HOUSE OF LORDS

UK Engagement with Space Committee

Report of Session 2024–26

The Space Economy: Act Now or Lose Out

Ordered to be printed 20 October 2026 and published 4 November 2025

Published by the Authority of the House of Lords

HL Paper 190

UK Engagement with Space Committee

The UK Engagement with Space Committee was appointed on 30 January 2025 "to consider UK policies relating to space, and both the opportunities and challenges related to the UK's engagement with space."

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See Appendix 1.

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Q in footnotes refers to a question in oral evidence.

SUMMARY

Space is transforming the world as we know it.

For decades, space exploration was the preserve of the wealthiest governments. This is no longer the case. Innovations in satellite design, coupled with falling launch costs, have transformed the opportunities available for ambitious businesses and bold policy makers. While the UK's space sector receives little public attention, this inquiry has found that the UK could be a bigger player in the new space economy. The UK has important advantages that we now need to build on.

Space is often viewed only through the lens of astronauts, asteroids and rockets, obscuring some of the critical ways that space technologies shape our modern lives. The GPS receivers in our smartphones use a network of satellites to give us precise location information. Weather satellites provide 24/7 data to multiple industries. Our banking systems depend on satellite technologies to ensure transactions are accurately timestamped. Farmers also rely on these technologies to inform their decisions on crop yields and water levels, and so do shipping companies, to work out cargo management. Additionally, Earth Observation (EO) technology is a vital part of climate science, urban design and the energy sector.

In years to come, the importance of satellite infrastructure and the opportunities presented by the space economy will grow significantly. Space's microgravity, vacuum environment offers the potential to grow human tissue, including organs, and produce purer crystals, leading to higher-quality semiconductors and pharmaceuticals. Work is underway to develop space-based solar power stations, which could function as an alternative source of clean energy. These activities will require advanced in-space logistics, with satellite repair, debris removal, and refuelling a growing business opportunity. Every child born in 2025 will grow up with their lives on Earth more and more dominated by what happens in space.

There are many exciting developments in space technologies, creating opportunities for significant economic growth and benefits both for wider society and for local communities. However, there is increasing global competition from both public and private sector actors to seize these opportunities. The UK signalled its intention to grow into a world-leading space power with the publication of the National Space Strategy in 2021. However, it has failed to turn its ambitions into reality. The UK's space sector requires clearer strategic direction, an updated funding structure and better cross-government working if it is to fulfil its potential. Perhaps most importantly, space needs to be championed politically by Government as a sector which is crucial to future economic growth and national resilience.

This report recommends effective action from government to prime the UK for leadership in the growing global space economy:

- **Provide a coherent strategic direction with clear delivery plans**—the UK space sector lacks the strategic direction necessary for success. The Government needs to provide clear, consistent and funded plans on the delivery of core national space capabilities. This will involve making choices.

- **Focus on the development of multi-use technologies**—we recognise the importance of satellite technology to the UK's national security and defence, with the Ministry of Defence contributing roughly half of the UK's space expenditure. The UK's space strategy must prioritise those national capabilities which meet UK security and defence requirements as well as offering multi-use potential for commercial exploitation and sectoral growth in the UK.
- **Ensure that structures of government are adequate to deliver cross-governmental space policy**—existing government structures impede the design and delivery of UK space policy. The UK requires a dedicated Space Minister, working across DSIT and MoD, who should be responsible for driving cross-government working. Government also needs a designated Space Champion to lead government engagement with industry, investors, and academia.
- **Reform the UK's space funding model to allow firms to grow and scale**—the UK's funding model for space requires a decisive shift from the current grant-based approach designed to propel research and development, to one in which government procurement is used to crowd in private investment and strengthen national capabilities.
- **Ensure the UK remains a world-leader in future space regulation**—the fast-moving nature of the global space economy means that states with agile, forward-looking regulation will hold an immense advantage.
- **Address skills challenges within the space sector**—the space skills challenge is one of the core impediments to development of the sector. The Government needs to create a Space Skills Taskforce with the authority to drive skills development policy and maintain UK competitiveness.
- **Adopt a strategic approach to international partnerships**—recently, space policies in the US, EU, and a number of countries around the world have seen major changes. The UK needs to be clear-eyed about where its international efforts should be concentrated and ensure that space partnerships are a core consideration in wider foreign policy development.
- **Promote space safety and sustainability on the international stage**—the space domain is subject to problems such as space debris which cannot be solved by the UK alone and require collective action. Ensuring the safety of space as an operating environment should be a diplomatic priority for the UK.

Only the most forward-looking and strategic states will be able to reap the benefits of the expanding and changing space economy—those who do not adapt will be left behind. The UK must act now if it wishes to be a leader in the growing space economy, the new race for space.

The Space Economy: Act Now or Lose Out

CHAPTER 1: INTRODUCTION

1. The space age is widely considered to have begun upon the launch of the USSR's *Sputnik* satellite in 1957. The ensuing space race saw the US and USSR compete to be the first to reach prestigious technological milestones, culminating in the historic first moon landings by the US Apollo 11 mission in 1969.[1] This period saw space exploration emerge as a viable policy pursuit for wealthy governments, most visibly by the US National Aeronautics and Space Administration (NASA). It also saw the proliferation and technological maturation of satellites—human-made objects which orbit Earth and transmit information via radio signals.[2] Satellites can provide data and services either individually, or as part of a constellation (large networks of satellites that operate as a system).[3]

2. Analysts of the global space economy typically separate it into two distinct elements: upstream and downstream.[4] Upstream refers to the systems and infrastructure that make spaceflight possible and includes the manufacturing of satellites and orbital vehicles and their launch. Downstream refers to the services that can be provided via satellites, the most common of which are:

    - Position, Navigation and Timing (PNT): satellite constellations which send users an accurate measure of their time and location. The US' Global Positioning System (GPS) is the world's most high-profile PNT system.

    - Communication: satellites which provide television, broadband, telephone and data transfer services.

    - Earth Observation (EO): satellites which image the Earth using remote sensing technology. This category also covers meteorological satellites.[5]

1 James Clay Moltz, *Crowded Orbits: Conflict and Cooperation in Space*, 2nd edition (New York: Columbia University Press, 2024)
2 Parliamentary Office of Science and Technology, *Defence of space-based assets*, POSTnote 654, 15 September 2021
3 Written evidence from Global Network on Sustainability in Space (SPA0063)
4 Written evidence from The Chart Think Tank (SPA0066) and Satellite Applications Catapult (SPA0049)
5 Parliamentary Office of Science and Technology, *Defence of space-based assets*, POSTnote 654, 15 September 2021

Box 1: Earth Orbits

Satellites orbit the Earth at different altitudes. Three prominent categories of Earth orbit are widely used in space science.

Low Earth Orbit (LEO) ranges from 100-2,000 kilometres above sea level and is the most populated Earth orbit, hosting Earth Observation satellites, satellite mega-constellations, surveillance satellites, telescopes and space stations.

Medium Earth Orbit (MEO) ranges from 2000–35,786 kilometres above sea level and hosts PNT systems, as well as some telecommunications satellites.

Geostationary Orbit (GEO) satellites sit at 35,786 kilometres above sea level and roughly match the Earth's rotation, which means they stay in a constant position over a fixed territory. This orbit hosts terrestrial weather, telecommunications, surveillance and missile launch detection satellites.

Source: Bleddyn E. Bowen, Original Sin: Power, Technology and War in Outer Space, 1st edition (London: Hurst, 2022); European Space Agency, Types of orbits, 20 March 2020

The value of space

3. There is widespread societal misunderstanding of the value of space. Recent polling demonstrates that many people still associate space with science fiction, extraterrestrial life and planetary exploration and that space "innovations [that] are so ubiquitous and ingrained in routine life [are] often overlooked".[6] Daniel Smith, Trade and Investment Envoy for Space for the Scottish Government, told us that "public perception continues to see space as disconnected from Earth, rather than being integral to our economy, our environment and our society".[7]

Box 2: Types of activities in space

Civil—Non-military and non-commercial activities in orbit or deep space, usually financed by governments. Space science, robotic exploration and human spaceflight fall into this category.

Commercial—Activities in or related to space conducted by private sector actors. These include the provision of satellite communications, Earth Observation and launch services.

Military—Activities in space conducted by the armed forces and designed to support military activity on Earth or project power in space.

Source: James Clay Moltz, Crowded Orbits: Conflict and Cooperation in Apace, Columbia University Press, 2nd edition (New York: Columbia University Press, 2024)

Satellite applications

4. The three core applications of satellite technology—PNT, communications and EO—are integral to the functioning of modern economies. PNT systems are crucial not just for transportation and logistics but also underpin financial transactions and energy grid monitoring (by providing highly accurate timing signals) and enable autonomous vehicles used in agriculture. Other sectors that are increasingly reliant on the location and timing services provided by satellites include fishing emergency services and construction. Widespread mobile phone access means that PNT intersects with daily life

6 Inmarsat, *What on Earth is the value of space?* 30 June 2022
7 Written evidence from Daniel Smith (SPA0068)

in a number of ways, through navigation applications, personal tracking and location sharing.[8]

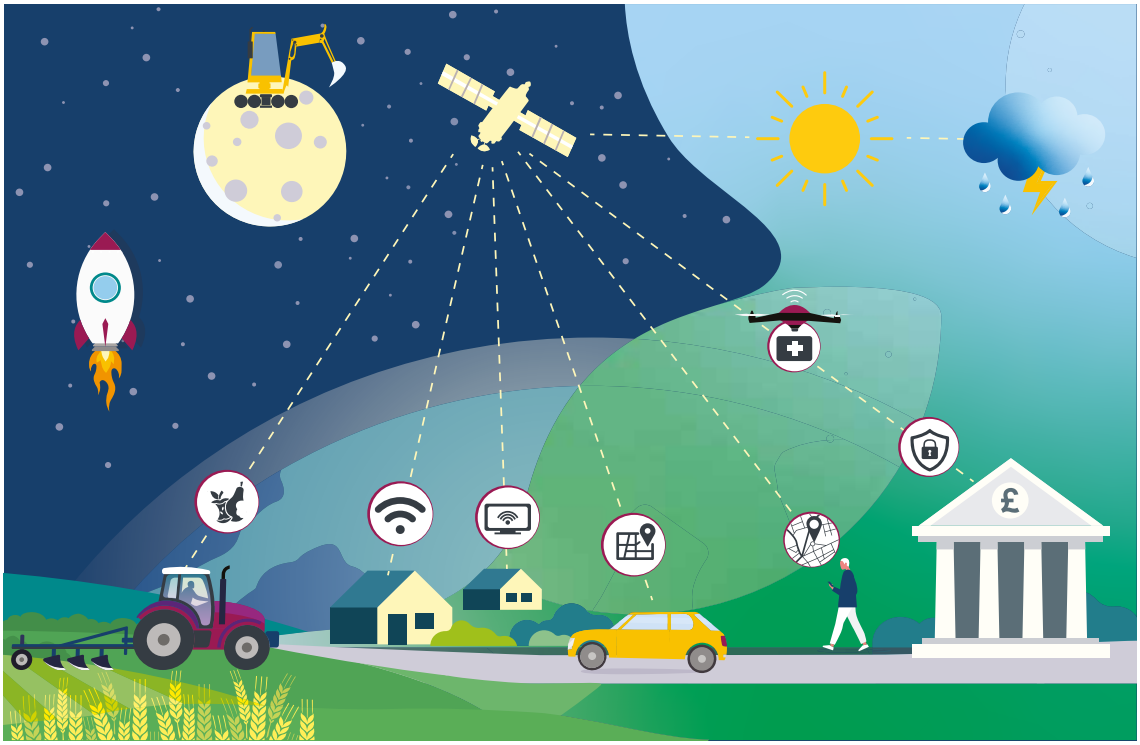
5. Satellite communications are vital in places where terrestrial alternatives are unavailable, such as war and disaster zones, oceans, and geographically isolated areas. Satellite communications provide connectivity to the air transportation and maritime economies, allowing for the effective sharing of information and response to crises. In rural areas, where ground infrastructure such as internet towers and cables are scarce, satellites offer an alternative mechanism to stay connected.[9] Alongside allowing for ubiquitous coverage, satellite communications systems contribute to resilience by providing an alternative to terrestrial communications.[10]

6. The downstream impacts of EO satellites are numerous. These satellites provide essential data and insights that help address global challenges such as climate change, natural disaster response and food security.[11] The technology allows scientists to understand and predict weather patterns, farmers to optimise crop yields, enables better navigation and fleet management in the shipping industry, and supports more effective urban planning.[12]

7. Beyond these well-established use cases for satellite technology, there are emerging opportunities in space which could have a profound economic impact on Earth. The combination of microgravity and vacuum conditions in LEO has opened up exciting opportunities for the manufacturing of high-quality crystals which could improve the performance of semiconductors and antibody drugs.[13] As launch costs have fallen, increasing attention is being devoted to the possibility of building solar power stations in space which offer the potential to address resource scarcity on Earth.[14] As this in-space economy develops, there will be a need for improved in-space logistics, with the market for advanced propulsion technologies and satellite removal, refuelling and repair likely to flourish as a result.[15]

8 London Economics, *Economic benefits of resilient PNT in the UK*, October 2022
9 Aerospace Corporation Centre for Space Policy and Strategy, *The Value of Space*, May 2020
10 Q 78 (Prof Barry Evans)
11 Written evidence from UK Research and Innovation (SPA0044)
12 World Economic Forum, *Amplifying_the_Global_Value_of_Earth_Observation*, May 2024
13 Q 98 (Major Tim Peake); Written evidence from Space Forge (SPA0019) and Giorgio Savini et al, University College London (SPA0064)
14 Q 5 (Prof Brian Cox); Written evidence from Space Solar (SPA0048), The Chart Think Tank (SPA0066) and The Royal Society (SPA0093); Space-based solar polar (SBSP) describes the deployment of power stations in space which can harness solar energy and transmit it back to Earth for terrestrial use., There are debates about whether it will be economically viable to construct and launch solar power stations in the near future, given that they would need to measure over a kilometre in length (with ground receiving stations of up to 10 times larger) to deliver economically viable energy outputs. Nesta, *Beam us down, Scotty: space solar power straight to Earth*
15 Written evidence from Satellite Applications Catapult (SPA0049) and Department for Science, Innovation and Technology (SPA0082)

Figure 1: Downstream uses of space applications



Resources
e.g. mining asteroids, comets and planets for resources such as water and metals

Tourism
e.g. human space travel for recreational purposes

Agriculture
e.g. more precise farming using satellites to reduce food waste

Internet
e.g. communication satellites provide internet access in rural areas

Television
e.g. wider variety of channels through satellite television

Transport
e.g. self-driving cars use navigation satellites for routing

Navigation
e.g. using navigation satellites to track location on a phone

Weather and climate
e.g. more accurate tracking and predictions

Health
e.g. satellite-enabled drones to carry medication to patients in remote areas

Finance
e.g. satellites enable secure digital financial transactions

Source: National Audit Office, The National Space Strategy and the role of the UK Space Agency 12 June 2024

Space science and exploration

8. Analysts attribute multiple benefits to space science and exploration. Many novel technologies with terrestrial use value were first invented for use in space or were optimised as a result of space-based experimentation, including solar panels, light-based anti-cancer therapy, mobile phone cameras, compact water purification systems, memory foam, advanced computing systems, and implantable heart monitors.[16] Civil space agencies have also acted as stimulants for the wider space industry by providing a vital market to private sector space actors looking to develop and test novel technologies.[17] Space scientific programmes have helped humanity better understand planetary threats, such as comet and asteroid impact and space weather events.[18]

16 International Space Exploration Coordination Group, *Benefits Stemming from Space Exploration*, September 2013
17 Written evidence from Space Academic Network (SPA0010)
18 Centre for Near Earth Object Studies, *Sentry: Earth Impact Monitoring*

National security and resilience

9. Satellite technology is so embedded into modern society that disruption to it represents a severe risk to national security. Satellites can be considered a "super-enabler of critical infrastructure"—without reliable access to space-based capabilities, other elements of the UK's core infrastructure, such as financial transactions, power grids and logistics, would be significantly compromised.[19] Some governments, including those of Australia and the UK, consider satellite technology to be part of their "critical national infrastructure".[20]

10. The reliance of the UK on space infrastructure should not be understated. According to one recent analysis, space and satellite services underpin an estimated 18% of the UK's GDP (£454 billion) by enabling sectors such as agriculture and transport.[21] Another estimated that the loss of access to PNT services would cost the UK £1 billion per day.[22] Space technology is also critical in ensuring climate resilience by providing essential data on "sea level rise, industrial emissions, environment changes and extreme weather events".[23] According to Dr Adam Baker, Consultant and Co-Founder at UK Launch Services Ltd, without access to space-based infrastructure, the "country would grind to a creaking halt".[24]

11. **The value of space to modern society is underappreciated. Satellite technology is fundamentally intertwined with the modern UK economy, underpinning multiple critical economic sectors. Satellite services are a Critical National Infrastructure, the disruption of which would create significant challenges across British society. And space scientific missions help drive technological innovation, provide a crucial customer for space firms and inspire future generations of scientists and engineers.**

Trends in global space policy

Growth

12. The major, high-level trend in global space politics is a growth in the economic and geopolitical importance of the space domain. This growth is evident across a variety of metrics:

    - Economic growth: The global space sector is currently valued at over $469 billion.[25] Many expect it to grow significantly—while estimates vary and are contested, several witnesses cited a recent report that predicted that the global space economy will be worth £1.8 trillion

19 Policy Exchange, *Britain and the Geopolitics of Space Technology*, 2021; Council on Geostrategy, *The role of space power in geopolitical competition*, January 2024

20 Rian Davis et al, 'Space as a critical infrastructure: An in-depth analysis of U.S. and EU approaches', *Acta Astronautica*, vol 225, (2024), pp 263–272: https://doi.org/10.1016/j.actaastro.2024.08.053. In the UK, Critical National Infrastructure is defined as "buildings, networks and other systems that are needed to keep the UK running and provide the essential services upon which we rely (e.g. energy, finance, telecoms and water services). It also includes infrastructure which, if disrupted, could have a significant impact on our national security, national defence, or the functioning of the state", Cabinet Office, *Public Summary of Sector Security and Resilience Plans*, 2018.

21 London Economics and UK Space Agency, *Size and health of the UK space industry 2024*, 20 August 2025

22 London Economics, *Economic benefits of resilient PNT in the UK*, October 2022

23 Written evidence from TechUK (SPA0032)

24 Q 68 (Dr Adam Baker)

25 Written evidence from UKspace (SPA0085)

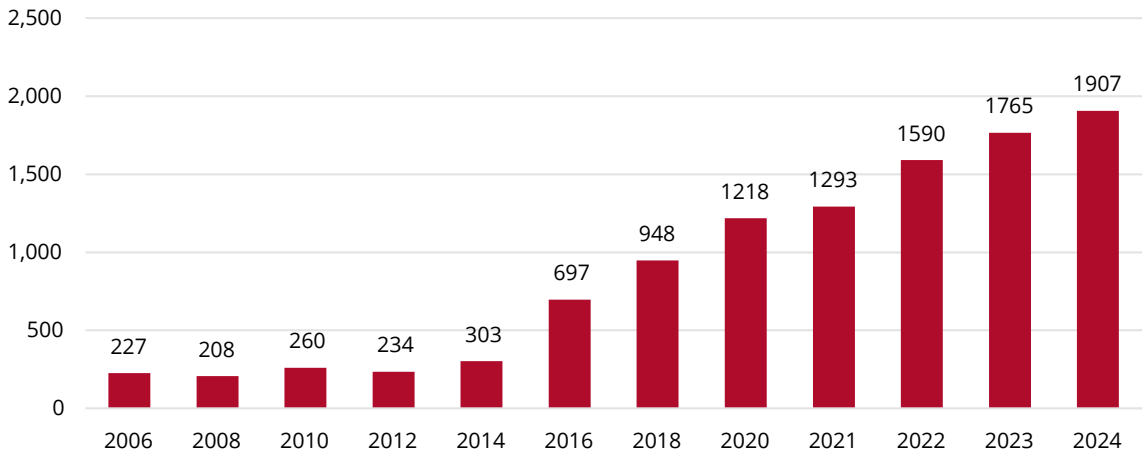
by 2035.[26] Over $47 billion of private capital has been invested in the global space sector since 2015, growing on average by 21% annually.[27]

- Growth in the number of satellites: The number of satellites in orbit has grown significantly, increasing from 2,000 to around 11,500 over the past ten years.[28] While estimates vary, the number of satellites is predicted to rise rapidly in coming years due to increasing commercial activity and the proliferation of satellite constellations.[29]

- Growth in the number of actors in space: Whilst space used to be the preserve of wealthy, technologically advanced states, there are now over 90 countries with their own satellites or registered companies with satellites.[30] There is also a growing number of commercial actors in space—in the UK alone, the number of commercial actors in the space sector increased from 227 in 2006 to 1907 in 2024.[31]

- Growth in societal reliance on space: As satellite technology develops, societies are becoming rapidly more reliant on space, with economic activity and critical infrastructure increasingly intertwined with satellite services.[32]

Figure 2: Growth in number of UK space firms (2006–2024)



Source: London Economics and UK Space Agency, The Size and Health of the UK Space Industry 2023, 26 July 2024

26 Q1 (Prof Brian Cox); Q 98 (Major Tim Peake); Q 158 (Prof Lucy Berthoud, Professor of Space Engineering, University of Bristol); Q 173 (Stuart Fyvie); Whilst most witnesses to this Committee were bullish about growth rates within the space sector, the Committee note a 2023 OECD report that contested exuberant valuations of the global space economy, which argued that "modest historical growth rates" make it difficult to substantiate claims that the industry will reach valuation predictions. The Department for Science, Innovation and Technology told the Committee that the global space sector is predicted to grow by 60% over the next decade. OECD, *The Space Economy in Figures*, September 2024; Written evidence from Department for Science, Innovation and Technology (SPA0082)

27 Written evidence from UKspace (SPA0085)

28 Q 120 (Prof Hugh Lewis)

29 Written evidence from Dr Julia Balm (SPA0028) and Global Network on Sustainability in Space (SPA0063)

30 Q 127 (Dr Bleddyn Bowen)

31 London Economics and UK Space Agency, *Size and health of the UK space industry 2024*, 20 August 2025. Not all of these firms are active in building, launching and operating objects in space. This figure also includes firms who use satellite technology to provide services (eg. broadcasting, data analytics).

