability categories are very similar, with some naming differences and defence-specific applications. MOD’s Space Command published its [Capability Management Plan](#) in November 2022, which set out capability headmarks against the seven capability areas of the Defence Space Portfolio: Satellite Communication, Space Domain Awareness, ISR, Command and Control (C2), Space Control, Positioning Navigation and Timing (PNT) and Launch.

²⁰ Space Science & Exploration capability goals are outlined in the preceding section (Pillar 3).

Piloting Access-Models for Commercial EO Data

Throughout 2023/24 the Geospatial Commission is piloting a new access model for commercial EO data in order to drive innovative applications in the public sector and increase understanding of this fast-evolving market. The year-long pilot will give participants access to commercial high resolution EO data and services, with a view to unlocking the high potential value of EO within critical public services and policies, including responding to domestic security threats, emergency response, tracking climate change and enabling land use planning. Through the pilot we will build our understanding of the maturity of the EO data and technology market, the maturity of demand and use across the public sector and potential next steps to help the public sector to act as an intelligent customer in this market.

In **Space Transport**, the UK is seeking to develop an effective domestic space launch capability, focused on delivering an end to end offering for our space sector, and having the among the best regulations in the world for space launch and satellite operations.

In **In Orbit Servicing and Manufacturing (IOSM)**, The UK continues to develop advanced domestic capability for future in-space applications: on Active Debris Removal both through ESA and our proposed national mission to remove legacy UK debris; and on early-stage studies of future markets such as in-space solar power generation for use on earth. Defence continues to develop a range of operational concept demonstrators for Space Control to help sustain military advantage and freedom of action in space.

A long-term plan

Whilst the UK has a history of space capability management in the defence domain, our civil capabilities have grown organically in response to changing needs. It is important that we move to an integrated planning approach, first defining specific goals for each space capability category and then considering government intervention to achieve these goals holistically.

Such an approach will support coordinated government acquisition and use of space capabilities, increase interoperability, encourage adoption and exploitation of space data, provide clear demand signals to the sector to give confidence and certainty for planning, investment, and development their own assets and infrastructure.

The following pages set out our cross-government national civil capability goals. Some of these help UK Government fulfil its **commitments and legal obligations**, some target specific **needs of the citizen**, and others are driven by **future ambition** and helping unlock markets.

These national goals are a **maximal set** of aims for the UK in space for 2030 and beyond. We will develop a plan to achieve these goals which, given their scope and scale, **will adopt a phased and prioritised approach** to delivery starting with a first wave of programmes and preparing subsequent waves for future development. We have started this process for one space sector already: setting out our **national priorities for civil Earth Observation (EO)** in the chapter below. We will periodically revisit the goals to ensure they remain relevant and continue to support wider national priorities.

Civil Space Capability Goals

Space Domain Awareness

Space Surveillance & Tracking (SST), Space Situational Awareness (SSA), Severe Space Weather (SSW), Space Traffic Management and Coordination (STM / STC)

As a nation, we want to:

Protect and defend UK citizens and infrastructure:

- Protect people and Critical National Infrastructure (CNI) in space & on Earth from hazards presented by spacecraft in orbit, re-entering space debris, Near Earth Objects and space weather;
- Assure continued access to space-enabled services for increasingly dependent citizens, businesses, and public services;
- Manage government's exposure to contingent liabilities created by licensing spacecraft in the UK.

Align the approach to space stewardship with UK interests:

- Evolve from an SST data consumer to a supplier;
- Continue global thought leadership and influence on agreed good practice and norms.

Unlock in-space economic value:

- Be fit-for-purpose to shape the future STM regime;
- Attract operators to the UK space regulatory regime.

So, we seek the capability to:

1. **Identify, understand, and attribute human-initiated space activity** in near-real time and with high revisit rate, particularly in relation to UK-licensed spacecraft, and share insights with operators, partner countries and other users.
2. **Integrate all SDA capability into a dual-use system-of-systems**, that also supports other national capabilities such as Space Transport and In-Orbit Services & Manufacturing
3. **Conduct operational as well as scientific space weather observation** to protect people and infrastructure.
4. **License, Monitor & Enforce** space objects, activities, and operators effectively and proportionately in a future operating environment of dramatically higher volume, diversity, and complexity of space activity, in a way that assures environmentally sustainable operator practices both on in space and on Earth.