32 Q 17 (Dr Paul Bate); Q 136 (Laurent Jaffart)

13. The drivers of this growth are myriad. The miniaturisation and standardisation of satellite technology, the development of reusable rocketry, innovations in data analytics and the deployment of new AI and additive manufacturing technologies have reduced manufacturing, launch, operation and application costs significantly.[33] And, as the global population becomes more mobile, connected and informed, there has been growing government and private sector demand for the navigation, communication and data-gathering capabilities provided by satellites.[34]

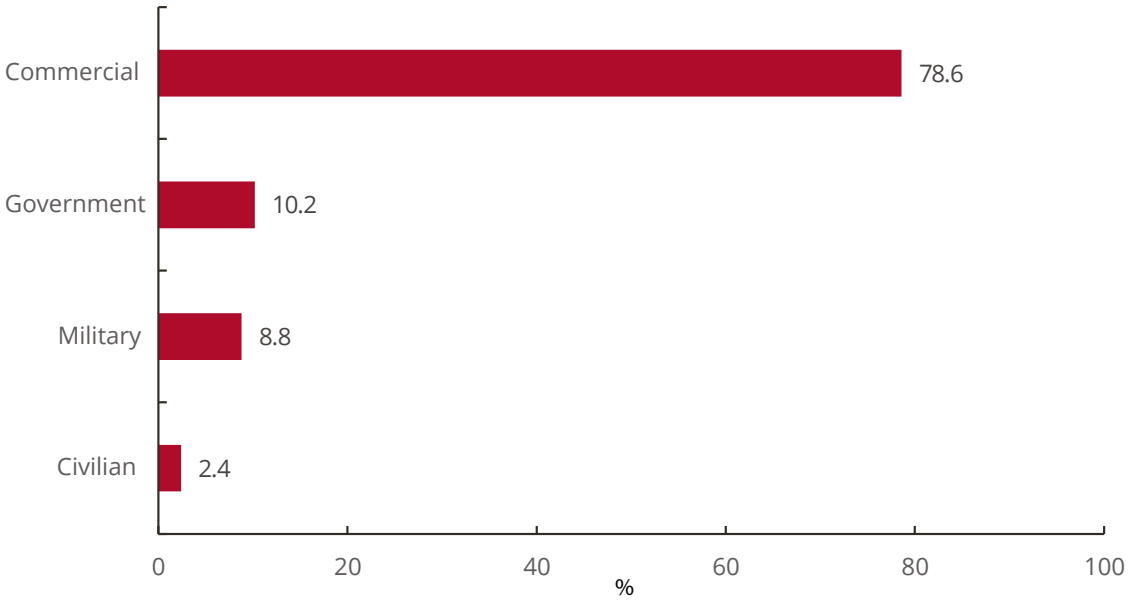
14. In years to come, the impact of space technology on terrestrial economics and politics will be profound. Rory Daniels, Senior Programme Manager of Emerging Technologies at TechUK, compared the growth of the global space economy to the invention of the internet, claiming that it "will lead to not only significant wealth creation but wider economic productivity and societal benefits".[35] Professor Brian Cox, Professor of Particle Physics at the University of Manchester opined that the development of space technologies would help address prominent societal issues such as resource scarcity and climate degradation.[36] The Royal Society, which recently conducted a large scale study of the future of the UK's space sector, claimed that "space technologies will become ever more integral and fundamental to the functioning of society and modern economies".[37]

Commercialisation

15. The growth of the space economy is directly tied to the increased involvement of commercial actors in space, with the contemporary, commercialised space economy often referred to as "New Space" by analysts.[38] Researchers from University College London described this era as one in which private sector actors have drastically reduced launch costs, making satellite constellations, in-space manufacturing and space-to-business applications (eg. agriculture, weather forecasting and city planning) economically viable.[39] A recent report summarises the New Space trend as the "evolution of space from being the mere theatre for the pursuit of certain public objectives, to being a marketplace where economic value can be generated".[40] Currently, 77% of the global space sector is commercial and, according to a survey by Deloitte, 98% of space executives believe that the role of private companies in the space market will increase over the next decade.[41]

33 Q 79 (Joanna Darlington); Written evidence from Prof Sylvester Kaczmarek (SPA0015), Surrey Satellite Technologies Ltd (SPA0027) and Space Solar (SPA0048); OECD, *The Space Economy in Figures*, September 2024
34 McKinsey, *Space: The $1.8 trillion opportunity for global economic growth*, 8 April 2024
35 Q 167 (Rory Daniels)
36 Q 1 (Prof Brian Cox)
37 Written evidence from Royal Society (SPA0093)
38 Written evidence from ADS Group (SPA0026), TechUK (SPA0032), and RAND Europe Space Hub (SPA0043)
39 Written evidence from Giorgio Savini et al (SPA0064)
40 Bennett Institute for Public Policy, *Space possibilities for our grandchildren: current and future economic uses of space*, 15 July 2024
41 Written evidence from UKspace (SPA0085); Deloitte, *Riding the exponential growth in space*, 22 March 2023

Figure 3: Distribution of operational satellites by type of operator (2022)



Source: OECD, The Space Economy in Figures, 15 December 2023

Congestion

16. One of the most prominent challenges to the continued economic expansion in space (and its attendant societal benefits) is the proliferation of orbital debris. Many experts indicate that the current approach to space launch is not sustainable.[42] The growing number of satellite launches, alongside the long de-orbit times of defunct satellites, has increased the number of objects in space significantly and has subsequently made collisions between objects in space more likely (as well as making astronomical research more challenging).[43] US-based aerospace firm SpaceX has been at the forefront of the exponential growth of space launches. Its pioneering work in launch technology has driven down the cost of access to orbit significantly and its Starlink subsidiary has launched over 8000 small satellites since 2019.[44]

17. Professor Hugh Lewis, Professor of Astronautics at the University of Southampton, estimated that there are over 50,000 trackable pieces of orbital debris (which include dead satellites, lost tools and rocket bodies) and Professor Don Pollacco, Professor of Astrophysics at the University of Warwick, claimed that there are almost a million pieces of debris that contain enough energy to damage a spacecraft.[45] Whilst the debate about space sustainability is growing louder, as of now, there is no binding international regime for space debris mitigation.[46]

42 Q 58 (Dr Rory Holmes); Q 120 (Prof Hugh Lewis); Written evidence from the Global Network on Sustainability in Space (SPA0063)

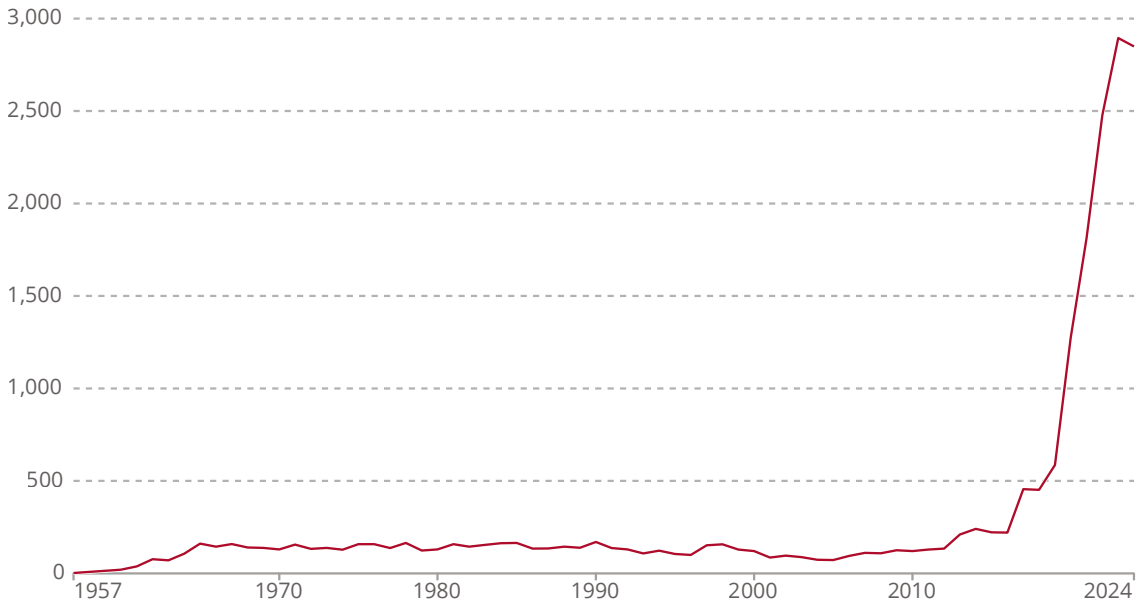
43 Daniel L. Oltrogge and Ian A. Christiansen, 'Space governance in the new space era', *Journal of Space Safety Engineering*, vol 7, issue 3, (2020), pp432–438: https://doi.org/10.1016/j.jsse.2020.06.003; Written evidence from Royal Astronomical Society (SPA0031)

44 Written evidence from the Global Network on Sustainability in Space (SPA0063); Space.com, *Starlink satellites: Facts, tracking and impact on astronomy*, 25 September 2025

45 Q 120 (Prof Hugh Lewis and Prof Don Pollacco)

46 Department for Science, Innovation and Technology, *Regulatory Horizons Council: the Future Regulation of Space Technologies*, 25 April 2024

Figure 4: Number of objects launched into space by year (1957–2024)



Source: United Nations Office for Outer Space Affairs, Annual number of objects launched into space, 2025

Militarisation

18. Satellite technology is immensely valuable to military actors, to the extent that militaries globally consider space to be a fifth strategic domain, alongside air, sea, land and cyberspace.[47] Military satellites deliver a variety of functions that enhance the capabilities of armed forces, which include secure strategic communication, intelligence imaging and positioning data for logistics, situational awareness and weapons targeting.[48] The Centre for Space Policy and Strategy highlighted how the military value of space is "both wide and deep"—orbital technology is deployed widely by militaries across the globe and is often deeply embedded into security infrastructure, equipment and operations.[49] Juliana Suess, Associate Fellow of Military Sciences at the Royal United Services Institute, emphasised the importance of space technology in enabling military activity in the land, sea, air and cyber domains but noted that space is also a strategic domain in which military activity is increasingly likely to occur.[50]

19. **Several trends in the global space economy are observable. The first is one of growth—the size of the global space economy, the amount of investment in space, the number of objects in space and societal reliance on space are all growing. This growth is linked to a more commercial space sector, with falling launch costs and innovations in satellite technology allowing new commercial players to enter the field. Low Earth Orbit in particular is becoming increasingly congested, with space debris an existential threat to future growth.**

47 Joint Air Power Competence Centre, *The 'Land Approach' to the Space Domain*, August 2021
48 Space Security Index, *Military uses of space*, November 2020
49 Centre for Space Policy and Strategy, *The Value of Space*, May 2020
50 Royal United Services Institute, *Between Ambition and Reality: How Space Fits into the UK Defence Framework*, 16 July 2024

The UK's role in space

20. The space sector is worth an estimated £18.6 billion to the UK economy.[51] The sector employs around 55,000 people, many of whom are in high productivity jobs—those working in the sector create an average of £129,000 annually, making the sector more than two times more productive than the UK average.[52] In recent decades, the sector has been fast growing. It is estimated to have grown at an average of 6.4% annually since 2000, with the sector's growth significantly outpacing the rest of the UK economy.[53] According to recent estimates, the UK accounts for between 4.3% and 6.1% of the global space economy.[54] However, the latest figures indicate that the UK's space sector contracted by 8.9% between 2021/22 and 2022/23.[55]

21. UK space policy spans across several government departments. The responsibility for UK civil and commercial space policy lies primarily with the Department for Science, Innovation and Technology (DSIT), and the UK Space Agency (UKSA), an executive agency which DSIT currently oversees. In August 2025, the Government announced that UKSA would be taken under direct departmental control and merged with DSIT's Space Directorate.[56] Meanwhile, the Ministry of Defence (MoD) is responsible for the development and operationalisation of defence space capabilities. Several other departments also have responsibilities in space such as the Foreign Commonwealth and Development Office (space diplomacy), the Department for Business and Trade (space-related trade), the Department for Transport (spaceflight regulation) and the Department for Environment, Food and Rural Affairs (climate and agriculture).

22. The Outer Space Act 1986 applies to space activities carried out by UK actors overseas.[57] The Space Industry Act 2018 is the main piece of legislation regulating the UK's domestic space industry. The Act was introduced to "create a framework for the expansion of commercial space activities and the development of spaceports in the UK" and requires those wishing to launch satellites, operate satellites or manage a spaceport to obtain a licence, which are administered by the Civil Aviation Authority.[58] In 2021, the UK government published the National Space Strategy (NSS), which brought together civil and defence strategy into a single document for the first time

51 London Economics and UK Space Agency, *Size and health of the UK space industry 2024*, 20 August 2025. The £18.6 billion figure includes revenues from Direct-to-Home (DTH) broadcasting (satellite television). Excluding DTH broadcasting, the size of the UK space industry income was £9.7 billion.

52 London Economics and UK Space Agency, *Size and health of the UK space industry 2024*, 20 August 2025

53 Written evidence from Royal Aeronautical Society (SPA0057) and Royal Society (SPA0093)

54 UK Space Agency, *The Size and Health of the UK Space Industry 2023*, 26 July 2024

55 According to a recent report conducted by London Economics on behalf of the UK Space Agency, the decline in the size of the UK space sector can be attributed to inflation eroding the real value of industrial contracts and dampening consumer demand, the disruption of launch schedules due to the War in Ukraine, the end of the EU withdrawal period and residual impacts in the supply chain as a result of the Covid-19 pandemic. It notes that other sectors that are susceptible to increased input costs also experienced falls in real GVA over the same period, indicating that these problems were not unique to the space sector. London Economics and UK Space Agency, *Size and health of the UK space industry 2024*, 20 August 2025

56 Department for Science, Innovation and Technology and UK Space Agency, *UK space sector bolstered with government reforms to boost growth and cut red tape*, 20 August 2025

57 House of Commons Library, *The UK Space Industry*, CBP 9202, 30 June 2025

58 Space Industry Act 2018 ; House of Commons Library, *The UK Space Industry*, CBP 9202, 30 June 2025

and expressed a desire to "build one of the most innovative and attractive space economies in the world".[59]

Challenges facing the UK

23. While the UK does not possess a large national space programme in the same way other countries (such as the US, Japan and France) do, it has developed significant areas of research and industrial excellence. The UK's universities are globally renowned for space science, it possesses significant industrial capacity when it comes to bespoke small satellite manufacturing and is lauded for its expertise in Earth Observation and satellite communications capability. The UK has also been an early mover in the nascent In-orbit Servicing, Assembly and Manufacturing (ISAM) sub-sector, holds geographical advantages when it comes to orbital launch (mainly in the North of Scotland, where polar orbits can be accessed) and has established legal, insurance and financial sectors which will be required as the global space economy grows.

Box 3: Core challenges for the UK space sector

Lack of strategic direction—The UK's space strategy remains unfocused, and Government has struggled with implementation and cross-departmental working.

Barriers to economic growth—Whilst previous growth rates have been strong, there are concerns that the UK's space economy could stagnate as a result of capital access issues, skills challenges and a lack of procurement opportunities.

Changing international environment—Shifts in space policy in both the EU and US (as well as new emerging players) have changed the international environment in which the UK operates.

Ensuring safe operations in space—Space is a shared domain, and all parties must seek to behave responsibly in space, especially on the issue of space debris creation.

24. Despite these notable strengths, the UK faces significant challenges to the growth of its space sector. The first broad challenge faced by the UK is the intense international competition for global market share in the growing space economy. DSIT stated that the UK is "in a new global space race, driven by private enterprise and involving a far wider range of nations with ambitious plans", whilst UKspace describe the increasingly "contested, congested and competitive" space environment in which the UK operates .[60] The states which will be successful in this environment will be those which develop strong national strategies which align government and industry around national advantages and shared goals.

25. A second core challenge involves ensuring the UK's space sector is primed for growth. Analysts regularly point out that the UK excels in the development of innovative space tech startups but that such firms struggle to scale up in the UK.[61] The UK space sector also faces a skills shortage, with 95% of

59 UK Space Agency, Department for Science, Innovation and Technology, Ministry of Defence and the Department for Business, Energy and Industrial Strategy, *National space strategy*, 1 February 2022

60 Written evidence from the Department for Science, Innovation and Technology (SPA0082) and UK Space (SPA0085)

61 Written evidence from Satellite Applications Catapult (SPA0049)

businesses reporting some form of skills challenge.[62] In a fast-moving global context, there is also a need to ensure that the UK maintains a competitive regulatory environment that enables innovation. All the while, it must ensure that its universities and fundamental research institutions are supported in driving the technologies of tomorrow.

26. A third challenge concerns the nature of the UK's international partnerships. The UK has historically looked towards the European Space Agency (ESA), a non-EU intergovernmental organisation, for collaboration on civil space and the US for military space cooperation.[63] However, a more activist approach from the EU on space policy, shifts in the US' attitude to international collaboration and the emergence of a host of new potential partners will pose questions for the UK's traditional approach to international engagement.[64] In a changing global environment, there is a need to assess which international partners will best facilitate the growth of the UK's space industry and meet our security requirements.

27. Lastly, the UK faces a challenge to ensure that space is a safe and peaceful domain for economic expansion. The space debris problem is only likely to grow in coming years and there is a clear need for the development of more sustainable business practices in space. Other threats to a safe operating environment in space include the global competition over satellite spectrum allocation and the exogenous risk of space weather events.[65] Additionally, the nascent nature of many space activities leaves significant legal and regulatory gaps that require global collaboration,from lunar property rights to IP for products manufactured in space.[66] The UK must seek to contribute to these conversations about the future governance of space to ensure any international regime aligns with its values and interests.

Background to this inquiry

28. The establishment of this Committee was recommended by the Liaison Committee in November 2024. The proposal for a "special inquiry committee to examine the opportunities and issues in relation to the UK's engagement with space" was made by Lord Cromwell.

29. During our inquiry, we received 106 written submissions and heard from 62 witnesses in oral evidence sessions. This included a joint evidence session with the Scottish Affairs Select Committee in the House of Commons, in which the two committees explored the opportunities for Scotland's launch sector. We thank everyone who submitted written evidence and gave oral evidence, as well as the Chair and staff of the Scottish Affairs Select Committee for their cooperation.

30. We also undertook a visit to the Harwell Science and Innovation Campus in Oxfordshire on 10 May 2025. Ten members of the Committee visited the Harwell space cluster's main offices and heard from representatives from UKSA and UK Research and Innovation (UKRI); visited the National Satellite Testing Facility; held two roundtables with industry representatives;

62 UK Space Agency, *Space Sector Skills Survey*, 13 September 2023
63 Q 133 (Bleddyn Bowen); Q 142 (Dr John B Sheldon)
64 Q 202 (Gabriel Elefteriu); Financial Times, *Donald Trump says $175bn 'Golden Dome' will be completed during his term*, 20 May 2025
65 Financial Times, *The satellite spectrum battle that could shape the new space economy*, 27 September 2024; UK Health Security Agency, *What is space weather, and why are we monitoring it?*, 13 March 2025
66 Written evidence from Prof Sylvester Kaczmarek (SPA0015) and UK Space (SPA0085)

and held a meeting at ESA's European Centre for Space Applications and Telecommunications. We thank all of those who welcomed them and provided a thought-provoking visit.

31. In this inquiry, we have set out to understand the challenges the UK faces in space and the policy solutions needed to address them. Most space-based activities are inherently dual-use, and, as above, we recognise the importance of space for national security and defence. However, due to time constraints, we elected to focus primarily on the UK's space strategy, the development of its commercial sector, its international partnerships and its contribution to international rules and norms. Nonetheless, we collected significant amounts of evidence on the importance of space for defence and security, which we refer to where relevant to our analysis and recommendations.

32. We are grateful to our specialist adviser, Michelle Howard, Space Working Group Director at the D Group.

Structure of the report

33. Each of the chapters in this report corresponds to one of the challenges outlined above. In Chapter 2 we examine the UK's strategic approach to space, considering whether the Government's approach to capability development, strategic prioritisation, machinery of government and space financing equips the UK to compete in the new global space race.

34. In Chapter 3, we consider how the Government can enable the growth of the UK's space sector. We consider how to address the space skills gap, the capital access problem for space firms and the changing space regulatory environment. We also consider how the Government should support universities, whose work underpins the strength of the UK space economy.

35. In Chapter 4 we assess the UK's approach to international partnerships. We analyse the UK's key space relationships with the EU, US and ESA, as well as addressing the potential of collaboration with actors beyond these.

36. In Chapter 5, we examine how the UK approaches the international regulation of activities in space. We assess what policy approaches the UK should take to addressing the space debris challenge, as well as other collective issues such as space weather mitigation and spectrum management. We also consider the ways in which the UK can shape the international rules and norms that will underpin the future of the global space economy.

CHAPTER 2: A STRATEGY FOR SPACE

37. Recent shifts in the global space economy have increased the importance of taking a strategic approach to space. Space Scotland told us that "the global space economy is fragmenting and decentralising" as states and private actors compete.[67] Gabriel Elefteriu, Senior Fellow (Space Power) at the Council on Geostrategy, expressed his view that the UK's current approach to space is not appropriate in the context of current global trends. He argued that the current policy approach "was created before the world took a very different turn geopolitically" and "before we had the rise of mega constellations and very strong players monopolising various parts of the global space industry".[68]

38. Many other countries are seeking to harness opportunities in space, and to be a competitor in the emerging space economy, it is essential for the UK to take a careful strategic approach. Space Scotland told us that "nations worldwide are racing to establish leadership in frontier technologies, and the UK risks falling behind if it fails to act decisively."[69] Similarly, RAND Europe argued that there is a limited amount of time for the UK to seize opportunities in space as other countries begin to "outpace" us. It emphasised that "without action to enhance the competitiveness, resilience and interconnectedness of its domestic space sector, the UK may be left behind."[70]

39. The space sector has traditionally been supported by, and propelled by, state interests. Despite the increasing activity of private actors in space, there is still a role for the Government to play in supporting the sector and market to grow to strengthen the UK's position in the global space economy. The Department for Science, Innovation and Technology (DSIT) "Case for Space" report, published in 2022, noted the role of the Government in supporting the space sector, outlining the high up-front investment required for space technology and long-lead times for commercial benefits, which deter private investment and create the need for state intervention.[71]

40. In its written evidence to us, DSIT emphasised the important role of government in providing finance to support fundamental technology development and de-risk future private investment.[72] This view was supported by witnesses. Nayen Pankhania, Strategy and Consulting Director at the Satellite Applications Catapult, argued that as markets in the space sector are still developing, it is necessary for the state to support firms in technological development until such a point at which "the free market [will] be able to ensure that such companies can survive".[73] Mark Boggett, CEO and Co-Founder at Seraphim Space, concurred, arguing that "we need a proactive role from government" to support the market.[74]

41. The Government also benefits from taking an active interest in the UK space sector due to space's essential role in underpinning national resilience, with space having been categorised as a Critical National Infrastructure sector since 2015.[75]

67 Written evidence from Space Scotland (SPA0096)
68 Q 201 (Gabriel Elefteriu)
69 Written evidence from Space Scotland (SPA0096)
70 Written evidence from RAND Europe Space Hub (SPA0043)
71 Department for Science, Innovation and Technology, *The Case for Space*, 19 July 2023
72 Written evidence from the Department for Science, Innovation and Technology (SPA0082)
73 Q 108 (Nayen Pankhania)
74 Q 108 (Mark Boggett)
75 Written evidence from Open Cosmos (SPA0036)

42. We heard about several key problems in the UK's approach to space policy that inhibit the UK's competitiveness in the global space economy. The core issues raised were:

- Space is underfunded—space is not prioritised for funding, despite investment in space having great potential for the UK's economy. For companies and organisations seeking funding, processes can be overly complex and bureaucratic (see Chapter 3).

- The UK's space strategy requires clear implementation plans—although the National Space Strategy was launched in 2021, witnesses highlighted the absence of planning for implementation and delivery.

- Space policy is fragmented across government—while civil and commercial space policy has a lead department in DSIT, the applications of, and potential impact of space impact a wide range of departments. A lack of communication and clarity between the different bodies with responsibility for space inhibits the ability of the UK to be truly competitive in space. The recent announcement of a merger between the UK Space Agency and the DSIT Space Directorate opens up new questions about the future organisation of space policy across government.

- Space is misunderstood by the public and by businesses—the space sector is misunderstood and underestimated, with the public unaware of its essential role in daily life, and non-space businesses unaware of its potential benefits for their operations. The efficacy of UK space policy is therefore inhibited as it is not seen as a political priority.

- The UK's space strategy is not focused enough—the approach of the National Space Strategy was perhaps too ambitious given the lack of significant funding for space. For the UK to develop its leadership in space under the current financial constraints, choices must be made about which areas within each capability to prioritise. However, these essential choices are not being made.

Funding for space in the UK

43. Space funding is delivered through a variety of governmental sources, including the UK Space Agency, DSIT, the Ministry of Defence and UKRI. A definitive figure of how much the Government invests in space does not exist, with the National Audit Office Report *The National Space Strategy and the role of the UK Space Agency*, published in 2024, finding that that DSIT "does not have a good understanding of the total government funding for civil space across all public bodies".[76] Analysis that has been done on the UK's space spending indicates that it spends far less on space than its international competitors, with the University of Strathclyde noting that as a proportion of GDP, as well as in terms of shares of government expenditure, "the UK spends significantly less than the EU average".[77] Professor Brian Cox, Professor of Particle Physics at the University of Manchester, told us that the UK "spends something like 0.05% of GDP on space. […] We are low; we are significantly below France and Italy, for example" as a percentage of GDP.[78] However, witnesses also noted that funding for space

76 National Audit Office, *The National Space Strategy and the role of the UK Space Agency*, 12 June 2024
77 Written evidence by the University of Strathclyde (SPA0033)
78 Q 2 (Prof Brian Cox)

has risen significantly in recent years, with the Royal Aeronautical Society outlining how "increased Government commitment to space is indicated through policies, funding, and institutional support", citing specifically that UKSA "has seen a 73% increase in funding from 2018 to 2023", from £370 million to £640 million.[79] Further discussion on the specificities of the UK's funding model can be found in Chapter 3.

44. The general sentiment from witnesses was that levels of funding are misaligned with the Government's ambitions and that investing properly in the sector would be necessary to capitalise on developments in the new space economy. A number of witnesses advocated for increasing the UK's space budget in order to achieve the goals of the NSS. ADS Group suggested the Government "should commit to scaling up the space budget to at least £1.2 billion",[80] while BAE Systems argued that "in order to create a stronger foundation for the sector and support growth there is a need for greater budgetary allocation".[81] Will Lecky, Co-founder of Know.Space, told us that "if you have high return on low investments, you still see low absolute returns", emphasising that it is "important to see the untapped potential […] There is a big prize on offer that we are not necessarily fully grasping."[82]

45. **The UK's spending commitments on space are not commensurate with its ambitions in terms of both capability development and international leadership. Compared with peer states, the UK invests relatively little in its space sector, which will limit its ability to capitalise on the opportunities that emerge in years to come. Given the degree of state support that is traditionally required to achieve success in space, the UK risks seriously falling behind competitor states at current funding levels.**

46. ***We acknowledge that the current fiscal environment makes a significant uplift in funding for space capability development unlikely. The Government has recognised space as part of the UK's Critical National Infrastructure and should prioritise funding for space within the budget available accordingly. The stability of funding ensured with the current three-year spending review cycle is welcome, but the current spending on space should represent a floor, not a ceiling.***

47. ***Like AI, space technology is a utility with use cases across multiple government departments. Given the fast-moving nature of the global space sector and the huge potential upsides of investment in space, the Government should ensure that all departments are aware of the value of space technologies and that funding across government departments is aligned to maximise impact.***

The National Space Strategy

48. In 2021, the then-government published the National Space Strategy (NSS), which brought together civil and defence policy into a single document for the first time and outlined the key priorities for the UK space sector, with the ambition to make the UK "one of the most innovative and attractive

79 Written evidence from the Royal Aeronautical Society (SPA0057)
80 Written evidence from ADS Group (SPA0026)
81 Written evidence from BAE Systems (SPA0038)
82 Q 44 (Will Lecky)

space economies in the world." The key priorities outlined in the document were unlocking growth, international collaboration, becoming a science superpower, and developing resilient capabilities.[83] The document was followed up by the 2022 Defence Space Strategy,[84] the 2023 National Space Strategy in Action,[85] and the 2024 Space Industrial Plan, which outlined five priority areas in which national space capability should be developed: Space Domain Awareness (SDA), In-orbit, Servicing Assembly and Manufacturing (ISAM), Earth Observation (EO), Position, Navigation and Timing (PNT) and satellite communication technology.[86] The 2025 Modern Industrial Strategy also identified these five capabilities as priorities as well as the development of launch capability.[87]

49. In general, witnesses viewed the strategy as a good starting point. Northrop Grumman UK described the "growing recognition of the importance of the space sector from the UK" and described the NSS as " a welcome initial step".[88] Dr Joanna Hart, Director at Space Partnership, felt that the NSS was "an ambitious vision for the future of the UK as a space nation, and to make the UK one of the most attractive countries for space businesses of all sizes to grow and thrive."[89] Following the publication of recent documents such as the Strategic Defence Review and the Modern Industrial Strategy, Colin Baldwin, Executive Director at UKspace, told us that "there has been a bit of a lightbulb moment fairly recently within the Government" in its recognition of the importance of space to defence and the economy.[90] Sir Chris Bryant MP, the then-Minister for State for Data Protection and Telecoms, who was the Government minister responsible for space until 6 September 2025,[91] indicated that the Government believes a new, updated space strategy may be necessary.[92]

Implementation

50. A common theme through the evidence was that while UK space policy documents were ambitious, they were not being implemented or delivered upon. While an implementation plan was promised in the 2024 Space Industrial Plan, this has not yet been delivered. Carol Buxton, Doctoral Researcher at the University of Birmingham, suggested that both the NSS and the 2023 follow-up were "yet to live up to the UK Space Agency's ambitious vision and translate into outputs." She particularly noted "the absence of a detailed implementation plan".[93] The Open University concurred, describing the NSS as a "useful overarching framework" that lacks a plan for implementation.[94] In terms of actions taken since the publication of the

83 UK Space Agency, Department for Science, Innovation and Technology, Ministry of Defence and Department for Business, Energy & Industrial Strategy, *National Space Strategy*, 27 September 2021
84 Department for Science, Innovation and Technology and Ministry of Defence, *National Space Strategy in Action*, 19 July 2023
85 Ministry of Defence, *Defence Space Strategy: Operationalising the Strategic Domain*, 1 February 2022
86 Department for Science, Innovation and Technology and Ministry of Defence, *Space Industrial Plan: from ambition to action - advancing UK space industry*, 7 March 2024
87 Department for Business and Trade, *The UK's Modern Industrial Strategy 2025*, 23 June 2025
88 Written evidence from Northrop Grumman UK (SPA0060)
89 Written evidence from Dr Joanna Hart (SPA0030)
90 Q 190 (Colin Baldwin)
91 As of 11 September 2025, the minister responsible for space is Baroness Lloyd of Effra, Parliamentary Under-Secretary of State (Minister for Digital Economy), https://www.gov.uk/government/people/liz-lloyd
92 Q 184 (Sir Chris Bryant MP)
93 Written evidence from Miss Carol Buxton (SPA0061)
94 Written evidence from the Open University (SPA0039)

strategy, Mr Baldwin said that "progress has been slower than we had all hoped; there was a lot of anticipation, and it has taken some time."[95]

51. **The National Space Strategy was a good first step in establishing a coherent, cross-government space strategy that functions as a lodestar for government, industry and academia. However, the document, and subsequent follow-up documents, still do not provide detailed and costed implementation plans that can provide certainty to stakeholders.**

52. **The current strategy is ambitious but insufficiently focused, and risks spreading resources too thinly. A targeted approach is essential for maximising the impact of public investment and fostering successful space businesses in the UK.**

53. ***Rather than producing a new strategy, the Government should focus on improving the implementation and delivery of the current strategy. The Government should set out clear implementation plans for the delivery of capability goals laid out in the Modern Industrial Strategy (see below).***

Machinery of government

54. Space policy has impact across various government departments due to the wide variety of uses of space to support modern society. UK space policy is currently spread across multiple bodies, including:

- Department for Science, Innovation and Technology (DSIT)
- the UK Space Agency (soon to be merged with the DSIT Space Directorate)
- the Ministry of Defence
- the Department for Transport
- the Department for Business and Trade
- the Department for Environment, Food and Rural Affairs
- the Foreign, Commonwealth, and Development Office
- Ofcom.

55. Many witnesses expressed the view that space policy is too fragmented across government, impacting its outcomes. Satellite Applications Catapult told us that responsibility for space policy is "now divided across multiple ministers within departments […] and across different departments" as well as "multiple different agencies and other quangos in both civil space and defence, paint[ing] a complex picture". The Catapult also highlighted that other government departments "are users or potential customers of space data and services but have no dedicated space expertise within their teams."[96] ADS Group argued that in order to "deliver an ambitious national strategy for space […] it is important to effectively streamline space activity throughout Whitehall to provide stronger clarity to those operating within

95 Q 190 (Colin Baldwin)
96 Written evidence from Satellite Applications Catapult (SPA0049)

it."[97] Following the June 2025 publication of the UK's Modern Industrial Strategy, Mr Baldwin told us that now "we are starting to see a much more coherent view from across government and this idea of a one-government approach to space", suggesting recent improvement in this area.[98]

56. Witnesses outlined how cross-government collaboration is increasingly important for space policy due to the potential dual-use nature of many space technologies, meaning that civil and commercial space programmes can also be deployed for military benefit, and vice-versa. A lack of a coordinated effort across governmental bodies can therefore risk unnecessary duplications of effort.[99] UKspace noted that the Ministry of Defence "provides roughly 50% of the UK's funding to the [space] sector and is becoming increasingly aware of dual-use or multi-application opportunities that lie in the civil and commercial parts of the sector."[100]

57. A number of potential solutions to the fragmentation of space across government were offered by witnesses. A common theme regarded having a central person or point of engagement for space. One suggestion was that the Government should introduce a dedicated Minister for Space to provide better coordination across different departments.[101] Airbus UK said that a goal should be "creating an HMG 'home' for space", by moving all space policy within a single department.[102] Rather than a minister, Astroscale suggested that a space "Tsar" or "Champion" should be appointed, describing the potential role as featuring "a visible, empowered figure to drive cross-government coordination" to "signal the UK's serious intent to lead this domain, provide consistent and focused leadership across Whitehall, and act as a vocal advocate for UK space on the international stage."[103] This view was supported by Scott Hammond, then-Deputy CEO at SaxaVord Spaceport, who stated "I do not see the drive coming out of the UK Space Agency. There is a bit from DSIT […] Somebody in government needs to grip it, get it all together and then lead so that we have a proper space strategy."[104]

58. UKspace felt that a national space programme or enterprise could "bring together the key components across Government to ensure we have the adequate coordination, funding and regulatory frameworks in place".[105] Northumbria University suggested that "a clear set of regularly updated Departmental policy priority statements" from departments involved with the space sector would be useful.[106]

59. From the Government's perspective, the 2025 Strategic Defence Review suggested that a "reinvigorated Cabinet sub-Committee—or equivalent ministerial group—should set the UK's strategic approach to space to

97 Written evidence from the ADS Group (SPA0026)
98 Q 190 (Colin Baldwin)
99 Written evidence from Satellite Applications Catapult (SPA0049)
100 Written evidence from UKspace (SPA0085)
101 Written evidence from the University of Strathclyde (SPA0033) and Royal Aeronautical Society (SPA0057)
102 Written evidence from Airbus UK (SPA0091)
103 Written evidence from Astroscale (SPA0041)
104 Q 74 (Scott Hammond)
105 Written evidence from UKspace (SPA0085)
106 Written evidence from Northumbria University (SPA0072)

maximise policy, operational, and capability synergies between the UK civil space sector and military needs."[107]

60. UKSA was established in 2010 and sits as an executive agency sponsored by DSIT. It works to "catalyse investment into the UK space sector, deliver missions and capabilities and champion the power of space to benefit people on Earth."[108] Its budget for 2025/26 is £681 million.[109] On 20 August 2025, the Government announced that UKSA would be subsumed into DSIT to "cut any duplication that exists and ensure decisions are made with clear ministerial oversight".[110] In a letter to the Chair of the Committee on 1 September 2025, the then-Minister of State for Data Protection and Telecoms noted that they would "be engaging with stakeholders in the coming weeks and months, as plans develop" to smooth the transition.[111]

61. We received a wide range of evidence about UKSA, with some witnesses highly praising its work and the ability of the sector to engage with government through the agency. Richard Osborne, Chief Technology Officer at AstroAgency Ltd and Director of Stellardyne, compared the UKSA positively to its predecessor, the British National Space Centre, describing it as "exceptionally supportive […] It is easy to reach the appropriate people, and there is a great degree of help."[112] Similarly, the Remote Sensing and Photogrammetry Society stated that UKSA "actively fosters collaboration through various programs and by acting as a central point of contact."[113]

62. However, other witnesses pointed to weaknesses within the UK Space Agency. The Royal Aeronautical Society described the technical expertise within UKSA as "insufficient […] Strengthening the cadre of experienced professionals in [UKSA] would be beneficial."[114] The National Physical Laboratory highlighted issues with funding, noting the "limited follow-on investment" from UKSA as well as Innovate UK and ESA.[115]

63. The NAO's recent report was critical of UKSA, highlighting delays in programme delivery, staff shortages, and a need to prioritise its ambitions. It also noted the impact of external factors such as COVID-19 and geopolitical developments on the agency's work. In March 2025, Dr Paul Bate, CEO at the UK Space Agency, told us that, following the report from the NAO which assessed the 2022/23 financial year, UKSA had spent 99.5% of their budget and "had hit a higher percentage of [the UKSA's] milestones".[116] Lord Willetts, Chair at UKSA, noted that they had also improved the geo-return from investment in ESA since the NAO's report.[117]

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107 Ministry of Defence, *The Strategic Defence Review 2025 - Making Britain Safer: secure at home, strong abroad*, 2 June 2025
108 Written evidence from the UK Space Agency (SPA0024)
109 UK Space Agency, *UK Space Agency Corporate Plan 2025–26*, 30 September 2025
110 Department for Science, Innovation and Technology, UK Space Agency and Sir Chris Bryant MP, *Press release: UK space sector bolstered with government reforms to boost growth and cut red tape*, 20 August 2025
111 Correspondence, *Sir Chris Bryant MP to the Chair of the UK Engagement with Space Committee*, 1 September 2025
112 Written evidence from Mr Richard Osborne (SPA0073)
113 Written evidence from the Remote Sensing and Photogrammetry Society (SPA0035)
114 Written evidence from the Royal Aeronautical Society (SPA0057)
115 Written evidence from the National Physical Laboratory (SPA0076)
116 Q 20 (Dr Paul Bate)
117 Q 20 (Lord Willetts)

64. Following the announcement of the merger between UKSA and the DSIT Space Directorate, Ian Annett, CEO at Celestial Fix Ltd and ex-Deputy Director of the UK Space Agency, told us that it was "not an immediately catastrophic move", providing the opportunity to "bring strategy, policy and delivery closer together".[118] UKspace felt that the merger could be an opportunity to "make the changes needed to set the UK space sector on a new course, working in true partnership across government and with industry". However, it also emphasised that for the merger to be effective and for the UK to achieve its goals in space, "absolute alignment, clarity and coordination" across Government is necessary.[119]

65. Witnesses noted strengths in UKSA that needed to be considered and preserved following the merger with DSIT. Mr Annett noted that the UK Space Agency holds a "significant leadership position" internationally, and "is a significant lever of soft power for the UK".[120] Meanwhile, UKspace emphasised that talented staff with "deep technical knowledge" currently work for UKSA, and that "people must be at the heart of this merger", with strong leadership required to maintain staff confidence.[121]

66. Witnesses also considered the risks of the merger. Mr Annett wrote that "DSIT simply does not have the experience and capacity to manage complex, cross-Whitehall, multi-year programmes […] that are subject to outcome-based contracts." He felt that other departments, such as the Department for Transport, would be better placed to handle such projects.[122] The current lack of a detailed plan for the merger was highlighted by UKspace, which argued that "establishing the vision, purpose and leadership of the new Agency must be the highest priority" for the merger to succeed.[123]

67. **The UK Space Agency's performance has received recent criticism, though evidence indicated that it was taking the necessary steps to address the problems identified in the 2024 National Audit Office report prior to the announcement of its merger with the DSIT Space Directorate. Stakeholders held mixed views about how effective UKSA has been, but we did not hear evidence arguing for the integration of the Agency with the DSIT Space Directorate.**

68. ***Absorbing UKSA into the DSIT Space Directorate risks diluting the focus and expertise that exists within UKSA as well as access to independent expertise. Concerns have been raised about the fragmentation of space policy across Government. If properly implemented, this merger could help address these concerns. However, the lack of details provided by the Government at the time of announcement mean that there is insufficient clarity about how space policy will be handled going forward. The Government should provide a detailed plan outlining the aim of the merger and how it will improve the coherence of space policy across Government.***

69. **Space policy cuts across the work of multiple departments which makes policy co-ordination difficult. Developing a working**

118 Written evidence from Ian Annett (SPA00105)
119 Written evidence from UKspace (SPA00106)
120 Written evidence from Ian Annett (SPA00105)
121 Written evidence from UKspace (SPA00106)
122 Written evidence from Ian Annett (SPA00105)
123 Written evidence from UKspace (SPA00106)

intragovernmental system for co-ordination is a necessary endeavour to ensure the UK maximises the value of its expenditure on space. The need for cross-governmental collaboration is especially pronounced given the dual-use nature of space technology which means that civil and military policy must be closely aligned.