Space Transport

Launch, Planetary Entry, In-space Transport

As a nation, we want to:

Lead the European market in commercial small-sat launch:

- Become the leading provider of commercial orbital launch from Europe by 2030;
- Have simpler, more robust, and efficient regulation for the UK to be competitive in the international launch marketplace;
- Lay the groundwork for end-to-end UK services building, launching, and operating small satellites;
- Address key gaps in the UK launch supply chain such as developing large propulsion systems & components.

Participate more fully in the new in-orbit economy:

- Provide responsive access to future economic zones in space;
- Provide in-space last-mile delivery and logistics;
- Launch & return “Made in space” products for use on Earth.

Return time-sensitive science experiments to the UK / Mainland Europe.

So, we seek the capability to:

1. **Launch responsively, dependably, and safely** from the UK to attractive orbits at a competitive price point, and routinely return spacecraft and payloads safely from space to Earth, while minimising the environmental impacts of space transport.
2. **Be a European hub for key space transportation technologies** such as propulsion systems, composite propellant tanks, eco-propellants; and develop more hands-on skills in propulsion system design and operation.
3. **Be a global hub for in-orbit economy logistics supply**, staging & processing; moving freight using space; and return and recovery of commercial products produced on-orbit.
4. **Collaborate on dual-use applications** of responsive launch, point-to-point space travel and controlled re-entry.

In Orbit Services & Manufacturing

Sustainability Services, Assembly & Manufacturing, Space Energy & Resources

As a nation, we want to:

Reduce the risk of operating in space:

- Protect CNI and maintain a safe and sustainable operating environment;
- Share the global burden of sustainability responsibilities;
- Model responsible space behaviours.

Cement UK leadership in new space economy:

- Gain first mover advantage in new industrial space applications;
- Diversify the domestic sector's commercial offering;
- Gain a share of future commercial opportunities.

Leverage the economic development of space for the sustainable development of Earth.

So, we seek the capability to:

1. **Engage, contain, and move or remove spacecraft and debris from orbit** when desired or required.
2. **Gain national skills, heritage and expertise** in the types and volumes of high-frequency rendezvous and proximity operations (RPO) that will be needed for building and maintaining assets and infrastructure in space and manufacturing products on orbit for use in space and on earth to become "Business as Usual".
3. **Prove in space novel technologies** (such as in-space manufacturing of energy-efficient materials and on-orbit energy provision for terrestrial applications) that could significantly contribute to the UK's energy security and net-zero goals,
4. **Conduct increased industrial activity on orbit** to reduce the UK's impact on Earth's climate, landscape, and biosphere.

Earth Services

Satellite Communications, Earth Observation (EO), Position Navigation & Timing (PNT), Data Processing, Quality Assurance, Storage & Access

As a nation, we want to:

Use space-enabled services to serve the citizen more efficiently and effectively:

- Deliver better public services with ubiquitous access using the best evidence whilst driving efficiencies;
- Underpin the resilience of other sectors (for example food production and natural resource management) and respond to emergencies on Earth (flooding, natural disasters etc);
- Leverage the data derived from space-based observations to contribute to defining solutions to global challenges;
- Mobilise data derived from space assets to the wider community.

Develop existing and new space-enabled services in the UK and globally:

- Define missions based on user needs and secure longevity of service through government custom;
- Develop a UK space ecosystem that is more environmentally sustainable while delivering increased private investment, growth, competition, and innovation;
- Build out the skills and capabilities to interpret the data and insights;
- Commercialise new space-enabled services from world-leading science.

Build international collaborations to burden-share space-enabled service delivery and deliver larger scale impact and benefits:

- Ensure that scientists in key areas such as methane, land temp, ocean circulation etc. can remain world leading;
- Have national space capability that is attractive to our partners.