70. ***The portfolio of the Minister currently responsible for space is too broad, and the importance of space as a policy area is significant enough to warrant concentrated attention. Therefore, the Government should create a Minister for Space sitting across both DSIT and MoD, who would hold responsibility for leading on cross-governmental co-ordination and have access to the National Security Council. The Government should also appoint a dedicated champion for space to coordinate between government, industry, and universities.***

Improving the public narrative on space

71. Many witnesses expressed concern that the space sector does not do enough to promote the benefits of space to the wider public. Satellite Applications Catapult told us that one of the core challenges with the UK space sector "is storytelling—we talk tech, when we should be talking outcomes." It argued that a shift in language could help, stating: "buyers care about outcomes, not orbits […] We must speak in language users understand, linking space capability to everyday impact."[124] Daniel Smith, Trade and Investment Envoy for Space for the Scottish Government, argued that many of the challenges facing the space sector "could be resolved, in whole or in part, by better communications", stating that the public do not understand the value of space to the UK's economy, environment and security."[125]

72. Rory Daniels, Senior Programme Manager of Emerging Technologies at TechUK concurred, arguing that awareness of the utility of space is low, and that where awareness does exist, perceptions of the importance of space are misguided. He shared an anecdote that illustrated the latter point—in French newspapers, space is reported in the business section, but in the UK it is reported as part of science and technology.[126] Joshua Western, CEO at Space Forge, claimed that the UK space sector has a "PR problem" and that most people do not understand what working in the sector entails, whilst David Browne, Director Corporate and Social Affairs at Maersk, claimed that people do not have a "good understanding of what space means".[127]

73. Mr Daniels told us that he believes that a national marketing campaign, along the same lines of the nuclear industry's "Destination Nuclear" campaign, would be desirable to shift societal understanding about the utility of satellite technology.[128] Richard Osborne stated that the Government needed to pursue "effective marketing of how space supports [the public] on a daily basis", which "would help counter negative and misinformed narratives about the value of space".[129] The Scottish Government Space Group argued for

124 Written evidence from Satellite Applications Catapult (SPA0049)
125 Written evidence from Daniel Smith (SPA0068)
126 Q 169 (Rory Daniels)
127 Q 61 (Joshua Western); Q 171 (David Browne)
128 Q 169 (Rory Daniels)
129 Written evidence from Richard Osborne (SPA0072)

"sustained marketing activity" that would "promote a narrative that space really is a cross-cutting enabler for service delivery and growth".[130]

74. Witnesses also emphasised the importance of inspiring children to undertake future careers in space technology. Dr Katie King, CEO and Co-founder of BioOrbit Ltd noted that the space industry is primed to grow and change over the coming decades and that it is important to ensure that people understand these changes, and the opportunities they bring, from an early age.[131] Dr Imogen Napper, Visiting Research Fellow at the University of Plymouth, stressed the need for "space literacy" amongst young people and Professor Lucy Berthoud, Professor of Space Engineering at the University of Bristol, noted the importance of engaging with young people at an early age to inspire them to pursue space-related careers.[132]

75. **The lack of societal understanding of the value of space technology can limit the potential of the UK's space sector. It impacts business utilisation of space-based data and services, impedes skills development and makes it more difficult for the Government to make the case for space as a national priority.**

76. ***The Government should work to promote awareness of space amongst the wider public, focusing on the benefits and potential applications of space technologies and programmes, highlighting career opportunities in the space sector to young people, and promoting the value of satellite applications to businesses. This could be done in part by building upon the success of existing organisations such as Speakers for Schools. The media should also be encouraged to consider how and when they cover space and the space economy in news and other programming.***

Developing core capabilities

77. National space capabilities can be described as "a range of infrastructures which provide the UK with certain functions or services, whether to meet a government requirement or to create new market opportunities".[133] This section will focus on the core space capabilities that the UK is seeking to develop, as outlined in the 2024 Space Industrial Plan and 2025 Modern Industrial Strategy.[134] The six core capabilities that have been identified as priorities by the Government are:

- Space Domain Awareness
- In-Orbit Servicing, Assembly and Manufacturing
- Space data for Earth applications (also known as Earth Observation)
- Position, Navigation and Timing
- Satellite Communications

130 Written evidence from the Scottish Government Space Group (SPA0087)
131 Q 61 (Dr Katie King)
132 Q 122 (Dr Imogen Napper); Q 163 (Prof Lucy Berthoud)
133 Department for Science, Innovation and Technology and Ministry of Defence, *Space Industrial Plan: from ambition to action - advancing UK space industry*, 7 March 2024
134 Department for Business and Trade, *The UK's Modern Industrial Strategy: Advanced Manufacturing Sector Plan*, 23 June 2025

- Launch

78. One of the core criticisms of the UK's approach to space policy is that it is too ambitious. Eutelsat OneWeb argued that "past UK space strategies have been too vague, and the UK cannot be a 'superpower' in all areas of the sector" and therefore it should leverage its existing assets and comparative advantages to maintain global competitiveness.[135] Astroscale told us that the current strategy "risks being stretched too thin" by "seeking to support a wide array of activities, often with limited funding […] HMG must refine its focus and double down on areas […] where the UK is uniquely positioned to lead."[136] Space Scotland noted that while emerging technologies are exciting, they need "sustained, targeted investment", concluding that:

> "without careful prioritisation, there is a risk that funding will be spread too thinly, siphoned off to remain merely competitive in one area, leaving little room for developing truly differentiating national capabilities. The UK must identify where it can lead globally and invest accordingly."[137]

79. **Government's efforts to streamline the UK's strategic approach to space to six core capabilities are welcome and will provide greater certainty to the sector about what the Government is hoping to achieve in space. However, each of these six areas require sufficient funding and strategic support to succeed. There remains a concern that UK space policy will still be spread too thin and that world-leading capability development will be blunted as a result. Under current budgetary restraints, strategic prioritisation is essential.**

80. ***The Space Industrial Plan, published in March 2024, promised the publication of a National Space Capability Development Plan by Autumn 2024, which would outline how the Government plans to deliver on the development of its space capabilities. We understand that this document has been delayed because of the election and spending review. The National Space Capability Development Plan must not be delayed past the end of this year, as it is key to providing stakeholders with greater certainty about the implementation of government strategy.***

81. ***The plan should make clear why the six capability goals were selected and outline achievable, funded measures that will be taken to achieve these capability goals. The plan should differentiate between established capabilities such as space data integration and use and satellite communication technologies, which should be UK strengths in a commercial marketplace compared to capabilities such as ISAM, which will need significant government contracts for services to be a basis for developing UK leading businesses in a worldwide market. (See Chapter 3 for further discussion). This plan should also provide some clarity of indicative expenditure on each capability area in the next ten years, including the balance of spending between ESA and UKSA and an indication of the grant funding and government contracts that to be awarded.***

135 Written evidence from Eutelsat OneWeb (SPA0017)
136 Written evidence from Astroscale (SPA0041)
137 Written evidence from Space Scotland (SPA0096)

82. ***The Advanced Research and Invention Agency (ARIA) should consider funding exceptional space technology projects outside the six capability areas, ensuring that curiosity-driven research can continue to be carried out, maintaining the UK's reputation for new inventions.***

Box 4: The Advanced Research and Invention Agency (ARIA)

ARIA is a research and development funding agency that is sponsored by DSIT. It funds breakthrough research and development in areas that are under-explored.

Source: Aria.org.uk Empowering scientists to reach for the edge of the possible

83. In the sub-sections below, we will examine each of the six capabilities and their strategic value as part of UK space policy.

Space Domain Awareness (SDA)

84. SDA refers to the ability of states or private actors to detect, track and identify space objects. SDA can be critical in helping to protect space assets by "help[ing] operators to identify more precisely when assets are at risk."[138] There has been increased Government focus on developing SDA capabilities, with a 2022 commitment to invest £85 million in SDA and the launch of the National Space Operations Centre (NSpOC) in 2024.[139] SDA is crucial in the tracking of orbital debris and will be fundamental in ensuring the safe operation of the in-space economy in years to come. As such, some witnesses argue strongly for "an indigenous source of [SDA] data that we can trust".[140]

85. The NSpOC was launched to provide space surveillance and protection capabilities to the UK. It works on a dual-use basis for both military and civil missions, providing awareness of threats to the space domain, such as space weather events, potential uncontrolled re-entries, and tracking of objects near Earth.[141] The then-Minister of State for Data Protection and Telecoms described the NSpOC as "absolutely essential to the work that we do in this area" and highlighted it as an example of cross-government collaboration, stating that "it is a very impressive and seemingly easy co-operation between two departments you might think would not necessarily operate so easily together."[142]

86. Other countries, such as the US, China, and Japan, have been advancing their SDA policies in recognition of space's essential role for critical infrastructure. The UK has recently been collaborating with other nations to advance its SDA capabilities. It has been part of NATO's Alliance Persistent Surveillance from Space programme which works to "improve the collection, dissemination and distribution of space situational awareness data gathered by national and commercial space systems." Additionally, a Memorandum of Understanding between the UKSA and the Japanese Space Agency was signed "for cooperation on SDA research" by the two countries.[143] Space Scotland advocated that more investment in SDA is needed, in line with

138 Written evidence from the Royal Society (SPA0093)
139 Written evidence from the Global Network on Sustainability in Space (SPA0063)
140 Q 124 (Prof Don Pollacco)
141 Written evidence from UKspace (SPA0085)
142 Q 185 (Sir Chris Bryant MP)
143 Written evidence from the Global Network on Sustainability in Space (SPA0063)

other nations. It told us that increasing funding for SDA "will ensure we remain competitive internationally and help secure our position as a leader in responsible space operations."[144]

87. **Space Domain Awareness is a critical space capability that is crucial in protecting UK assets in space from both orbital debris and malicious activity from enemy actors. The establishment of the National Space Operations Centre has been a positive move to align civil and military capability.**

88. ***The Government should report on the progress of the National Space Operations Centre after three years of operation and highlight what lessons can be drawn from the MoD/DSIT cross-working approach and how these lessons may be applied to other capability areas.***

In-Orbit Servicing, Assembly and Manufacturing (ISAM)

89. In-Orbit Servicing, Assembly and Manufacturing technologies are those which focus on producing new materials and manufacturing in space, such as pharmaceuticals, as well as in-orbit services such as debris removal and refuelling satellites. Dr Rory Holmes, UK Managing Director at ClearSpace, highlighted the possibilities of recent technology developments:

> "Until recently, when you launched a satellite into space, you had no way of interacting with it physically again. If it broke, you could not repair it. If it ran out of fuel, you could not refuel it, and if it became obsolete, you could not upgrade it; but that is changing. The technology now allows us to go and physically interact with objects in orbit again."[145]

Box 5: In-Orbit Servicing, Assembly and Manufacturing

In-Orbit Servicing, Assembly and Manufacturing (ISAM) covers an array of novel activities that are expected to be conducted in space in coming years:

Servicing satellites will perform refuelling, component replacement, inspection and maintenance operations on other satellites. They will also remove defunct satellites from orbit.

Assembly refers to the potential building of large-scale infrastructure (such as space stations, solar power satellites and lunar bases) in space.

Manufacturing in-space will see new products and materials created in orbit, for either use on Earth or in space. The microgravity and natural vacuum environment in space is beneficial for the production of metal alloys, pharmaceutical goods and semiconductors.

Source: UK Space, UK Space In-Orbit Servicing and Manufacturing Priorities Paper, June 2023

90. Mr Western spoke to us about the possibilities for manufacturing crystals for semiconductors in space, stating that the conditions in space enable them "to create semiconductors up to five orders of magnitude higher in purity compared to the ground […] that means we can effectively reduce energy consumption by up to 60% in almost all major infrastructure."[146] Similarly, Dr King described the potential for pharmaceutical production in space, noting that the microgravity environment enables the formulation of the

144 Written evidence from Space Scotland (SPA0096)
145 Q 57 (Dr Rory Holmes)
146 Q 57 (Joshua Western)

required "quality of antibody crystal" for the creation of antibody drugs that can be administered via subcutaneous injection. This would allow patients to administer antibody drugs at home and take strain off health services.[147]

91. The UK is viewed as a global leader in this area, with several ISAM firms such as Clear Space, Astroscale, Space Forge, and Orbit Fab having presence in the UK. UKspace told us that "the UK is a leader in this fast-growing new subsector of the space industry which is predicted to grow to $18 billion by 2033", citing PWC analysis estimating it will contribute $170 billion to the global economy in the next twenty years, though UKspace included the caveat that "the technology is still being proven for commercial applications."[148] DSIT noted that ISAM has been prioritised as a space capability area because there is a "unique opportunity" for the UK in the global market. The Government is therefore focused on "making sure we develop the right technologies, an innovative systems testing environment and an agile, attractive regulatory regime" to help ISAM technologies develop.[149]

92. Another significant subsector within ISAM technology is Active Debris Removal (ADR), which will be discussed in more detail in Chapter 5. Witnesses highlighted that developments in ADR technology could "serve as a pathway" for future commercial opportunities such as in-orbit services, asteroid mining, and space-based solar power.[150]

93. **The UK has developed a position of global leadership in the high-potential ISAM economy. Debris removal, in-space manufacturing and satellite repair and refuelling will be a significant part of the global space economy in years to come, and the Government has been proactive in providing financial and regulatory support to innovative firms in this area.**

Earth Observation

94. Earth Observation (EO) is the "process of gathering information about the Earth's surface, waters and atmosphere via ground-based, airborne and/or satellite remote sensing platforms". [151]

95. EO data allows governments and other customers to better understand and analyse issues such as "climate change, natural disaster management, food security, and sustainable development", among others.[152] Many witnesses highlighted EO technology as a key UK comparative advantage and core capability, with the National Centre for Earth Observation (NCEO) stating that "the EO community in the UK is vibrant" with " world-leading science; internationally competitive research institutes; huge impacts on public life" and "a large number of SMEs utilising EO data" for commercial purposes.[153] Space Scotland highlighted the UK as being "at the forefront of Earth Observation innovation", with Scotland alone having over thirty companies focusing on satellite data.[154]

147 Q 57 (Dr Katie King)
148 Written evidence from UKspace (SPA0085)
149 Written evidence from DSIT (SPA0082)
150 Written evidence from RAND Europe Space Hub (SPA0043) and Space Solar (SPA0048)
151 EUSPA, *What is Earth Observation?*, 17 April 2024
152 Written evidence from UKRI (SPA0044)
153 Written evidence from the National Centre for Earth Observation (SPA0067)
154 Written evidence from Space Scotland (SPA0096)

96. There are varying estimates of the market for EO, but the general conclusion drawn by various sources is that the EO market "is expected to grow very significantly", with a large part of that market being for climate-related services.[155] Know.Space estimated that EO data supports underpins £100 billion (4.7%) of UK GDP,[156] while a 2024 EUSPA report estimates EO global revenues will grow from £3 billion in 2023 up to around £5.5 billion in 2033.[157] The NCEO told us that "we consistently see very large GDP contributions from an active UK EO sector, at a European level" as well as "globally".[158] Geoff Busswell, Vice President of Business Growth at Telespazio UK described the UK EO market's growth as having "been extremely strong and resilient over the past 10 years".[159] Dr Sam Richards, Founder and Director of Meridian Space Command, argued that the UK could serve the market of emerging space nations who "increasingly require scalable, affordable, and sovereign-compatible space solutions for Earth observation", for example for disaster monitoring.[160]

97. Witnesses also explained how the EO sector is growing and changing. Professor John Remedios, Director at the National Centre for Earth Observation, explained that "there has been a huge change in the public service provision and a much cleverer system, fuelled by demand", for example the growth of Europe's EO capabilities through programmes such as Copernicus and EUMETSAT.[161] Mr Busswell noted that there has also been increasing amounts of "private investment go[ing] into private constellations".[162]

98. The UK's participation in the EU's Copernicus programme was also raised frequently by witnesses. Copernicus is the EU space programme's Earth observation component, served by dedicated satellites.[163] Mr Busswell praised Copernicus highly, stating: "I must emphasise how incredible it is; a world leading EO programme that is the envy of other continents."[164] However, witnesses also highlighted the complications that arose out of Brexit, as the UK was excluded from Copernicus until January 2024. Dr Chris Chaloner of Trym Systems Ltd stated that "the renewed access to Copernicus is of course welcome, but late, and some of the contract conditions make bidding by UK companies very difficult."[165] Mr Busswell told us that "unsurprisingly, there is a bit of a lag to get back to where we were" due to the multiyear contracts Copernicus uses, which are currently held by other countries. He also noted that "there is no geo-return rule in Copernicus as there is in ESA" and that the UK has invested money straight into the EU budget despite not being an EU country.[166]

99. Despite EO being recognised as a UK strength, witnesses also highlighted some issues encountered in the EO sector. The NCEO argued that the

155 Written evidence from the National Centre for Earth Observation (SPA0067)
156 Know.Space, *Evidencing UK Leadership in the Global Space Sector*, February 2024
157 Written evidence from the National Centre for Earth Observation (SPA0067)
158 *Ibid.*
159 Q 88 (Geoff Busswell)
160 Written evidence from Dr Sam Richards (SPA0098)
161 Q 88 (Prof John Remedios); EUMETSAT is an intergovernmental satellite agency, which monitors weather from space. It is a separate institution from ESA and the EU and has 30 member states, which include the UK. EUMETSAT, *About EUMETSAT*
162 Q 88 (Geoff Busswell)
163 European Commission, *Copernicus | Earth Observation*
164 Q 93 (Geoff Busswell)
165 Written evidence from Dr Chris Chaloner (SPA0011)
166 Q 93 (Geoff Busswell)

importance of EO is underestimated, stating that "it is not clear that the scientific and economic strength, impact and practical significance of EO is always well-recognised in government appraisal of the space sector."[167] Beyond recognition for its value, one of the issues in the EO sector is the availability of data from various sources. Prof Remedios noted that "although we find that public service data is readily available, it takes a lot of work with the commercial data providers to get that data" and that "we lack a national intermediary service in the UK", leading the NCEO to work on developing the EO Data Hub, which brings together public and commercial EO datasets in one place. He noted that the Hub has received interest from SMEs who could benefit from it.[168] Another concern was about the sovereignty of EO data. Dr Richards argued that "sovereign data is not simply a technical asset, it is a foundation for national autonomy and digital economic growth" without which EO customers will have "permanent dependence on foreign operators".[169]

100. **The UK has a strong heritage in the design and manufacture of Earth Observation satellites, as well as a strong capability in the analysis of EO datasets that can positively impact the functioning of government programmes and also stimulate downstream economic activity. EO technology is essential in the analysis of climate change and also provides significant use cases in agriculture, disaster management, the maritime sector and national security.**

101. ***Further investment in EO should be facilitated jointly by UKRI and Government departments by calling for proposals for Prosperity Partnerships between universities and UK space companies dedicated to EO, similar to the existing Prosperity Partnerships in the aerospace sector facilitated by the Engineering and Physical Sciences Research Council.***

Position, Navigation and Timing (PNT)

102. PNT satellites send users an accurate measure of their time and location, which supports much economic activity on Earth. The Chart Think Tank emphasised that downstream use of PNT "underpins everything from smartphone apps to power grid timing".[170]. A 2022 study estimated that the loss of PNT capability would cost the UK £1 billion per day.[171] UKspace emphasised that PNT "underpins all of the space capabilities".[172]

103. Rasmus Flytkjaer, Partner at London Economics, highlighted PNT resilience as an area of UK expertise, as well as its industrial capacity in PNT system development, citing UK contributions to the development of the EU's PNT programme, Galileo, prior to Brexit.[173] However, the UK does not possess an autonomous PNT capability, with the UK's PNT being "almost completely provided through Global Navigation Satellite Systems (GNSS), primarily the US Global Positioning System (GPS)."[174] Other PNT satellite systems

167 Written evidence from the National Centre for Earth Observation (SPA0067)
168 Q 90 (Prof John Remedios, Geoff Busswell)
169 Written evidence from Dr Sam Richards,(SPA0098)
170 Written evidence from The Chart Think Tank et al (SPA0066)
171 London Economics, *Economic benefits of resilient PNT in the UK* October 2022
172 Written evidence from UKspace (SPA0085)
173 Q 35 (Rasmus Flytkjaer)
174 Department for Science, Innovation and Technology, *Guidance: Positioning, Navigation and Timing: Overview*, 26 March 2025

include Russia's GLONASS and China's Beidou systems. UKspace indicated the importance of PNT in the UK, arguing that "we need a concerted effort to boost the UK PNT sector".[175] The Chart Think Tank noted that the UK government "has explored options for strengthening" the UK's PNT resilience through "potential augmentation of GPS or contributing to allied GPS-like projects".[176] Witnesses discussed the potential for the UK to find alternate sources for their PNT capabilities, such as through re-joining the EU's Galileo programme (discussed in more detail in Chapter 4).

104. Other witnesses suggested that the UK should build its own autonomous PNT system. Carol Buxton suggested that the UK "should draw from Japan's experience and develop a UK system which is complementary to the EU's Galileo and US GPS", noting that the UK "has the technical skills and knowledge" to build this.[177] However, the Durham University Space Research Centre argued that building a sovereign system is "extremely expensive and challenging."[178] The Government has recognised a need to develop the UK's PNT resilience. Its 2023 framework for Greater PNT Resilience outlined a series of commitments, including developing a PNT crisis plan and developing proposals for backup PNT resilience systems.[179]

105. **PNT capability is fundamental to the functioning of modern economies and increasingly underpins national resilience and economic activity. The UK is reliant on the US GPS for secure PNT capability but is making progress in building PNT resilience in the absence of participation in the EU's Galileo programme.**

106. ***The Government should provide clarity over their plans to improve the UK's PNT resilience to address the current vulnerability and dependence the UK holds in this area. In light of the new Security and Defence Partnership signed between the UK and the EU in May 2025, the Government should explore whether there is potential to re-join Galileo (see Chapter 3). In the absence of re-joining Galileo, the Government should provide a clear indication of its strategic plans for PNT resilience.***

Satellite communications

107. Satellite communications refers to the use of satellites to provide communications links between different points on Earth. There are currently thousands of satellites in orbit providing an array of telecommunications services, which include the transfer of voice, video, imagery and data between locations.[180] Communications satellites have historically been based in geostationary orbit but can increasingly be found in low-Earth orbit as part of large satellite constellations.