So, we seek the capability to:

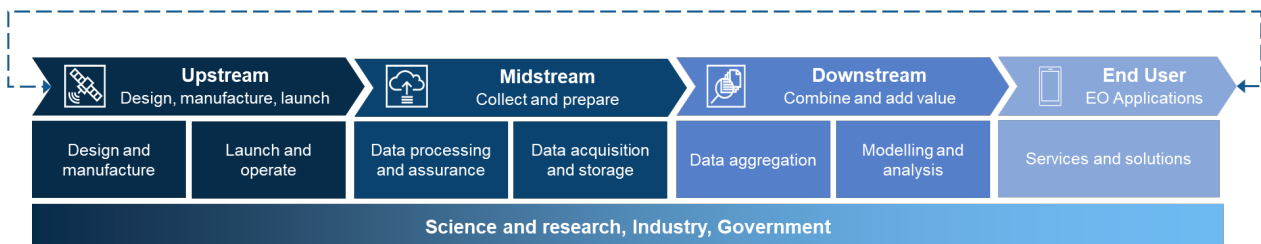
1. **Use space-derived and enabled data at all levels of government and across departmental boundaries** to inform and improve public service delivery and real-time decision-making, long-term policy making and responses to future threat scenarios, supporting both civil and defence users from dual-use platforms.
2. **Access high-quality, timely and trusted space-derived data** (with long-term availability) on the UK and the planet, combine with complementary space and non-space data sources, and contribute to the improvement of global data sets, ensuring space data assets and resources are appropriately quality-assured, curated, and stored.
3. **Provide ubiquitous and resilient coverage and access** to space-enabled applications across the whole of the UK to improve productivity and quality of life and enable Internet of Things / Machine-to-Machine applications.
4. **Ensure and improve spectrum efficiency and resilience.**

Civil EO National Priorities

The Civil Space Capability Goals above detail our top-level ambitions across the UK space sector. As a first step in implementing those goals, we have developed national priorities for civil Earth Observation (EO) which will focus activity to achieve our ambition to stay at the forefront of EO technology and know-how. These priorities build on the strengths of our world-leading EO sector and set out the ambitious, sector-specific outcomes that will deliver long term sustainable growth and support innovative use of EO for commercial and public services.

Earth Observation (EO) data is utilised by a wide range of scientific and industrial application areas, and is therefore critical to a variety of government departments and public services e.g. informing policy decisions, monitoring environmental changes, and enhancing security measures. DSIT will lead coordination of these EO priorities and convene Whitehall, and wider public sector organisations who are invested in the development, delivery, and use of EO data to meet the UK's needs to optimise HMG use of EO data and support for the sector. In particular, DSIT will continue to work closely with Defence as they develop their Intelligence, Surveillance and Reconnaissance programme to identify opportunities for dual use activity across the civil priority areas.

Collectively, they will shape and impact the breadth of the EO value chain (shown below).



Definitions

EO is the capability by which data is collected, analysed, and presented in order to better understand and provide actionable intelligence regarding the planet and the activities taking place upon it. The scope of EO includes all remotely sensed data from space as well as data from airborne platforms, ground-based sensors and in-situ measurements that give context and relevance to the observations from space and enable us to measure, monitor and gain unique insights into our natural and built environment.

These priorities have been produced with the support of the UK EO sector (including government, academia, and industry stakeholders). They describe key outcomes that we are aiming for over the next 5-10 years. DSIT will work closely with government departments and the sector to map existing activity and new opportunities for government intervention (whether as a funder, customer, regulator or convener) to deliver meaningful activity that achieves these outcomes. Through these priorities, we aim to:

1. GROWTH

Create a dynamic EO business environment that fosters innovation and commercialisation and unlocks global market opportunities, to drive prosperity and growth across the entire UK.

- Invest in EO projects and missions that enhance national capabilities and create opportunities for the UK sector to commercialise and export technology and data to overseas markets.
- Stimulate new and innovative uses of EO data and technologies, enabling multiple sectors from forestry to agriculture and aquaculture to become more environmentally responsible, positioning the UK as a global leader in EO-enabled green economic activities and sustainable finance.

2. LEADERSHIP

In partnership with other government departments, set out a clear vision to grow national EO capabilities, safeguard our national critical infrastructure by providing resilience against natural threats and disasters and increase EO investment to support our world leading EO science, commercial growth and efficient public services.

- Create a strong and resilient EO sector that is led by a long-term national strategy that drives economic growth, delivers science excellence, enhances public services, and fosters strong collaborations between government, industry, and academia.
- Improve public sector use of EO-data for decision-making and policy development²¹ at all levels within government: building on the UK's established capability to analyse and use EO data for critical public services, the UK Geospatial Strategy 2030 aims to develop our understanding of the integral role that EO data plays in the UK economy more widely. The Geospatial Commission has invested £700k in an EO pilot initiative that is providing up to 35 public sector bodies with 12 months of access to EO data and services. This initiative will support fast-evolving EO technology market, encourage demand for innovative EO technology and support the public sector to become an intelligent anchor customer through efficient and transparent procurement that reduces administrative burdens and encourages innovation.
- Maximise national investment by developing links between the civil and defence EO activity to create innovative civil and defence dual-use EO programmes, that share and maximise the development, access and use of UK EO infrastructure, technology, data and tools.

3. TECHNOLOGY

Push new frontiers of EO for the future needs of the UK and the world by developing new EO technologies, capabilities and fundamental knowledge that enables the UK to engage meaningfully in international programmes.

- Capitalise on the UK's strength in small satellites to be the world's leading supplier of small satellites and their technologies, to enhance development of EO services.

²¹ In areas such as climate change, disaster management, agriculture, urban planning, and environmental and biodiversity conservation

- Create a comprehensive end-to-end technology ecosystem (from developing novel and low Technology Readiness Levels (TRL) EO technologies through to the technical delivery of missions for the UK) that enables the UK to lead and participate in specific future mission opportunities.

4. DATA

Make the UK a global centre for trusted EO data, quality assurance and standards, to secure reliable, long-term access to high-quality, timely EO data for the current and future needs of UK government, academic and commercial sectors.

- Build on existing capability to create cutting edge integrated EO Data architecture²², which creates competitive advantage for the UK by providing user-friendly access to timely, interoperable data from multiple sources for the benefit of government, industry and academia.
- Develop world-leading, next generation calibration and validation systems, especially on-orbit traceable measurements systems, and quality assured EO data, to enable competitive advantage whilst tackling global challenges such as food and water security, climate science and services and EO applications.

5. CLIMATE, WEATHER & ENVIRONMENT

Capitalise on the UK's world-leading capabilities in climate, weather and the environmental sciences²³ and services to inform and improve national and global resilience to the impacts of climate change, disaster monitoring and extreme weather.

- Support the development of the next generation of weather services and satellites for longer range, higher resolution models which provide useful and actionable climate information for mitigation, adaptation and early warning systems that improve national and global resilience to extreme weather events.
- Provide global leadership in the fight against climate change to incentivise behaviour change that will enable us to monitor, mitigate and adapt to climate impacts, biodiversity loss and disasters; and support the global effort to better understand and predict changing environments, by using EO-enabled science, applications and monitoring services.

6. INTERNATIONAL

Enhance the UK's credibility as a major global contributor to the development and use of EO to achieve shared international economic and scientific goals.

- Strengthen the UK's position as a member of the European Space Agency (ESA) and European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and maximise impact of the UK's role in Group on Earth Observation (GEO) and Committee on Earth Observation Satellites (CEOS) to support international collaboration, influence international standard setting, and increase opportunities to demonstrate UK world-leading capabilities.

²² In this instance architecture refers to the hardware, software, data processing and data content.

²³ Environmental sciences include: the biosphere, lithosphere, atmosphere, hydrosphere and cryosphere.