108. Professor Barry Evans, Professor of Information Systems Engineering at the University of Surrey, told us that "satellite communications provide coverage and resilience […] satellite provides, essentially, the backup" for essentials such as emergency services and utilities, and that satellite communications

175 Written evidence from UKspace (SPA0085)
176 Written evidence from The Chart Think Tank et al (SPA0066)
177 Written evidence from Carol Buxton (SPA0061)
178 Written evidence from Durham University Space Research Centre (SPA0058)
179 Department for Science, Innovation and Technology, *Guidance: Positioning, Navigation and Timing: Overview*, 26 March 2025
180 Britannica, *Development of satellite communication*, 9 October 2025

are set to continue evolving and improving—in the near future, "we should have a complete 5G connection via satellite coverage anywhere."[181]

109. Satellite communications have been widely recognised as a strength in the UK and as a valuable, central aspect of UK space policy. DSIT described the satellite communications sector as "the most crucial for growth and national security".[182] The UK is home to a number of satellite communications companies, including major players such as Viasat, , Intelsat, Avanti, and Eutelsat OneWeb,[183] and is also a "leader in ground-based manufacturing and services" for satellite communications.[184] While much of the satellite communications sector has traditionally been involved in broadcast, the sector continues to grow. Joanna Darlington, Chief Communications Officer and Executive Committee Member at Eutelsat OneWeb, told us that "the real change that has come around is LEO … This has been a massive game-changer for the industry." She went on to describe that there had also been "a real revolution" led by Elon Musk with the Starlink satellite constellation.[185]

110. The market for satellite communications is large, with UKspace stating that the global market size in 2023 was estimated at $83.29 billion and "is expected to grow at a CAGR of 10.0% from 2024 to 2030". The satellite communications sector also underpins £112 billion, or 5.4% of UK GDP.[186] UKspace argued that "the UK has the required expertise, technology and talent to capture a significant portion of the global satellite communications market over the coming decade."[187]

111. However, despite the UK's expertise in satellite communications, witnesses did raise some concerns. Prof Evans argued that issues have arisen from the "transition" to LEO constellations, which have a much larger number of satellites than previous communications platforms. He stated that "the UK does not have a sovereign satellite operator for very large numbers of satellites, and we do not have the industrial capacity to build one."[188] Joanna Darlington raised concerns about "volatility" due to geopolitical issues, as well as issues with financing. She told us that "the barriers to entry are enormous" and that "it probably costs between £7 billion and £10 billion to build a new LEO constellation." Beyond cost, another issue is the availability of radio spectrum, a finite resource which allows satellites to send and receive information. Joanna Darlington noted that OneWeb's value as an asset is particularly significant "because there will be room for maybe only four or five of these constellations—there just is not enough room and frequency available for more."[189] The issue of radio spectrum availability is discussed in more detail in Chapter 5. Witnesses also raised concerns about Starlink's influence on the satellite communications sector (see Chapter 4).

112. Eutelsat OneWeb is the result of a 2023 merger between Eutelsat, a legacy satellite company, and OneWeb, a low-orbit satellite constellation—"the only LEO constellation apart from Starlink that is operating today."[190] The

181 Q 78 (Prof Barry Evans)
182 Written evidence from Department for Science, Innovation and Technology (SPA0082)
183 Written evidence from the Space Academic Network (SPA0010)
184 Written evidence from UKspace (SPA0085)
185 Q 79 (Joanna Darlington)
186 Written evidence from UKspace (SPA0085)
187 *Ibid.*
188 Q 79 (Prof Barry Evans)
189 Q 80 (Joanna Darlington)
190 Q 78 (Joanna Darlington)

constellation seeks to deliver "high-speed, low-latency, and cost-effective connectivity."[191] The UK Government has a "golden share" in OneWeb, "which enables them to prescribe certain things that [OneWeb] can do."[192] Witnesses were positive about the UK's involvement with OneWeb. The Global Network On Sustainability in Space described the UK as "the first nation to hold a stake in a small satellite constellation network operator" due to its investment in OneWeb,[193] and Dr Richards argued that the Government's support for OneWeb has "established credibility" for the UK in satellite communications, although it "is not positioned to compete directly with global mega-constellations."[194] In July 2025, the Government announced that they would be joining the Eutelsat Group's capital increase with an investment of €163 million, maintaining its 10.89% share hold. In a letter to the Committee, Rt Hon Peter Kyle MP, the then-Secretary of State for Science, Innovation and Technology, listed three objectives for the investment: "strategic security and resilience benefits … support[ing] the growth of the UK space sector [and] establish[ing] a closer security and defence collaboration between the UK and France".[195]

113. **The global satellite communications sector is expected to grow as governments, businesses and individuals strive for seamless and resilient connectivity. The global market is increasingly dominated by the Starlink LEO constellation, but there is likely to be increasing competition from other national or private sector constellations in coming years. The UK potentially possesses a strategic asset in the form of its "golden share" in Eutelsat OneWeb, but it is unclear how the Government intends to exploit this; and whether the stake in Eutelsat OneWeb may be taken forward as a long-term commercial investment.**

Launch

114. The UK is the only nation in the world to have had sovereign launch capability and then lose it, making a decision in 1971 to not continue to pursue this capability for economic reasons.[196] Dr Adam Baker, Consultant and Co-Founder at UK Launch Services Ltd, told us that "we are the only well-developed space economy in the world that not only does not have it, but we did have it and we gave it away—and … 53 years later to be precise, we are now trying to get it back."[197]

115. The 2025 Modern Industrial Strategy identified launch as a focus alongside the five other capability areas, reflecting government efforts in recent years to support the development of the capability to launch satellites from UK soil. The Space Industry Act 2018 (and subsequent regulations) sought to provide a route for the licensing UK spaceports and space launch firms and the 2021 National Space Strategy set an ambitious target to capture the European market for small satellite launch by 2030.[198] In 2023, the first ever orbital launch from UK soil was attempted by Virgin Orbit at Spaceport Cornwall.

191 Written evidence from Eutelsat OneWeb (SPA0017)
192 Q 87 (Joanna Darlington)
193 Written evidence from Global Network On Sustainability in Space (SPA0063)
194 Written evidence from Dr Sam Richards (SPA0098)
195 Correspondence, *Letter from Secretary of State Peter Kyle to Baroness Ashton*, 10 July 2025
196 New Space Economy, *The History of the UK Space Program*, 23 June 2025
197 Q 68 (Dr Adam Baker)
198 Space Industry Act 2018; Ministry of Defence and Department for Business, Energy & Industrial Strategy, *National Space Strategy*, 27 September 2021

RAND Europe summarised this shift in approach, stating that "there is now a significant opportunity to establish the UK as a desirable launch location given the recent investments in Orbex [a UK-based launch services firm], orbital launch services for small satellites, and mid-size launcher plans for the European Launcher [Challenge]."[199]

116. The UK Government has also sought to develop several spaceports that may provide the ability for vertical and horizontal space launch (horizontal launch refers to the practice of using a traditional aircraft to take a payload to higher altitude before launching). As of 2023, there were seven spaceports under development in the UK, five of which were in Scotland.[200] The leading UK spaceport is SaxaVord in Shetland, which is one of only two spaceports to have received a Launch Operator Licence from the Civil Aviation Authority. The Government has shown its support for the prospect of sovereign space launch by actively investing in launch firms. For example, Orbex has received £20 million of investment from the Government "to support the construction and launch of the first UK-manufactured and UK-launched orbital rocket" from the SaxaVord spaceport.[201] This investment was welcomed by the Scottish Government Space Group.[202]

117. The UK has more geographic suitability for sovereign launch than almost any other country in Europe, with the exception of Norway, but it is not a competitor for launches from near the equator. Specifically, UK spaceports are suitable for polar orbits or sun-synchronous orbits. Alan Thompson, Head of Government Affairs at Skyrora, explained that launching "north over the Arctic provides an opportunity to deploy into those orbits faster than from launch sites at the equator." Moreover, launching from Scotland allows for access to the Arctic without having to fly over populated areas.[203] Space Scotland noted that "Scotland is central to the UK's vertical launch ambitions, hosting three of the most advanced UK launch sites", SaxaVord, Spaceport-1, and Sutherland. Mr Hammond emphasised the importance of geographic location for space launch, stating that "economically sustainable launch sites are vanishingly rare" and that in Europe "you are really looking at two sites, ours [SaxaVord] and Andøya [a Norwegian site]."[204]

118. Support for UK launch capability was expressed by a number of witnesses due to its potential for national security and resilience.[205] Dr Baker told us that "if you look around the world, the most developed space economies—America, China, Russia—all have indigenous or sovereign launch capability."[206] Orbex explained that "launch capability is a strategic national asset" ensuring "flexible, rapid-response access to space from British soil—boosting national security and domestic industrial resilience."[207] Dr Baker highlighted the value of access to space, stating that "in today's uncertain times, we need the ability to control our own space destiny because of

199 Written evidence from RAND Europe Space Hub (SPA0043)
200 UK Space Agency, Department for Transport and Civil Aviation Authority, *A guide to UK spaceports*, 18 April 2023
201 Written evidence from the ADS Group (SPA0026)
202 Written evidence from the Scottish Government Space Group (SPA0087)
203 Q 68 (Alan Thompson)
204 Q 71 (Scott Hammond)
205 Q 71 (Scott Hammond); written evidence from Satellite Applications Catapult (SPA0049), and The Chart Think Tank et al (SPA0066)
206 Q 68 (Dr Adam Baker)
207 Written evidence from Orbex (SPA0075)

the extraordinary importance of it to our daily lives."[208] The ADS Group suggested that sovereign launch capability could strengthen the UK's international standing in organisations such as NATO through programmes such as NATO STARLIFT by "leveraging national space expertise to support and enhance NATO's collective capabilities."[209]

119. Despite acknowledgement of the national security and resilience value of sovereign launch capability, witnesses expressed mixed views about the market potential of UK launch. Orbex told us that "the global launch and satellite market … is projected to grow to $63 billion by 2030" from $45 billion in 2022, with opportunity arising from existing long waiting lists for launch services.[210] A contrary view was expressed by Newton Launch Systems Ltd, which stated that "when last assessed in 2019, the estimated market for a small satellite launcher, launching to polar and sun-synchronous orbits was around 8 launches per annum … It was reckoned at the time that such a vehicle could just about provide a return for its investors over 10 years." Falling launch costs since this assessment was made have made the potential market for a UK-based launcher even smaller. It concluded that "the accessible market for a UK-based launcher is relatively small."[211]

120. We heard different views about the potential of having multiple spaceports in the UK. While there have been seven sites established for the building of spaceports in the UK, they have made varying progress. Only two spaceports have received licences to launch, SaxaVord and the Spaceport Cornwall.[212] Meanwhile, sites such as the Sutherland spaceport have been placed on indefinite pause—in Sutherland's case, due to Orbex, which had planned to launch from there, withdrawing its support.[213] Sutherland Launch Ltd argued that the spaceport "was only 7 months from completion and 4 months from securing its spaceport licence" when Orbex paused construction, and that it "has already secured the interest of four rocket companies."[214] Other witnesses argued that having more than one functioning spaceport would be important for resilience, with Daniel Smith arguing that the UK must "ensure that losing one spaceport would not completely remove sovereign access to space".[215] Orbex noted the potential for spaceports to "stimulate regional growth", citing northern Scotland as having "already demonstrated the potential for space to regenerate local economies, drawing on legacy skills from oil and gas and defence" and arguing that "these benefits can and should be spread more widely across the UK".[216] However, other witnesses were sceptical. Mr Hammond told us that "the other [potential spaceport] locations just do not cut it, I am afraid, from a safety point of view".[217] Dr Martin Heywood, Director at Newton Launch Systems Ltd argued that while "there is a case for a UK launcher commercially … I do not see us having multiple launches for multiple launch sites."[218]

208 Q 71 (Dr Adam Baker)
209 Written evidence by the ADS Group (SPA0026)
210 Written evidence from Orbex (SPA0075)
211 Written evidence from Newton Launch Systems Ltd (SPA0069)
212 Written evidence from DSIT (SPA0082)
213 Written evidence from Sutherland Launch Ltd (SPA0071)
214 *Ibid.*
215 Written evidence from Daniel Smith (SPA0068)
216 Written evidence from Orbex (SPA0075)
217 Q 75 (Scott Hammond)
218 Q 174 (Dr Martin Heywood)

121. We also heard about the potential of the European Launcher Challenge (ELC) for UK launch. The ELC is ESA's initiative "to strengthen Europe's position in the global space market and ensure sustainable and competitive access to space to European and worldwide customers" and will provide funding and contracts to firms developing launchers following the next ESA Council of Ministers meeting (where ESA budgets are determined) in November. Funding for launch companies selected will need to be provided by their host state, up to a maximum of €169 million [219] DSIT described the ELC as an "opportunity … for UK launch companies", stating that they "will be interested to see who applies and who is selected by ESA", though "decisions on UK participation in the ELC will form part of the ESA Ministerial Council … negotiations in the Autumn."[220] In a joint meeting with the House of Commons Scottish Affairs Committee, Chris White-Horne, Interim Space Director at DSIT and Deputy CEO at UKSA stated that "even with the best will in the world, the UK on its own is not going to support a thriving launch sector in Scotland. We have to go elsewhere, so through the European Space Agency and the European Launcher Challenge."[221] We received evidence from Orbex advocating for the UK's involvement in the ELC, which described it as "vital" to enabling the next stage of their growth and argued that it would "unlock significant job creation, strengthen the UK supply chain, and enhance sovereign launch capability".[222] Orbex is one of the five pre-selected candidates for the scheme.[223]

122. **Orbital launch represents an opportunity for the UK, given its advantageous geographic position. Whilst the market opportunities for UK-based launchers remain unclear, the security case for sovereign launch capability is strong. A sovereign launch capacity would strengthen national security, underpin the growth of the UK's space and satellite industries, and ensure that Britain remains a trusted and resilient partner within the allied space operations. It would also enable government policy to align more coherently across the Strategic Defence Review, the National Industrial Strategy and broader ambitions for regional regeneration and technological innovation.**

123. ***We recognise that a case has been made for the development of UK launch capabilities for national security purposes. However, we believe that the business case for a UK-based launcher and UK-based spaceports has not been fully proven, and that economic viability should be considered. The question of launch requires serious consideration. The Government needs to provide clear answers about the commercial opportunities available for a UK-based launcher, what kind of launch capability is needed (vertical or horizontal), the military and civil need for sovereign launch capability, and whether there is a case for building more than one spaceport.***

219 European Space Agency, *European Launcher Challenge*; European Spaceflight, *ESA Shortlists Five Companies for European Launcher Challenge*, 7 July 2025

220 Written evidence from Department for Science, Innovation and Technology (SPA0082)

221 Scottish Affairs Committee meeting concurrently with the UK Engagement in Space Committee , Inquiry into Scotland's space sector follow-up , 23 April 2025, Q 101 (Chris White-Horne)

222 Written evidence from Orbex (SPA0075)

223 Orbex, *Orbex Pre-Selected for European Launcher Challenge*, 7 July 2025

124. ***If the Government wishes the UK launch programme to be competitive, it should continue to support UK participation in the European Launcher Challenge. Early-stage launch enterprises usually require a significant degree of state support to achieve success and the contracts that would emanate from participation in the Launcher Challenge would be pivotal in allowing a UK-based launch provider to grow towards commerciality.***

125. ***If the Government wishes to progress with the pursuit of sovereign launch capability, it should consider designating UK spaceports as Critical National Infrastructure, as they are built, to underscore their strategic importance. Furthermore, the Government should consider whether strategically supporting multiple spaceport initiatives across the UK would ensure critical resilience and sovereign access to space, preventing single points of failure. We also encourage the Government to consider advancing programmes such as NATO STARLIFT, which will allow the UK to bolster allies by providing launch services.***

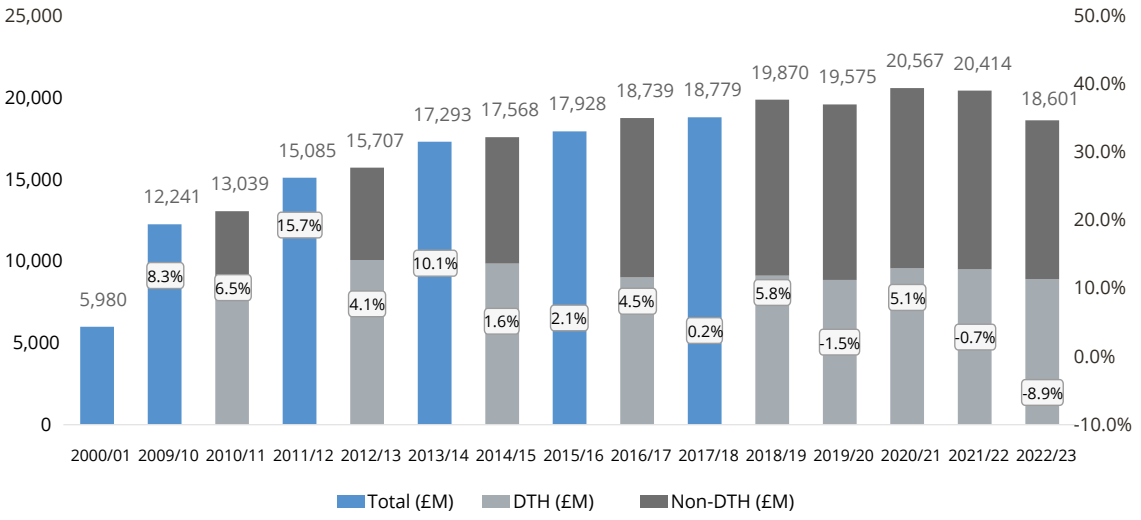
CHAPTER 3: GROWING THE UK'S SPACE ECONOMY

The UK Space Economy

126. The UK Space Agency (UKSA) recently published an updated "Size and Health of the UK Space Industry" report for the 2022/23 financial year. Amongst its key findings were:

- The UK space sector had a total income of £18.6 billion in the 2022/23 annual year (though this figure is only £9.7 billion when Direct-to-Home television broadcasting is excluded).
- The sector is comprised of 1907 organisations (a figure that has doubled since 2018). However, the industry is concentrated in a few large organisations—just 12 organisations account for 69% of the sector's income.
- The sector employs over 55,000 people, who are, on average, roughly twice as productive as the average UK employee.
- Since the financial year 2009/10, the sector has grown by an average of 3.3% per annum.
- The UK space sector contracted by 8.9% between 2021/22 and 2022/23 as a result of inflationary pressures, new barriers of access to European markets, volatility related to the war in Ukraine and residual supply chain disruptions from the Covid-19 pandemic.

Figure 5: Size and annual growth rate of the UK space sector (2001–2023)



Source: UK Space Agency, Size and health of the UK space industry 2024, 16 July 2025

127. The report noted that "survey respondents indicated optimism with respect to near-term growth", with a general expectation of increased income over the next three years.[224] Lord Willetts, Chair at UKSA, told us that the UK currently accounts for around 5% of the global space economy and that he believed that maintaining this market share would bring massive opportunities to the wider UK economy, given the global space economy is

224 UK Space Agency, Size and health of the UK space industry 2024, 16 July 2025

primed for rapid growth.[225] The Satellite Applications Catapult described the UK's space sector as "full of promise", whilst Professor Brian Cox, Professor of Particle Physics at the University of Manchester, stated that the UK possesses the necessary foundations to participate in the coming global growth of the space sector.[226]

128. However, the Satellite Applications Catapult also highlighted how the UK is on course to lose half of its global market share in the next decade, due to a slower UK growth rate than the global space economy.[227] RAND Europe argued that, "there is a window of opportunity for the UK to exploit its significant potential in space, but also a risk … that growth opportunities are missed as other nations' industrial sectors outpace the UK".[228] The University of Strathclyde informed us that the UK's space sector outperformed the global space economy between 2010 and 2015, but that "subsequent growth has broadly matched, or at times fallen below, global growth trends".[229] Notwithstanding general concerns about the level of government funding in space and a fragmented government strategy (discussed in Chapter 2), several core challenges were brought to our attention:

- Access to finance—UK-based space start-ups do not typically struggle to obtain funding for early levels of technology development. However, there is widespread concern that these firms are unable to access the finance required to commercialise their technologies and scale-up.[230]
- The UK's funding model—the UK's approach to space funding is based on the allocation of numerous small-scale grants and provides limited government procurement opportunities. We heard that this approach was sub-optimal in supporting innovative space firms to scale.[231]
- Regulation—whilst many witnesses praised the UK's forward-looking approach to space regulation, there were also calls for the UK to maintain an agile and competitive approach to regulation in a rapidly changing technological frontier.[232]
- Skills—there is a widely observed skills challenge in the sector, with firms facing fierce competition for talent from other high-tech sectors and from international competitors.[233]
- Support for universities and space science—a strong national research base is fundamental to ensuring technological competitiveness further down the line. We heard concerns that British universities were losing ground due to budgetary and institutional challenges.[234]

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225 Q 13 (Lord David Willetts)
226 Q 10 (Prof Brian Cox); Written evidence from Satellite Applications Catapult (SPA0049)
227 Written evidence from the Satellite Applications Catapult (SPA0049)
228 Written evidence from RAND Europe Space Hub (SPA0043)
229 *Ibid.*
230 Written evidence from Space Forge (SPA0019), Satellite Applications Catapult (SPA0049), The Chart Think Tank et al (SPA0066) and Dr Sam Richards (SPA0098)
231 Written evidence from Space Forge (SPA0019), ADS Group (SPA0026), Open Cosmos (SPA0036) and Satellite Applications Catapult (SPA0049)
232 Written evidence from Eutelsat OneWeb (SPA0017), Astroscale (SPA0041), Satellite Applications Catapult (SPA0049) and The Chart Think Tank et al (SPA0066)
233 Written evidence from Space Skills Alliance (SPA0018)
234 Written evidence from the Royal Astronomical Society (SPA0031), Cardiff Hub for Astrophysics Research and Technology (SPA0037) and The Open University (SPA0039)

129. This chapter will consider what interventions the Government should make to tackle these challenges. By and large the recommendations outlined below are not tied to the development of specific space capabilities—they are crosscutting in nature and are desirable irrespective of which capabilities the Government elects to focus on.