- Reset the UK relationship with the EU Copernicus programme, either as a participating member or as a supportive third party, with an open dialogue about future collaboration.
- Cultivate and harness bilateral relationships with international partners including European countries and Five Eyes to encourage collaboration, inward investment, share expertise and unite on global challenges.

Defence Highly Assured Capabilities

To ensure that the Government is able to protect and defend national interests, some capabilities will demand a very high level of assurance. For these critical capabilities, the MOD is likely to require that they can be delivered from secure on-shore facilities with full intellectual property user rights. Listing them here is intended to provide a clear signal to the sector of the government's likely requirements for highly assured capabilities. It also indicates which space-specific technologies are likely to be prioritised for development and sustainment in the UK as we deliver the Defence Space Strategy.

This list focuses on space-specific technologies where Defence deems it must preserve the option to procure on-shore, due to the inherent security and assurance risks associated with employing these technologies in a space system. It only covers technologies which are specific to space, and does not include the many supporting technologies that underpin activities beyond the domain, such as network management and cyber defence. These are no less important, but will be addressed outside of the scope of the National Space Strategy and the Defence Space Strategy. This work does not indicate any deviation from the standards that are set by policy owners in related areas such as cryptography or cyber defence when it comes to their application in space, and established security standards will apply for each area.

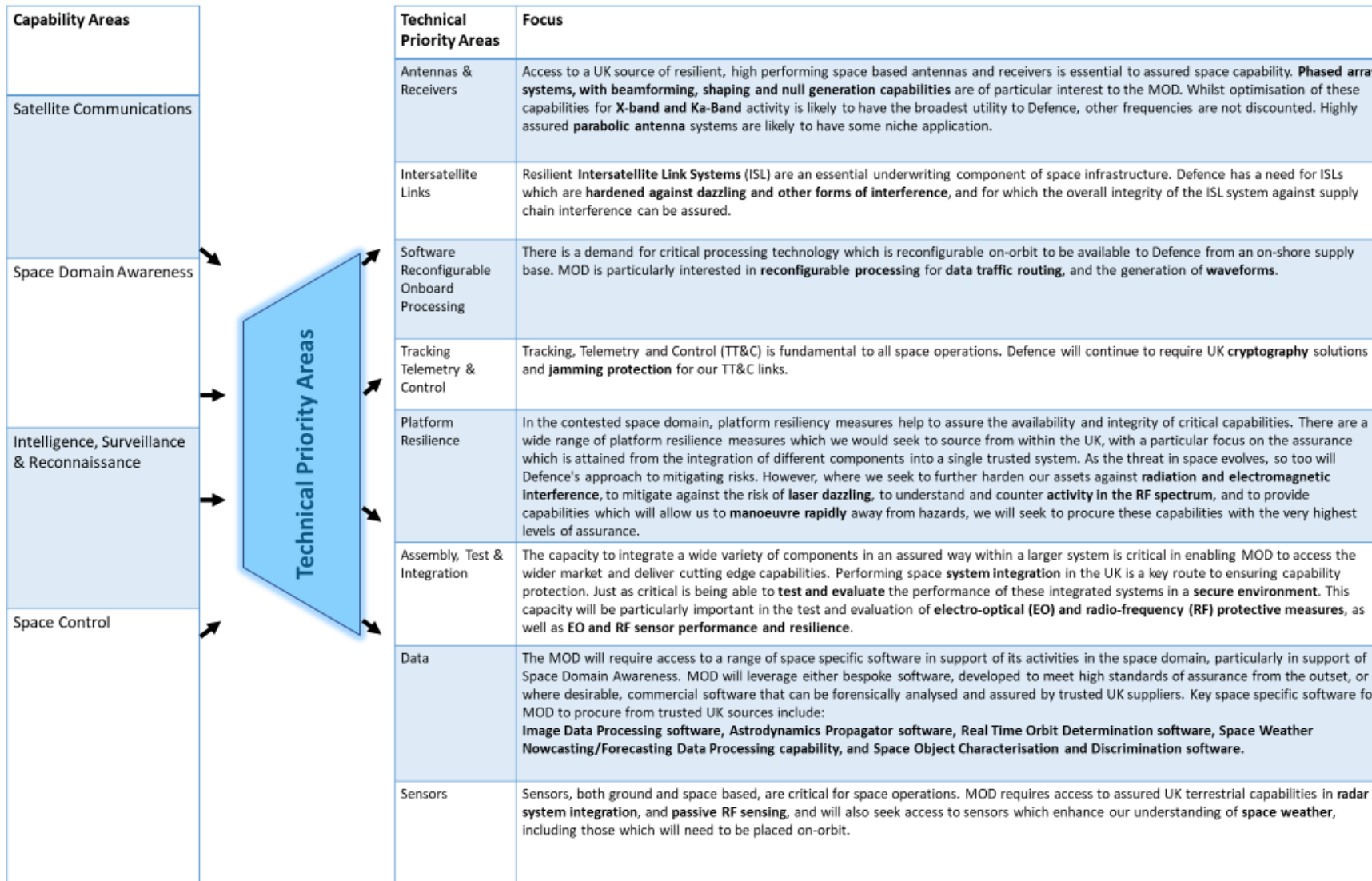
The primary function of this list is to indicate to industry, well ahead of any future tenders, the space-specific technologies which MOD is likely to require be delivered from secure on-shore facilities with full intellectual property user rights for its operational space capabilities. Its intention is not to restrict defence suppliers (or anyone else) from working on these technologies with other countries or non-UK entities, or to prevent Defence from ever procuring these capabilities from non-UK sources in the future.

Whilst this list is specific to the specialised technologies which MOD deems it must preserve the option to procure on-shore for assurance reasons, it does not outline other capabilities which MOD may yet seek to support the development of on-shore specifically in order to realise strategic and operational advantage. Further work will follow to develop these capabilities and a route to their exploitation, in collaboration across government.

Defence Acquisition

The Ministry of Defence is driving increased pace and agility into acquisition to enable Defence to meet current and future threats and challenges and deliver capability to the front line when it is needed. This involves practical initiatives to set our programmes up for success, increase professionalisation across the acquisition community and drive system-wide improvement. We expect the Defence Space Portfolio to benefit from these changes. In addition, the recently established Defence Space Capability Framework will build upon the established agile frameworks and a light touch onboarding process, reducing the burden for Industry.

Defence Highly Assured Capability Areas



Working with the Sector

Achieving the UK's ambitions in space cannot be solely a matter for government, and nor can government's interventions have their best effect without the support of the experts in the UK space sector. As we set the conditions for a competitive space sector, encourage private investment, support UK space science, we will ensure we can hear the views of the sector.

The Space Partnership

Government, industry, and academia have come together in the last year to establish the Space Partnership to work together on our joint priority issues and to realise the ambitions of the National Space Strategy to grow the sector.²⁴

Since its inception, it has brought together representatives from:

- **Government**, representing DSIT, MOD, DBT, and UKSA
- **Industry**, including the UKSpace representative trade body; SMEs, and the Satellite Finance Network
- **Academia**, including the Space Academic Network and the Space Universities Network

The Space Partnership will examine the challenges and opportunities facing the sector and propose collaborative action to address them.

The Space Sector Forum

The Space Sector Forum will assist ministers with responsibility for space in developing their strategic policy and supporting actions by providing expert inputs to set alongside advice from officials.

Space Skills Advisory Panel

The Space Skills Advisory Panel (SSAP) plays a crucial role in ensuring access to quality skills and training offers across the space sector. It will remain vital in the development of future space workforce policy initiatives, ensuring coordinated action can be taken by government, academia, and industry in resolving current and future skills gaps.

Our wider engagement

We have established a programme of strategic engagement with the UK space industry to understand the key issues that matter to space companies and facilitate opportunities to boost investment and help grow the sector. We use international space events such as the UK Space Conference, Farnborough International Airshow and the International Astronautical Congress to promote and support the UK space sector to thrive in a global market.

²⁴ www.spacepartnership.org.uk

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