Access to finance

UK challenges

130. When it comes to technological innovation, the UK has a widely observed problem. Broadly speaking, it performs well in producing highly innovative start-up firms, but these firms often struggle to scale their operations and develop into larger, internationally competitive entities.[235] Whilst the UK challenge in scaling businesses has multiple causes, it is generally accepted that accessing capital is foremost amongst them—UK firms struggle to obtain the necessary funding required to commercialise technologies and expand. As a result of this, UK firms may have to seek funding and move operations elsewhere to do so.[236] Several other House of Lords Committee inquiries have noted the urgency of this issue.[237]

131. We heard that the space sector is not immune to this challenge.[238] Dr Sam Richards, Founder and Director of Meridian Space Command, provided an overview of the problem:

> "The UK space sector is characterised by high technical competence but constrained access to capital. While early-stage funding is supported through UK Space Agency programmes, Innovate UK grants, and R&D tax credits, there remains a critical funding gap across technical demonstration and commercial scalability … This 'valley of death' is where many promising UK space companies stall, exit prematurely to international investors, or relocate their operations entirely."[239]

132. The Satellite Applications Catapult stated that the UK's space sector is imbalanced, highlighting that 60% of UK space firms turnover less than £260,000 annually. It also stated that only 1.6% of UK space firms have scaled in the last decade.[240] Space Solar argued that "we haven't seen a breakout UK space business for a long-time" and that leading UK firms such as SSTL and AAC ClydeSpace were not supported to scale by government (indeed, RAND Europe noted that both are now owned by non-UK firms).[241] The Department for Science, Innovation and Technology (DSIT) highlighted that, in employment terms, the UK is ahead of European peers when it comes to space start-ups but that mid-cap employment is

235 Q 12 (Lord David Willetts); Q 31 (Alexandra Jones); Q 60 (Josh Western)
236 Q 106 (Mark Boggett); House of Lords Communications and Digital Committee, *AI and creative technology scaleups: less talk, more action* (2nd Report, Session 2024–26, HL Paper 71)'
237 House of Lords Communications and Digital Committee, *AI and creative technology scaleups: less talk, more action* (2nd Report, Session 2024–26, HL Paper 71)' House of Lords Science and Technology Committee, *Don't fail to scale: seizing the opportunity of engineering biology*, (1st Report, Session 2024–2,6 HL Paper 55); House of Lords Science and Technology Committee, *"Science and technology superpower": more than a slogan* (1st Report, Session 2022–23, HL Paper 47)
238 Written evidence from Eutelsat OneWeb (SPA0017), ADS Group (SPA0026), TechUK (SPA0032), UKRI (SPA0044), The Chart Think Tank et al (SPA0066) andAirbus UK (SPA0091)
239 Written evidence from Dr Sam Richards (SPA0098)
240 Written evidence from Satellite Applications Catapult (SPA0049)
241 Written evidence from RAND Europe Space Hub (SPA0043) and Space Solar (SPA0048)

much lower.[242] Joshua Western, CEO of Space Forge, noted that, whilst his firm had been successful in garnering state and private investment in the UK, "the quantum of funding that is available for scale-up companies doing as hard as a technology as we are in space is difficult to find in the UK".[243] In written evidence, Space Forge claimed that the UK effectively funds businesses up until the point of commercialisation, when funding and support drops off significantly. It stated that "comparative states [have] very effective structures to enable commercialisation at scale, such as sizable government backed procurement contracts, investment and ease of access to larger infrastructure, facilities, and talent pools".[244]

133. Mark Boggett, CEO at Seraphim Space, stated that:

> "if you are a quality early-stage company, you can access the capital that you need, by and large. The big problem is around the later-stage venture. UK and European investors are cautious largely because these companies are capital intensive and prefer not to invest in these long-term type businesses".

134. He also claimed that recent years have seen the EU seek to increase the amount of capital available to growing firms through vehicles such as the European Investment Fund, and that the UK risks getting left behind. Moreover, he highlighted that, whilst the UK ranks highly in terms of total private investment in its space sector, it performs poorly when it comes to average deal size (17th globally and 10th in Europe), which he believed indicates that the UK is good at identifying innovators, but underfunds businesses, which prevents them from "grow[ing] on the global stage".[245]

135. Investor desire for orbital demonstrations was also cited as a barrier to growth. Professor Sylvester Kaczmarek told us that UK-based space firms face challenges in finding the funding to scale technologies requiring extensive testing and validation.[246] Professor Michele Dougherty, Executive Chair at the Science and Technology Facilities Council, told us that "UK seed investors frequently require in-orbit demonstration of their hardware before they will invest".[247]

136. There was widespread concern that these funding challenges would result in UK-based space firms moving operations to other countries. Mr Western noted that his firm was "continually inundated with offers from Europe, the Middle East and America to shift our HQ to their country".[248] Mr Boggett argued that "there is a huge risk that they [UK firms] will go overseas" at the point it becomes clear that they will not be able to access capital in the UK, noting that "UK companies are getting half of what their US counterparts are getting in every [funding] round".[249] Dr Richards argued that, as a result of firms being acquired by international competitors or redomiciling, "taxpayer-backed innovation frequently delivers long-term value to foreign markets, not the UK economy".[250]

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242 Written evidence from Department for Science, Innovation and Technology (SPA0082)
243 Q 60 (Joshua Western)
244 Written evidence from Space Forge (SPA0019)
245 Q 107 (Mark Boggett)
246 Written evidence from Prof Sylvester Kaczmarek (SPA0015)
247 Q 106 (Prof Michele Dougherty,)
248 QQ 60–62 (Josh Western)
249 Q 109 (Mark Boggett)
250 Written evidence from Dr Sam Richards (SPA0098)

137. **The space sector faces the same capital access challenges as many other high-tech sectors in the UK. The sector has a vibrant start-up and R&D ecosystem but firms struggle to commercialise and scale-up due to inability to access requisite finance in the UK. There is a risk that UK-based firms will move abroad if they are not able to acquire necessary funding in the UK.**

138. ***We note that several other committees in the House of Lords have produced reports highlighting the challenges faced by technology firms in the UK in obtaining access to the capital required to commercialise their technologies and grow. Whilst we welcome recent Government initiatives to address these issues, we affirm the critical importance of Government policy in addressing funding challenges faced by innovative UK tech firms.***

Attracting private capital

139. We heard about government efforts to increase the amount of private investment in UK-based space technology. The Government will host a Space Investment Conference in December 2025 and, through the Unlocking Space for Investment programme (which provides engagement and education opportunities for both firms seeking investment and potential space investors), UKSA is seeking to broaden the investor pool for UK space tech.[251] We also heard about positive trends when it came to the investment landscape in the UK, with increased activity from venture capital funds in UK space tech and the use of government vehicles, such as InnovateUK, the UK Science and Innovation Seed Fund, the British Business Bank, the National Wealth Fund, and UK Export Finance, to bridge the finance gap and de-risk future private investment in the sector.[252] These movements have occurred against the backdrop of wider government efforts to improve capital access for innovative companies.[253]

140. We heard further suggestions about how the Government could use the UK's public finance institutions to stimulate greater private sector investment in space. Mr Boggett noted that, whilst the British Business Bank does invest in space venture funds, it is far less ambitious than the European Investment Fund and similar funds in countries such as Italy. He encouraged the British Business Bank and National Wealth Fund to be more ambitious in injecting capital into the UK space sector.[254] The Chart Think Tank recommended that the UK launch a "Space Growth Challenge Fund" through the British Business Bank or National Wealth Fund, which would invest in promising space firms seeking to scale.[255] Dr Richards claimed that the British Business Bank and National Wealth Fund still had limited exposure to space and argued for the development of "matched public-private equity funds" for

251 Written evidence from ADS Group (SPA0026) and UK Space Agency (SPA0100)

252 Q 15 (Dr Paul Bate); written evidence from the Department for Science, Innovation and Technology (SPA0082) and UK Space Agency (SPA0100)

253 Department for Science, Innovation and Technology, *Lord Vallance speech at the BVCA Pensions and Private Capital Showcase*, 3 October 2025; British Business Bank, *British Business Bank commits £6.6bn to back innovation as part the UK's modern Industrial Strategy and to unlock potential for entrepreneurs across the UK, 23 June 2025*; Department for Business and Trade, *The UK's Modern Industrial Strategy 2025*, 23 June 2025

254 QQ 107–109 (Mark Boggett)

255 Written evidence from The Chart Think Tank et al (SPA0066)

space technology, in which the Government would co-invest in firms with UK-based institutional investors.[256]

141. Nayen Pankhania, Strategy and Consulting Director at the Satellite Applications Catapult, claimed that the Government should visibly signal that it wants London to be a global centre for space finance and should provide strong cross-party support for the space sector to provide firms with confidence that the policy environment will remain stable.[257] The Chart Think Tank recommended the establishment of a Space Investment Forum that "regularly convenes government, investors, and industry to identify financing gaps and coordinate solutions".[258]

142. Others focused on the need for investor education. Rory Daniels, Senior Programme Manager of Emerging Technologies at TechUK, claimed that investors perceive space activity as "high-risk, very technical and capital-intensive".[259] Prof Kaczmarek spoke of an "investor expertise gap" which can "lead to an under-valuation or avoidance of genuinely innovative but complex technologies".[260] Mr Boggett lamented the "lack of knowledge around the space market and dual use" amongst investors, whilst the Satellite Application Catapult also called for "better investor education".[261]

143. ***We welcome government efforts to promote the UK space sector to the investment community and facilitate greater understanding about the potential of UK-based space firms. The Government should create another five Science and Technology Venture Capital Fellowships, which should focus specifically on space technology.***

144. ***We urge the British Business Bank to take a more proactive, ambitious, and tailored approach to financing space technology, comparable to leading European counterparts. This is critical to ensure that UK-based space firms have access to the capital they require to commercialise and grow into national champions.***

The UK's funding model

Business grant funding

145. One of the primary roles played by government in the UK space sector is the provision of grant funding for firms and research institutions to stimulate innovation.[262] The UK Space Agency leads on grant delivery to businesses in the sector and seeks to ascertain the efficacy of grant initiatives through measuring the amount of private investment they generate (this is known as UKSA's "North Star Metric"). Dr Paul Bate, CEO at the UK Space Agency, told us that UKSA's grant programmes have been successful and have supported companies to raise money on capital markets or from parent companies.[263]

146. However, we also heard evidence that the UK's approach to grant funding was sub-optimal. One common criticism was that UKSA delivers many small

256 Written evidence from Dr Sam Richards (SPA0098)
257 Q 111 (Nayen Pankhania)
258 Written evidence from the Chart Think Tank et al (SPA0066)
259 Q 169 (Rory Daniels)
260 Written evidence from Prof Sylvester Kaczmarek (SPA0015)
261 Q 106 (Mark Boggett); written evidence from Satellite Applications Catapult (SPA0049)
262 Written evidence from the Department for Science, Innovation and Technology (SPA0082)
263 Q 15 (Dr Paul Bate)

grants to a large amount of businesses, as opposed to providing larger grants and government contracts (see below) to a smaller number of high-potential firms.[264] Written evidence from the Satellite Applications Catapult noted that many of the UK's space start-ups are heavily reliant on government funding and would likely fail if the funding environment shifted.[265] ADS Group criticised the Government's approach, arguing that "for too long the UK has issued its space grant funding pot in small, fragmented amounts, achieving minimal market impact" and recommended a new minimum "floor" of £2 million for grants.[266] Space Forge noted that the average grant size delivered by UKSA was below £100,000 in 2023/24, arguing that "funding is being sprinkled around in small amounts to a large number of small companies and so does not create an effective environment for rapid growth".[267] Several witnesses told us that this fragmented approach should be replaced by one in which the Government "picks winners" through concentrating funding to those firms which it believes has the capacity to be world leading.[268]

147. Others have noted that timelines for grant funding have made forward planning difficult. RAND Europe noted that short funding cycles (in recent years, they have lasted only 12 months) make it "difficult for innovative businesses to plan ahead and align to government's space R&D goals" and also creates hesitancy amongst private investors.[269] Astroscale agreed, arguing that multi-year funding cycles were required to give businesses "long-term certainty" and the ability to commit to programmes with a longer timeframe.[270] UKspace noted the long-term timelines of scientific and commercial space activities and argued that the success of researchers and firms in the UK is "hampered by a short-term approach to funding and policy development".[271] Rasmus Flytkjaer, Partner at London Economics, compared the UK approach unfavourably to the European Space Agency, which operates on three-year funding cycles.[272]

148. Lastly, we heard that the current funding environment was difficult for businesses to navigate. Will Lecky, Co-founder at Know.Space, claimed that the funding environment for space consisted of many different organisations and programmes and was difficult to navigate for those who did not know the sector well.[273] Mr Pankhania claimed that it is challenging for SMEs to navigate the ecosystem, as their small size makes staying on top of various funding streams difficult.[274] RAND Europe cited research conducted for UKSA that found that companies face uncertainty about when calls for funding will be made (and their regularity) and would prefer more advanced notice from government on this front.[275]

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264 Q 109 (Mark Boggett), written evidence from Space Forge (SPA0019), ADS Group (SPA0026), Open Cosmos (SPA0036), RAND Europe Space Hub (SPA0043) and Satellite Applications Catapult (SPA0049)
265 Written evidence from Satellite Applications Catapult (SPA0049)
266 Written evidence from ADS Group (SPA0026)
267 Written evidence from Space Forge (SPA0019)
268 Q 97 (Prof John Remedios), Q 109 (Mark Boggett), Q 176 (Phil Chambers); written evidence from Space Solar (SPA0048)
269 Written evidence from RAND Europe Space Hub (SPA0043)
270 Written evidence from Astroscale (SPA0041)
271 Written evidence from UKspace (SPA0085)
272 Q 41 (Rasmus Flytkjaer)
273 Q 37 (Will Lecky)
274 Q 109 (Nayen Pankhania)
275 Written evidence from RAND Europe Space Hub (SPA0043)

149. **One of the core functions of the UK Space Agency is to provide grant funding to support firms in developing innovative technology. However, we heard that UKSA's approach to grant funding faces significant issues. Its approach is fragmented, providing small amounts of funding to many businesses, which limits the impact government investment has. Funding timelines, for reasons beyond UKSA's control, have been too short term, which prevents businesses from planning ahead and creates uncertainty for investors. And the current funding environment, with many different programmes and stakeholders, remains challenging for businesses, especially SMEs, to navigate.**

150. ***Grant funding calls from UKSA should be streamlined and occur at a known cadence within each 3-year spending review cycle.***

Contracts

151. We heard significant evidence of existing government procurement of space data and services, which include the Home Office's use of satellite data for vessel detection, Scottish Forestry's work with industry to develop a pest and disease detection system for trees and the UKSA's purchase of methane emissions data for use across government.[276] The Ministry of Defence, which accounts for roughly half of UK space spending, is involved in procurement operations for military space capabilities such as satellite communications and Intelligence, Surveillance and Reconnaissance.[277] In July 2025, UKSA announced a £75.6 million procurement opportunity to de-orbit two non-functioning UK licenced satellites from LEO by late 2028.[278]

152. However, one of the core messages received from witnesses was that, by and large, the UK still operates using a grant-based funding model and needs to move towards more public contract opportunities.[279] This is recognised within government. Alexandra Jones, Director-General for Science, Innovation and Growth at DSIT, claimed the department recognised that "grants matter … but we know from firms that it is the contracts, it is the procurements, that are important".[280] The Space Industrial Plan laid out an ambition for the Government to be "a more intelligent customer for space technology with a more appropriate, well informed risk appetite for procuring innovative space services".[281]

153. Witnesses highlighted the value of contracts relative to grant funding. Mr Western noted that "contracts allow me to leverage private finance to a much greater extent" by demonstrating that his firm had concrete support and oversight from a government customer, whilst Dr Joanna Hart, Director at Space Partnership, noted the ability of firms to borrow against contracts.[282] Richard Blain, Founder and Chairman at Earth-I Ltd, highlighted how a

276 Q 91 (Geoff Buswell); Q 18 (Dr Paul Bate); Scottish Affairs Committee meeting concurrently with the UK Engagement in Space Committee , Inquiry into Scotland's space sector follow-up , 23 April 2025, Q 66 (Dr Pamela Smith)
277 Written evidence from UKspace (SPA0085)
278 UK Space Agency, *UK launches tender for mission to clean up space and safeguard vital services*, 3 July 2025
279 Q 60 (Joshua Western); Q 72 (Scott Hammond); Q 93 (Richard Blain, Founder & Chairman, Earth-i Ltd); Q 100 (Major Tim Peake)
280 Q 31 (Alexandra Jones)
281 Department for Science, Innovation and Technology and Ministry of Defence, *https://www.gov.uk/government/publications/space-industrial-plan*, March 2024
282 Q 60 (Joshua Western); Q 157 (Dr Joanna Hart)

secure government customer removes market risk and that small procurement commitments from government can facilitate the crowding-in of significant private investment.[283] The Scottish Government Space Group provided a summary of the general benefits of procurement:

> "Public sector contracts bring benefits to both parties; for industry, a public sector contract is a valuable signal to the investment community for the purposes of attracting further investment. For the public sector, benefits are generated from the ability to re-shape public service delivery through use of satellite-data derived applications".[284]

154. Several witnesses advocated for an improved approach to government procurement of space data and services. Mr Daniels called for a "dedicated downstream procurement strategy" which is centred around national priorities such as defence, resilience and environmental protection.[285] Mr Pankhania made a similar point, arguing that the Government had to identify issues that could be solved by using satellite data and services, as opposed to buying services "for the sake of [it]".[286] Colin Baldwin, Executive Director at UKspace, called for a more joined-up approach to procurement across Government, claiming that a fragmented approach across departments means that promising opportunities with wide use cases are deemed unaffordable.[287]

155. Lord Willetts noted that many government departments were still not alive to the benefits that space-based data and services could bring, claiming that "you find some places that absolutely get it and are keen to be strategic in using space-based services; there are other places where you are knocking your head against a brick wall".[288] Mr Daniels also noted the lack of demand within government, claiming that "government adoption of [space] services is still low".[289]

156. Beyond the procurement of data and services for immediate government use, there was also support for the Government acting as an anchor customer for future space capabilities. Several representatives from sub-sectors without an established market (such as debris removal, space-based solar power and in-space manufacturing) called on the Government to act as a first customer that would help create a market for their products and services.[290] Such an approach would see the Government use contracts not to satisfy immediate end-user needs but to help develop national capabilities and create "globally competitive national champions" in nascent areas of the space economy.[291] Mr Flytkjaer noted the example of SpaceX in the US, which was awarded significant government contracts (with milestone payments) for future launches before the firm had successfully tested its early technology. He claimed that this example showed that a government with a clear idea of what services it needs can help firms develop a foothold in the market.[292]

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283 Q 93 (Richard Blain)
284 Written evidence from the Scottish Government Space Group (SPA0087)
285 Q 172 (Rory Daniels)
286 Q 111 (Nayen Pankhania)
287 Q 196 (Colin Baldwin)
288 Q 18 (Lord David Willetts)
289 Q 172 (Rory Daniels)
290 Q 60 (Dr Rory Holmes, Joshua Western); Written evidence from Space Solar (SPA0048)
291 Written evidence from Open Cosmos (SPA0036)
292 Q 44 (Rasmus Flytkjaer)

157. We were concerned about how industry's desire to move towards a contracts-based funding model would align with current budgetary pressures. Mr Pankhania claimed that government needed to improve the procurement process to use public money better (e.g. through co-ordinating procurement across departments) but also claimed more money would be required to procure sovereign capabilities for public and military usage.[293] Space Forge argued that the amount of public funding was not a problem, but solely the way the Government elected to deploy it.[294] Open Cosmos argued that larger, strategic contract funding will eliminate grant dependence within the sector and that "it is possible to deploy government funding to unlock value at scale without creating a recurrent call on public monies".[295]

158. **Providing public procurement opportunities for innovative space firms is the most effective way that government can attract private capital into the UK space sector and facilitate the growth of national champions with global competitive advantage. We have heard extensive evidence that the award of government contracts allows businesses to demonstrate they have an initial customer and crowd-in private investment.**

159. ***We support the Government's commitments to become a smarter procurer of space-based data and services. However, it remains unclear what concrete plans are underway to achieve this aim. UKSA (within DSIT) should therefore publish a procurement strategy, outlining the steps it intends to take in this area and how government departments can better utilise space data and services produced by UK firms.***

160. ***Whilst recognising the importance of R&D grant funding, we recommend that UKSA realign its funding system to offer more public contract opportunities relative to small-scale grant funding. By acting as an anchor customer for firms developing novel space systems (e.g. ISAM), UKSA can help generate private sector investment in UK-based space firms, build the UK's industrial base and help create globally competitive space businesses. UKSA should publish annual data on the number and value of space-related contracts it (and other government departments) tender, alongside the number and value of grant awards it issues.***

Regulation

Space regulation in the UK

161. Space regulation in the UK flows from the UK's international obligations as a party to the 1967 Outer Space Treaty (which provides the basic framework for international space law) and the 1972 Convention on International Liability for Damage Caused by Space Objects, which stipulates that states are liable for damages caused by their space objects on Earth and are liable for damage due to faults in space (for a more detailed discussion of international space law, see Chapter 5).[296] The Space Industry Act 2018 is the main piece

293 Q 110 (Nayen Pankhania)
294 Written evidence from Space Forge (SPA0019)
295 Written evidence from Open Cosmos (SPA0036)
296 UNOOSA, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 1966; UNOOSA, *Convention on International Liability for Damage Caused by Space Objects*, 1971

of legislation regulating the UK's domestic space industry. The Act was introduced to "create a framework for the expansion of commercial space activities" and requires those wishing to launch rockets, manage spaceports or operate satellites to obtain a licence.[297] The Civil Aviation Authority (CAA) was appointed as the regulator of space activities in 2021 and has issued over 385 licences since.[298] The Space Industry (Indemnities) Bill is currently passing through Parliament with cross-party support, and seeks to alter the legislation to "require operator licences authorising the carrying out of spaceflight activities to specify the licensee's indemnity limit".[299]

162. In May 2024, the Government published the Space Regulatory Review, which provided a framework for the consideration of future space regulations and considered the effectiveness of the current licensing regime. It stated that there was "overwhelming evidence" that the legislation was performing well and allows for safe access to space without preventing innovation or growth. The report included several recommendations for improvement, which included the reduction of the "time, cost and complexity" of licence applications, the development of financial tools and incentives to promote sustainable activity, and the publication of clear policy and guidance on the regulation of emerging technology areas such as AI and quantum tech. These recommendations will be taken forward by a "cross government implementation team" that will be co-ordinated by DSIT.[300]

163. We heard widespread evidence that the UK was performing well in its approach to regulation. The University of Strathclyde described the UK as a "global leader in the modern regulation of space activities" and Space Solar praised the Government for "using regulation as a market enabler".[301] Professor Joanne Wheeler MBE, Director at the Earth Space Sustainability Initiative, praised the UK's "outcomes-based" approach to regulation, which gives applicants flexibility to meet certain outcomes as opposed to a more rigidly prescribed approach.[302] Mr Hammond also praised outcomes-based regulation as "the way to go", and compared it favourably to the US approach.[303] Mr Western noted that the ability to engage with regulators was a UK strength and that many other countries do not allow for such continuous engagement. He also noted that the speed and engagement with regulators have improved significantly since 2023.[304]

164. The UK has also been praised for exhibiting leadership in regulating Rendezvous and Proximity Operations (RPO), by running a "regulatory sandbox" to explore the regulatory challenges associated with satellites that work in close proximity with others (such as debris removal, refuelling and

297 HM Government, *Understanding the Space Industry Act*. Acquiring a licence requires passing key legislative tests in the following areas: national security; national interest; financial and technical resources; international obligations; fit and proper persons; safety assessment; and environmental assessment. Orbital operator licenses do not require safety or environmental assessments. Civil Aviation Authority, *Space licensing in the UK*, 2023

298 Scottish Affairs Committee meeting concurrently with the UK Engagement in Space Committee , Inquiry into Scotland's space sector follow-up , 23 April 2025, Q76 (Colin Macleod)

299 , Space Industry (Indemnities) Bill

300 House of Commons Library, *The UK Space Industry*, CBP 9202, 30 June 2025; Department for Science, Innovation and Technology, Department for Transport, Department for Business and Trade and Ministry of Defence, *Space Regulatory Review 2024*, 16 May 2024

301 Written evidence from Eutelsat OneWeb (SPA0017), University of Strathclyde (SPA0033) and Space Solar (SPA0048)

302 Q 115 (Prof Joanne Wheeler)

303 Q 76 (Scott Hammond)

304 Q 65 (Josh Western)

on-orbit servicing).[305] Indeed, Astroscale (a participant in the RPO sandbox) claimed that the UK's leadership in regulating In-Orbit Servicing, Assembly and Manufacturing (ISAM) technologies has allowed it to position itself as a world-leader in the sub-sector.[306] Mr Western noted the UK's leadership in the regulation of in-space manufacturing, noting that the UK is one of only two countries to award an in-space manufacturing licence.[307] The UK was also the first country to licence an ADR demonstrator mission in 2021.[308]

Box 6: Rendezvous and Proximity Operations Regulatory Sandbox

The Rendezvous and Proximity Operations (RPO) Regulatory Sandbox was established in response to the Government's 2024 Space Regulatory Review, which highlighted the need for more effective licensing processing for emerging technologies and mission-types in space. RPO operations (which involve two spacecraft operating closely to one another) are a crucial component of future debris removal, refuelling or repair operations. The sandbox saw government and industrial partners (Astroscale, ClearSpace and D-Orbit) work together to simulate the licensing process and explore gaps in the UK's regulatory regime that needed to be addressed before RPO operations could be licenced. We heard that the process "provided a valuable forum for Government, regulator, and industry to come together and examine … legal and regulatory gaps in depth". However, the findings of the sandbox showed that, whilst the UK's licensing framework does not prohibit the licensing of RPO operations, the licensing process was not designed with these missions in mind and that there was "substantial uncertainty and operational friction" for firms wishing to gain licenses for RPO operations. The project made over 60 targeted recommendations to government to improve the licensing process for RPO missions.

Source: Written evidence from RPO Consortium (SPA0092)

165. We heard that the newly established Regulatory Innovation Office (RIO), which has been established to "streamline the regulatory process, reduce bureaucratic hurdles, and facilitate the rapid deployment of innovative products and services", will focus on space technology as one of its four key priority sectors. RIO is currently working with the CAA to improve licensing processes, and the Satellite Applications Catapult encouraged the body to focus on innovative ISAM regulations.[309]

166. **The UK has developed a strong regulatory environment for its space sector which maintains general support from industry. The UK's outcome-focused approach, alongside the ability of industry to work with regulators are core features of a space regulatory environment that enables innovation.**

167. ***We welcome recent announcements on the Regulatory Innovation Office's space remit and the results of the RPO sandbox. Initiatives like these indicate a desire for the UK to position itself at the regulatory frontier for space technology and a willingness to engage***

305 Written evidence from Astroscale (SPA0041), Royal Aeronautical Society (SPA0057) and RPO Consortium (SPA0092)
306 Written evidence from Astroscale (SPA0041)
307 Q 65 (Josh Western)
308 Written evidence from the Department for Science, Innovation and Technology (SPA0082)
309 Written evidence from Satellite Applications Catapult (SPA0049) and the Department for Science, Innovation and Technology (SPA0082)

with novel mission types. The pursuit of regulatory innovation, including the simplification and streamlining of licensing and regulatory processes for spaceports and launch activities, should remain a central goal for Government.

Regulatory challenges

168. Despite this support, witnesses also indicated that there are several problems with the UK's regulatory approach. Prof Wheeler claimed that, whilst the UK regulatory model still retains many strengths, the Government has been "complacent" and other countries have caught up over the last ten years.[310]

169. We heard concerns about whether the Civil Aviation Authority possessed the relevant sectoral knowledge to regulate effectively. Patrick Wood, then-Head of Space Systems UK at Airbus, noted that the CAA had to "go up a pretty steep learning curve with launch and satellite operators" and that some of its behaviour is difficult to understand from an industry perspective.[311] Dr Adam Baker, Consultant and Co-Founder at UK Launch Services Ltd, told us that "a lot of our space businesses thrive and succeed in spite of rather than thanks to the regulator" citing lack of experience within the CAA as a core problem.[312] Eutelsat OneWeb argued that there is an expertise gap when it comes to UK space regulators and that "it is crucial that investment is made in developing the necessary expertise within regulatory bodies".[313]

170. Several witnesses made comment on the cost, complexity and time requirements of licensing. The Satellite Applications Catapult noted the finding from the Space Regulatory Review that indicated that licensing costs need to be kept to a minimum to maintain UK competitiveness.[314] Alan Thompson, Head of Government Affairs at Skyrora, expressed dissatisfaction at the length of time it had taken for his firm to achieve a licence—it had applied for one in 2022 and had still not received it at the time of his evidence.[315] Eutelsat OneWeb highlighted the tiered licensing processes used in France and the US, which allow established satellite operators a fast-track licence, an approach which could help the UK attract a wider range of operators. It also argued that there should be a "defined timeframe" for licences to be processed.[316] Space Forge agreed, noting that there are legislative limits of six months for licence application processing in Australia and Portugal. It claimed that "business-as-usual" licensing should be distinguished from "novel mission types [which] often require more intense scrutiny".[317]

171. The Satellite Applications Catapult criticised the regulatory regime as being too onerous for small businesses, claiming that space missions often require three licences: an operator licence from the CAA, a Permanent Earth Station licence from Ofcom and an export licence (if the mission is being launched elsewhere).[318] It also warned against excessive sustainability criteria for UK licences as these would increase operating costs for companies in the UK and

310 Q 115 (Prof Joanne Wheeler)
311 Q 52 (Patrick Wood)
312 Q 76 (Dr Adam Baker)
313 Written evidence from Eutelsat OneWeb (SPA0017)
314 Written evidence from Satellite Applications Catapult (SPA0049)
315 Q 76 (Alan Thompson). Skyrora eventually received a licence to conduct spaceflight operations in August 2025. BBC News, *First UK-based firm gets space launch licence*, 5 August 2025.
316 Written evidence from Eutelsat OneWeb (SPA0017)
317 Written evidence from Space Forge (SPA0019)
318 Written evidence from Satellite Applications Catapult (SPA0049)

incentivise them to move elsewhere.[319] Daniel Smith, Trade and Investment Envoy for Space at the Scottish Government, argued that "admin-intensive application processes can add unnecessary pressures" on small firms, citing sub-orbital launch as an area where the regulatory burden disincentivises testing of technology.[320]

172. Others criticised the Space Industry Act 2018 for being too launch-focused. Astroscale, an in-orbit services firm, argued that security requirements placed on "space sites" make sense for spaceports but are excessive for non-launch sites such as Astroscale's Mission Control Centre in Harwell.[321] The Scottish Government Space Group noted that there is a "lack of clarity around areas away from core launch activity", including cybersecurity, export licensing and dual-use technologies.[322]

173. Some noted that the rapid growth of the global space sector would necessitate an agile approach to regulation that accounts for new technological developments. Mr Western argued that the UK does not currently allow for re-entry vehicles to return to the UK, which is a crucial part of Space Forge's business model.[323] Prof Wheeler noted other gaps in the legislation, such as human spaceflight, very large rockets and space resource extraction.[324] The Chart Think Tank argued that "going forward, industry seeks quicker turnaround times for licences and regulatory guidance on novel activities like in-orbit servicing, space tourism, and mega-constellations".[325]

174. **The UK possesses a strong and internationally renowned regulatory regime for space technologies. However, future technological developments will necessitate an adaptive regulatory regime capable of enabling new technologies whilst ensuring public safety and compliance with international agreements. In-space manufacturing, debris removal, space-based solar power and in-orbit servicing may have seismic impacts on the space economy, and businesses operating in this area will require an enabling regulatory environment.**

175. ***We welcome the establishment of a dedicated team within DSIT that will focus on maintaining UK regulatory competitiveness. Addressing the time, cost and complexity of the licensing process, as well as ensuring innovative technologies can be brought to market in the UK should be a matter of priority for this new unit and it should be backed with the authority to make an impact.***

176. ***The Government should consider introducing a maximum time limit of six months for the licensing of established activities in space. Such a move would give confidence to investors that innovative UK-based businesses will not suffer from extended periods of regulatory uncertainty.***

177. ***Furthermore, we recommend that the Government evaluate the benefits and risks of merging the Outer Space Act 1986 and the Space Industry Act 2018 into a single, comprehensive framework.***

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319 *Ibid.*
320 Written evidence from Daniel Smith (SPA0068)
321 Written evidence from Astroscale (SPA0041)
322 Written evidence from the Scottish Government Space Group (SPA0087)
323 Q 63 (Joshua Western)
324 Q 115 (Joanne Wheeler)
325 Written evidence from The Chart Think Tank et al (SPA0066)

This would aim to simplify and streamline regulatory processes for spaceports and launch activities, fostering a more agile and competitive environment.

Skills

The space skills challenge

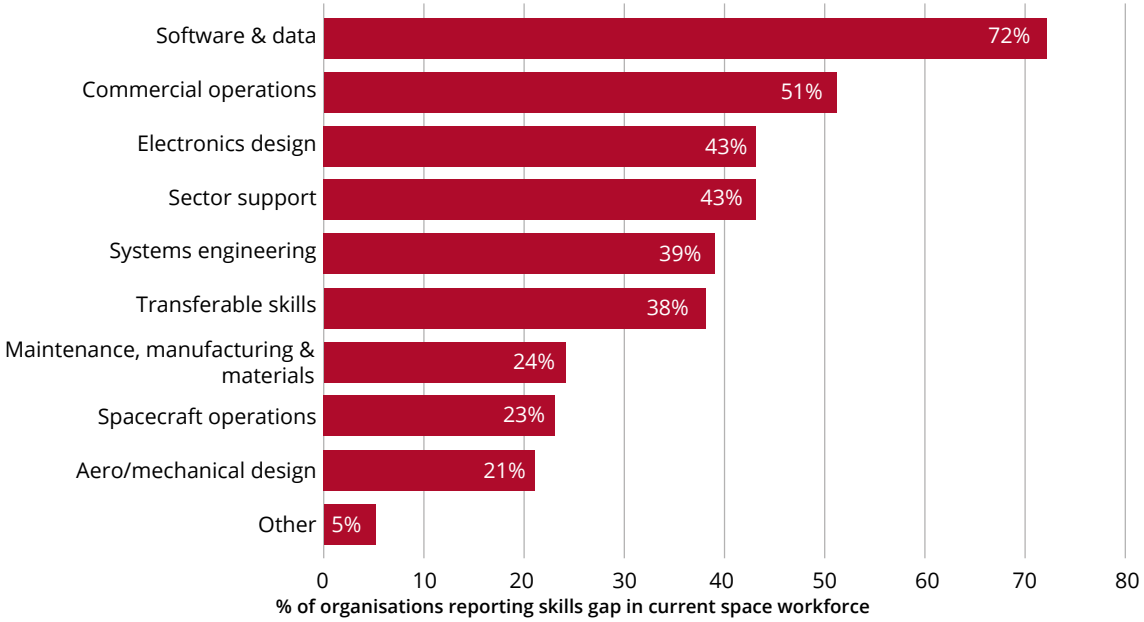
178. The 2023 Space Sector Skills Survey (the most recent comprehensive analysis of the UK space skills landscape) was widely discussed in evidence we received. The report highlighted that 52% of space organisations reported skills gaps in their current workforce, 61% reported skills gaps in job applications and 95% reported having some form of skills challenge.[326] Several witnesses viewed skills development as a core impediment to the growth of the sector.[327]

179. However, not all witnesses recognised the existence of a skills challenge within the sector. Mr Western argued that "space is cool" and that his company, Space Forge, receives an average of over 50 candidates per post.[328] However in response to this, the Space Skills Alliance, a think tank that is focused on space skills development, noted that "Space Forge is one of the highest profile companies in the sector with a charismatic CEO, a good reputation, and a sensible approach to recruitment" and that other space companies without such attributes face significant recruitment issues.[329]

180. The prevalent view we heard was that the sector faces significant skills challenges. Several key issues were brought to light. Firstly, the space sector faces significant competition from the tech and finance sectors. The Space Skills Alliance noted that "though some of the space sector's skills needs are space specific, the majority are more general STEM skills" and argued that the space sector is therefore locked in a wider competition for STEM skills with other sectors.[330] Professor Lucy Berthoud, Professor of Space Engineering at the University of Bristol, noted that graduate aerospace engineers could expect an average starting salary of £30,000, compared to £80,000–£90,000 in finance or management consultancy.[331] Written evidence from Space Forge noted that software development and financial services were more established commercial sectors and therefore could offer significantly higher salaries.[332]

326 UK Space Agency, *Space Sector Skills Survey 2023 Report*, 13 September 2023; written evidence from the Space Skills Alliance (SPA0018), Royal Astronomical Society (SPA0031) and TechUK (SPA0032)
327 Written evidence from the Space Skills Alliance (SPA0018), Satellite Applications Catapult (SPA0049) and the Royal Aeronautical Society (SPA0057);
328 Q 61 (Josh Western)
329 Written evidence from Space Skills Alliance (SPA0018)
330 *Ibid.*
331 Q 159 (Lucy Berthoud)
332 Written evidence from Space Forge (SPA0019)

Figure 6: Percentage of UK space organisations reporting skills gaps, by skill type



Source: UK Space Agency, Space Sector Skills Survey 2023 Report, 13 September 2023

181. A second core feature of the space skills challenge is that it is most prominent at the mid-career level. The Space Skills Alliance highlighted that, whilst graduate schemes are often significantly oversubscribed, 60% of vacancies in the sector are for mid-career roles.[333] Richard Thorburn, then-COO at Thales Alenia Space, argued that "there is a very limited pool of experienced space engineers", whilst the Satellite Applications Catapult stated that the sector's rapid growth has meant "expansion has outstripped the rate of experience gain".[334] Surrey Satellite Technologies Ltd noted that in the absence of a strong national mission to "rally around" graduates in the sector struggle to see opportunities for progression and seek jobs in other industries or space sectors abroad, thus diluting the pool of experienced professionals.[335]

182. A third, related, challenge is the lack of early-career opportunities for graduates. Dr Heidi Thiemann, Director at the Space Skills Alliance, told us that bright students "come out of university and they have nowhere to go" and subsequently move to other sectors where there are greater opportunities.[336] Dr Joanna Hart, Director at Space Partnership, claimed that providing opportunities for these candidates is a crucially important task, as these individuals will eventually fill the gap when it comes to mid-career roles.[337]

183. A fourth challenge pertains to immigration and visa issues. Several leading space firms and academic institutions highlighted the international nature of their workforce to us and noted concerns with visa costs and paperwork as potential barriers to growth.[338] Recent data indicates that 13% of the

333 Written evidence from Space Skills Alliance (SPA0018)
334 Q 54 (Richard Thorburn, COO, Thales Alenia Space UK); written evidence from Satellite Applications Catapult (SPA0049)
335 Written evidence from Surrey Satellite Technologies (SPA0027)
336 Q 161 (Dr. Heidi Thiemann)
337 Q 154 (Dr Joanna Hart)
338 Q 61 (Dr Rory Holmes); written evidence from Space Forge (SPA0019), Cardiff Hub for Astrophysics Research and Technology (SPA0037) and Astroscale (SPA0041)

UK's space workforce are foreign nationals.[339] Dr Thiemann noted that over half of UK space organisations who had tried to recruit from abroad cited issues with the cost and paperwork associated with visas.[340] Prof Berthoud emphasised that the UK space sector is locked in a global competition for space skills with better funded competitor states. She stated that current visa requirements represented "self-harm" to the sector, as the current skilled worker minimum salary is above the market rate for early career space professionals.[341]

184. Lastly, we heard that the sector faces challenges when it comes to diversity. The Chart Think Tank highlighted the 2020 Space Census, which showed that "women and several other demographic groups are under-represented in the UK space workforce".[342] Dr Katie King, founder and CEO at BioOrbit, noted the difficulty in ensuring gender diversity within her team, whilst the University of Strathclyde noted that "advantaged socioeconomic backgrounds [are] overrepresented in the sector".[343]

185. **The UK space sector faces a significant skills challenge which will act as an impediment to growth if left unsolved. The UK space skills landscape is characterised by significant competition with other high-tech sectors for data, AI and software development talent; a lack of early-career roles for talented graduates; skills shortages at the mid-career level; a highly international workforce that is subject to visa challenges; and a lack of gender, ethnic and socio-economic diversity.**

Tackling the skills challenge

186. The Government is taking measures to address the space skills gap. The UK Space Agency has committed £19.6 million to education, outreach and workforce projects since 2022. Much of this money has funded three programmes: Space to Inspire (which aims to promote space amongst the wider public), Space to Learn (which works through schools to promote space) and Skills for Space (which provides funding for space skills development at the university and postgraduate level).[344] The Government also established a Space Skills Advisory Panel, which is an expert grouping that advises the Government on skills issues in the sector.[345] Dr Thiemann praised the Government for delivering on its 2016 Space Skills Strategy, but noted the uncertain future of the above programmes in coming years.[346]

187. We received several suggestions for further interventions that could help address the skills gap. Several witnesses advocated for the creation of a Space Skills Taskforce (using the same model of quantum, nuclear and electronics skills task forces).[347] Prof Berthoud suggested that such a task force would be responsible for advising government on strengthening the UK's domestic skills pipeline, re-skilling and up-skilling and developing a more competitive

339 Q 162 (Dr Heidi Thiemann)
340 *Ibid.*
341 Q 160 (Prof Lucy Berthoud)
342 Written evidence from The Chart Think Tank et al (SPA0066)
343 Q 61 (Dr Katie King); written evidence from the University of Strathclyde (SPA0033)
344 Written evidence from the Department for Science, Innovation and Technology (SPA0082)
345 *Ibid.*
346 Q 160 (Dr Heidi Thiemann)
347 Q 159 (Prof Lucy Berthoud); written evidence from ADS Group (SPA0026) and BAE Systems (SPA0038)

approach to international talent retention.[348] Dr Thiemann argued that a task force would help ensure that skills development initiatives led by government, industry and academia aligned, noting that "task forces that other sectors such as the nuclear have are very good at having an independent body look at all the evidence and say, 'This is where we should be going'".[349]

188. Witnesses also suggested changing immigration laws to allow for the attraction of international talent. Prof Berthoud suggested altering the thresholds for skilled worker visas, which would allow for the retention of talented international postgraduates in the sector.[350] Fragomen LLP encouraged the Government to "develop a bespoke mobility pathway for the UK Space sector", reintroduce certain engineering and STEM roles to the immigration salary list and to introduce flexible mobility routes for short-term projects.[351], Sir Chris Bryant MP, the then-Minister of State for Data Protection and Telecoms, told us that, with regards to inward migration, "I worry sometimes that the system just is not quick enough to be able to accommodate the needs of business".[352]

189. Witnesses cited the importance of PhD programmes in pulling-through the next generation of UK space leadership. The Open University stated that funded PhD studentships result "in highly skilled well-trained engineers and scientists entering the workforce" but that the number of available studentships was at risk due to precarious research funding.[353] The Cardiff Hub for Astrophysics Research and Technology (CHART) described PhD students and postdoctoral researchers as "the lifeblood of all research programmes" which produce "the next generation of leaders". However, it lamented the decreasing number of PhD places and lack of UKRI funded postdoctoral fellowships available in the UK.[354] Prof Berthoud voiced support for the concept of "engineering doctorates", where engineers study for PhDs part-time. However, she said that such programmes need support from government, as industry will be unlikely to fund them.[355]

190. Dr Hart encouraged the Government to use "every lever" to increase the number of apprenticeships and early career opportunities in the sector, as skilled candidates are lost to other sectors due to lack of opportunities.[356] Prof Berthoud stated that there was a need for more mid-career training opportunities that will allow professionals from other sectors to switch to space. She also argued that, given the majority of UK space firms are SMEs, government support would be required to help them deliver training programmes.[357]

191. Some witnesses noted that space skills should be considered more widely and should also include artistic and creative skills. Professor Martin Barstow, Professor of Astrophysics and Space Science at the University of Leicester, encouraged greater imagination from the space sector in spreading knowledge about space applications, claiming that thinking about artistic

348 Q 161 (Prof Lucy Berthoud)
349 Q 160 (Dr Heidi Thiemann)
350 Q 162 (Prof Lucy Berthoud)
351 Written evidence from Fragomen LLP (SPA0046)
352 Q 186 (Sir Chris Bryant MP)
353 Written evidence from The Open University (SPA0039)
354 Written evidence from the Cardiff Hub for Astrophysics Research and Technology (SPA0037)
355 Q 161 (Prof Lucy Berthoud)
356 Q 154 (Dr Joanna Hart)
357 Q 160 (Prof Lucy Berthoud)

skills alongside STEM is important.[358] Major Tim Peake CMG, British ESA astronaut, spoke about outreach programmes he had conducted which focused on literacy and music, citing the importance of reaching out to children who are not interested in STEM.[359]

192. ***We note that the Government has been proactive in addressing the space skills issue and has followed through on many of the recommendations made in the 2016 skills strategy. However, fundamental challenges still remain that are proving difficult to solve. We recommend the establishment of a Space Skills Task Force, which would mirror similar task forces in other sectors (such as nuclear and quantum). This body should be responsible for bringing together government, employers and academia, providing a cohesive analysis of space skills issues in the UK and fashioning policy recommendations for addressing these issues.***

193. ***Success in the emerging space economy will require the UK to be flexible in attracting high-skilled sectoral experts, and the Government should ensure that immigration rules enable companies to attract the talent and skills necessary to make the UK space sector world-leading.***

194. ***However, the Government must also seek to develop homegrown space talent. It should consider funding a greater number of PhD studentships and postdoctoral fellowships specifically designed to provide development opportunities for UK-domiciled students.***

Universities and space science

University research

195. The UK's universities are world-leading when it comes to space science and the development of space technologies. The UK ranks second in the world for space science publications, has over 60 universities and 84 observatories engaged in space research and leads on providing instrumentation for, and scientific exploitation of, many significant space science missions (such as the James Webb Space Telescope and the ESA Euclid mission) .[360] As of 2023, over 1800 people worked in astronomy and solar system science within UK universities (a doubling since the 1990s) and, according to the Solar System Advisory Panel, there are over 50 "active and planned space-based missions where the UK Solar System community has a significant science or instrumentation involvement".[361]

196. Both the UKSA and UK Research and Innovation (UKRI) allocate funding to universities to support R&D.[362] UKRI invests over £180 million annually in space science and is responsible for provision and maintenance of R&D facilities for academic and industrial use (such as RAL Space, the National Centre for Earth Observation and the UK Astronomy Technology Centre).[363] UKSA has multiple grant funding streams that are open to academic

358 Q 155 (Prof Martin Barstow)
359 Q 104 (Major Tim Peake)
360 Q 147 (Prof Martin Barstow); written evidence from UKspace (SPA0085)
361 Written evidence from the Royal Astronomical Society (SPA0031) and the Solar System Advisory Panel (SPA0056)
362 Written evidence from the Department for Science, Innovation and Technology (SPA0082)
363 Written evidence from UK Research and Innovation (SPA0044)

participants and also provides funding for ESA's Science and Exploration missions. Space science funding is split between UKSA and UKRI in what is known as the "dual key" approach which means "the UKSA supports the design and build of instruments and missions, and UKRI supports most science exploitation".[364]

197. Several witnesses highlighted the importance of curiosity-driven research in fuelling the growing space economy. The Space Academic Network argued that universities underpin the sector through fundamental and applied research, strengthening UK supply chains and by acting as anchor institutions for space clusters.[365] The Open University argued that ESA's Science and Exploration programmes function as a "technological forcing house" which facilitates the development of innovative technologies, a point also made by UKspace.[366] Several witnesses highlighted the importance of universities in generating space spin-out firms, with many citing Surrey Satellite Technologies Ltd as an example of this.[367] Universities are also the key players in the training of the future space workforce.[368]

Challenges

198. Despite the core contribution of the university sector to the UK's space economy, we heard evidence of several challenges. The Royal Astronomical Society argued that UKRI's 2025/26 budget, which it described as "flat cash", is "challenging for academic research in space and astronomy".[369] The Open University argued that the UK's non-ESA space science funding has been threatened by a number of factors, including inflation and friction in technology supply chains.[370] CHART warned that any savings that need to be made within UKRI tend to come out of grant funding, as UKRI has high fixed costs in maintaining expensive facilities.[371] MIST, a research organisation, noted that even though the overall UK R&D budget is not dropping, "inflation pressures mean the practicality is very much one of hard times in research funding".[372]

199. Others criticised the timelines for grant funding as too short and unpredictable. The Space Academic Network criticised the "stop-start" nature of grant funding, claiming that it "hampers effective use of resources and planning".[373] CHART claimed that recent one-year funding settlements posed significant challenges for universities and make it difficult to retain highly skilled staff.[374] The Royal Society called for longer-term budgets for research, citing the long technological lead-up times for space missions as necessitating longer funding cycles and called for a 10-year planning cycle with reviews built-in to enable flexibility.[375] Prof Brian Cox noted that longer funding cycles do not cost more money, they just require stability of funding.[376]

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364 Written evidence from the Solar System Advisory Panel (SPA0056)
365 Written evidence from the Space Academic Network (SPA0010)
366 Written evidence from the Open University (SPA0039) and UKspace (SPA0085)
367 Q 3 (Prof Brian Cox); Q 13 (Lord David Willetts); written evidence from UK Research and Innovation (SPA0044) and Dr Sam Richards (SPA0098)
368 Written evidence from the Cardiff Hub for Astrophysics Research and Technology (SPA0037)
369 Written evidence from the Royal Astronomical Society (SPA0031)
370 Written evidence from the Open University (SPA0039)
371 Written evidence from the Cardiff Hub for Astrophysics Research and Technology (SPA0037)
372 Written evidence from Magnetosphere, Ionosphere and Solar Terrestrial (MIST) (SPA0053)
373 Written evidence from the Space Academic Network (SPA0010)
374 Written evidence from the Cardiff Hub for Astrophysics Research and Technology (SPA0037)
375 Written evidence from the Royal Society (SPA0093)
376 Q 8 (Prof Brian Cox)

200. Others from the academic sector claimed that universities and research institutions did not receive adequate funding relative to industry. The University of Strathclyde argued that the Government has "a tendency to focus on the commercially-valuable outputs of the innovation pipeline rather than the inputs"[377] The National Centre for Earth Observation (NCEO) claimed that UK space funding "is too tuned to businesses already in existence" as opposed to start-ups and research institutions.[378] The Solar System Advisory Panel claimed that solar system research had been "chronically underfunded" and that the "UK's international leadership position is at risk".[379] With reference to the split between funding for R&D and for commercialisation, Prof Barstow told us that "by and large, the balance is about right", but also claimed that balancing between the two was a complex process.[380]

201. The Royal Society highlighted a system in which grant funding for space science projects often comes from multiple different funding pots, thereby creating inefficiencies.[381] The Space Academic Network highlighted friction between UKSA and UKRI, claiming that hardware "designed and flown" by UKSA funding is often not exploited by UKRI.[382] The Solar System Advisory Panel questioned the effectiveness of the "dual-key" approach, arguing that a unified approach to space science research funding would allow for maximum benefits from UK investments.[383] The Open University claimed that UKSA and UKRI should "collaborate on the longer-term planning for participation and science exploitation to ensure researchers have better visibility of priorities and more timely access to funding to support those priorities".[384]

202. Dr Hart noted that it would be difficult to put all space-related research funding into one place, arguing that we need co-ordination, not a "fundamental rejig".[385] Prof Barstow warned against significant reshuffling of organisational roles and responsibilities, claiming there was a significant "opportunity cost" to widespread changes.[386] Both Dr Hart and Prof Barstow claimed greater collaboration and strategic focus between funders as essential to improving outcomes.[387]

203. Several witnesses highlighted the need for greater collaboration between academia and industry. Prof Kaczmarek noted that many SMEs do not have the resources and networks to collaborate with university partners and that university Technology Transfer Offices often do not possess the space sector expertise to exploit industrial relationships. He also noted that academia and industry work to different timeframes and that IP ownership disputes can create fiction.[388] Mr Smith argued for "improved business to academia

377 Written evidence from the University of Strathclyde (SPA0033)
378 Written evidence from the National Centre for Earth Observation (SPA0067)
379 Written evidence from the Solar System Advisory Panel (SPA0056)
380 Q 149 (Prof Martin Barstow)
381 Written evidence from The Royal Society (SPA0093)
382 Written evidence from the Space Academic Network (SPA0010)
383 Written evidence from the Solar System Advisory Panel (SPA0056)
384 Written evidence from The Open University (SPA0039)
385 Q 150 (Dr Joanna Hart)
386 Q 150 (Prof Martin Barstow)
387 Q 150 (Dr Joanna Hart, Prof Martin Barstow)
388 Written evidence from Prof Sylvester Kaczmarek (SPA0015)

links" and, like Prof Kaczmarek, claimed SMEs often don't realise the value of academic partnerships.[389]

204. The Open University claimed that government laboratories should function as the "glue" that aligns industry and academia but claimed that the lack of strategic priorities and implementation plans prohibit this.[390] The Durham University Space Research Centre noted that the lack of a UK national programme "leaves a development gap between idea generation (at universities) and system productization (by industry)". He argued that the Government could facilitate greater collaboration by providing opportunities for universities and industry to come together for technological demonstrations.[391] Dr Hart and Prof Barstow agreed that the current mechanisms in place, such as the Space Partnership, a forum for industry, academia and government to come together, and space clusters (see below), were the correct ones for fuelling collaboration and that resourcing these initiatives should be a priority.[392]

205. **The UK possesses a world leading university sector when it comes to space science and engineering. Generally, the UK's academic sector remains in good health when it comes to space—it produces significant numbers of high-quality graduates and UK institutions contribute to leading international missions. However, universities are concerned about the wider funding environment for academia, which has squeezed institutions' ability to deliver. Universities have also been hampered by recent short-termism when it comes to grant delivery.**

206. ***We encourage UKSA and UKRI to work towards integrated and strategic alignment on long-term funding. The merger between UKSA and the DSIT Space Directorate provides an opportunity to ensure a more coherent funding system that aligns with UK priorities.***

Other interventions

Clusters

207. We heard evidence about the effectiveness of the UK's 14 space clusters in driving the development of the sector. UKRI describe space clusters as "collaborative, supportive ecosystem[s] where companies, research organisations, and government agencies come together".[393] The Satellite Applications Catapult described how clusters have dedicated personnel and resources which are deployed to drive shared projects, skills development and attract foreign investment. It also highlighted how space clusters can attract inwards investment and high-skilled jobs to areas of lower economic vitality, noting the Space North East England cluster (which has 50 recognised space businesses) as an example.[394] The Chart Think Tank noted that regions such as the North West, West Midlands and Yorkshire have all seen significant space sector growth in recent years, which it attributed to "deliberate efforts

389 Written evidence from Daniel Smith (SPA0068)
390 Written evidence from The Open University (SPA0039)
391 Written evidence from Durham University Space Research Centre (SPA0058)
392 Q 152 (Dr Joanna Hart, Prof Martin Barstow)
393 Written evidence from UK Research and Innovation (SPA0044)
394 Written evidence from Satellite Applications Catapult (SPA0049)

to broaden the industry's geographic base".[395] The Scottish Government Space Group noted the infrastructural benefits of clusters, arguing that public investment in testing sites and digital infrastructure is critical in unlocking private sector investment.[396]

208. Prof Barstow described clusters as an effective mechanism to bring industry and academia together but noted that, in some areas, "we have seen funding coming through to the clusters drop back quite dramatically" and that clusters were in "keep alive" mode.[397] Dr Hart noted that there is already an established number of space clusters in the UK but "the challenge is finding things for them to work on" due to lack of resources on the academic side to drive projects.[398] Mr Smith argued that the development of space clusters has been successful in providing a platform for wider industry cooperation but noted the importance of developing cross-cluster programmes and information exchange, a point that was echoed by the Satellite Applications Catapult.[399]

209. In May 2025, we visited the Harwell Science and Innovation Campus in Oxfordshire, which has a space cluster on its campus. Harwell's space cluster is a UKRI-funded cluster and is the largest of its kind, hosting over 100 space organisations on site. In written evidence, UKRI described Harwell as an effective example of "the power of cluster models in stimulating cross-sector partnerships, rapidly commercialising research and providing targeted facilities and expertise to businesses, academia and government agencies".[400] We saw first-hand the collaborative benefits of geographical clustering through engagement activities with the UK Space Agency, European Space Agency, UKRI, the Satellite Applications Catapult and several leading space firms.

210. **The Government's approach to delivering space clusters has largely been a success. There are now a number of established space clusters across the country which function as valuable focal points for industry, academia and other stakeholders to engage and harmonise their working. They also provide valuable shared infrastructure that facilitate the growth of space firms. Most of the UK's space clusters are located outside London and the Southeast and help spread high-value jobs across the country.**

211. ***We note that some space clusters are experiencing financial challenges. It should be a matter of priority for DSIT, UKSA and UKRI to ensure the continued functioning of space cluster infrastructure.***

Trade and market access

212. ADS Group stated that space-related exports contribute around £6 billion to the UK economy and that this figure has the potential to grow in coming years. It argued that UK space exports are currently focused primarily in Europe and that the UK should pursue new international partnerships to widen its trading footprint.[401] Both the Satellite Applications Catapult

395 Written evidence from The Chart Think Tank et al (SPA0066)
396 Written evidence from Scottish Government Space Group (SPA0087)
397 Q 149 (Prof Martin Barstow)
398 Q 152 (Dr Joanna Hart)
399 Written evidence from Satellite Applications Catapult (SPA0049) and Daniel Smith (SPA0068)
400 Written evidence from UK Research and Innovation (SPA0044)
401 Written evidence from ADS Group (SPA0026)

and UKRI noted that Brexit had made access to European markets more complex and burdensome, with the latter encouraging the Government to "develop robust, alternative market linkages".[402] However, Surrey Satellite Technologies Ltd stated that the UK struggles to access certain international markets due to ""policies of buying locally", which it contrasted to UK national procurement opportunities, which are often open to international firms.[403]

213. Prof Wheeler argued that the space sector needs to work better with the Department for Business and Trade to encourage international firms to "set up in the UK and then export", citing Scottish Enterprise and Scottish Development International as being effective at this.[404] Dr John B. Sheldon encouraged the Government to "champion the UK space sector proactively" when it comes to international trade, claiming that the space sector is not considered a priority for the trade department, embassies and development agencies.[405]

214. Eutelsat OneWeb argued that the UK needs to use export credit financing to the extent that France and the US do, as this will help "stimulate both domestic and international demand" and help UK-based firms scale.[406] Joanna Darlington, Chief Communications Officer and Executive Committee Member at Eutelsat OneWeb, told us that the decision to manufacture OneWeb satellites in France, as opposed to the UK, was made to secure French export credit financing.[407] The Chart Think Tank noted that the UK has begun to offer export financing for space contracts, which may help space firms secure deals abroad.[408] Airbus UK stated that "the UK must improve space export support and ensure better resourcing to fully utilise Government-to-Government export opportunities".[409]

215. **International trade in space data, services and manufactured goods is likely to increase as more countries develop space programmes and firms seek to utilise space data to improve their business models. There are currently concerns that the UK's approach to international space trade is underdeveloped and that UK-based firms are losing out on international opportunities as a result.**

Downstream development

216. We heard about the importance of spreading knowledge of the usefulness of space data and services to "non-space" customers. The Satellite Applications Catapult told us that, despite falling launch and data costs, "end-user adoption outside the space sector remains slow".[410] Alexandra Jones noted that firms in other sectors do not realise the benefits space technology may bring them, and that changing this will generate greater demand for space products in the UK.[411] UKSA claimed that lack of awareness, poor demonstration of

402 Written evidence from UKRI (SPA0044) and Satellite Applications Catapult (SPA0049)
403 Written evidence from Surrey Satellite Technologies Ltd (SPA0027)
404 Q 115 (Prof Joanne Wheeler)
405 Q 146 (Dr John B Sheldon)
406 Written evidence from Eutelsat OneWeb (SPA0017)
407 Q 85 (Joanna Darlington)
408 Written evidence from The Chart Think Tank et al (SPA0066)
409 Written evidence from Airbus UK (SPA0091)
410 Written evidence from Satellite Applications Catapult (SPA0049)
411 Q 31 (Alexandra Jones)

business cases by service providers and data limitations prevent businesses from buying satellite data and services.[412]

217. The Government has taken action to address this problem. The Satellite Applications Catapult, which is part-funded by InnovateUK, has a core function to support businesses and researchers to commercialise space technology by focusing on real world problems.[413] UKSA's "Unlocking Space for Business" programme helps match space businesses with potential customers in the wider economy through workshops, showcase events and grant funding.[414] The National Centre for Earth Observation has led on the development of an EO data hub that will provide a single point of access for UK EO data (both public sector and commercial).[415] We also received evidence from representatives from the agricultural and maritime industries who stated that, by and large, awareness of satellite services and integration of them into working practices was very strong.[416]

218. However, we also received evidence that more can be done. Mr Daniels highlighted that space clusters possess the "reach, networks and convening power" to create demand for satellite data and services and that the Government should systematically target sectors which could benefit from space technology to communicate the benefits.[417] The Chart Think Tank recommended expanding the Satellite Applications Catapult to clusters beyond Harwell, whilst others recommended that UKSA's Unlocking Space programme has been successful and needs further funding for expansion.[418] The Scottish Government Space Group argued that the Unlocking Space programme does not focus adequately on new technologies and therefore is missing the opportunity to convey some of the novel benefits of space technology to customers.[419]

219. **Currently, adoption of space-based data and services amongst "non-space" businesses is too low, with many firms losing out on the potential benefits of space technology to their enterprises. Space remains poorly understood by businesses that could potentially benefit from it, which subsequently inhibits the growth potential of the UK space sector.**

220. ***The Government should accelerate efforts to increase understanding of space technology across the wider economy, with a view to building a stronger domestic market for space-based data and services. The Government should continue supporting the Satellite Applications Catapult to achieve these aims, as well as championing initiatives such as the EO Data Hub, which is simplifying access to EO data for downstream users. The Government should consider making public sector EO data available through the National Data Library, if it has not already done so. Other measures recommended above, such as the prioritisation of cluster infrastructure, will aid in supporting downstream adoption of space-based data and services.***

412 Written evidence from UK Space Agency (SPA0100)
413 Written evidence from Satellite Applications Catapult (SPA0049)
414 Written evidence from UK Space Agency (SPA0100)
415 Q 90 (Prof John Remedios); Q 90 (Geoff Buswell)
416 Q 169 (Dr Joseph Mhango, David Browne)
417 Q 169 (Rory Daniels)
418 Written evidence from from TechUK (SPA0032),The Chart Think Tank et al (SPA0066) and Richard Osborne (SPA0073)
419 Written evidence from Scottish Government Space Group (SPA0087)

Space law and insurance

221. We heard evidence that the UK's pedigree in space law and insurance would be an advantage in a growing global space economy. DSIT told us that "part of HMG's vision for the space sector involves seeing the UK and City of London becoming the pre-eminent global centre for space financial products and services" and that the growing space economy represented an opportunity for the UK to export financial and insurance services globally.[420]

222. Several witnesses cited the UK's legal sector as a comparative strength in space.[421] Prof Wheeler told us that "we are seeing more demand for space insurance and space law than we have ever seen—not just in disputes but also in regard to finance contracts [and] commercial contracts" and that the UK should aim to be a hub for space law, arbitration, standards and insurance.[422] Alderman Professor Emma Edhem, who was the Lord Mayor's Aldermanic Envoy for Space Technology and Innovation from 2023–24, argued that the UK's legal services represented a comparative advantage in space, stating "our legal system is second to none in the world and no other jurisdiction can compete".[423] However, Professor Sa'id Mosteshar, Director at the London Institute of Space Policy and Law, claimed that London's expertise in law and arbitration was not in doubt, but that arbitration of space disputes has historically been low and "is not a huge area of development".[424]

223. Others highlighted opportunities in space insurance. The Chart Think Tank argued that "the UK is home to leading satellite insurance and brokerage firms", claiming that that the City of London's insurance expertise will give "UK space companies an edge in managing risk and raising funds".[425] Mr Richard Osborne, Chief Technology Officer at AstroAgency Ltd and Director of Stellardyne, claimed that space insurance is an "oft overlooked success story" and that the "UK modestly leads the world". He stated that "even if no support is needed, the space insurance sector should at least be acknowledged and praised more widely".[426]

224. However, Mr Flytkjaer told us that the space insurance market remains small, though he noted the need for insurance products for future ISAM activities.[427] Major Peake highlighted that about 98% of satellites remain uninsured and that many states do not have a regulatory regime that requires insurance. He cited the need for an international regulatory framework to incentivise operators to acquire insurance.[428] Mr Lecky stated that "the provision of insurance will follow the demand" and will depend on whether regulatory regimes globally demand insurance.[429]

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420 Written evidence from the Department for Science, Innovation and Technology (SPA0082)
421 Q 100 (Major Tim Peake); written evidence from Space Solar (SPA0048)
422 Q 116 (Prof Joanne Wheeler)
423 Q 203 (Prof Emma Edhem)
424 Q 116 (Prof Sa'id Mosteshar)
425 Written evidence from The Chart Think Tank et al (SPA0066)
426 Written evidence from Richard Osborne (SPA0073)
427 Q 39 (Rasmus Flytkjaer)
428 Q 100 (Major Tim Peake)
429 Q 39 (Will Lecky)

CHAPTER 4: LEVERAGING INTERNATIONAL PARTNERSHIPS

International collaboration in space

225. As a middle-sized space power with a limited space budget, the UK is reliant on international partnerships to achieve its aims in space—according to the UK Space Agency (UKSA), "international engagement, coordination and collaboration is woven throughout much of UKSA's work".[430] Professor Martin Barstow, Professor of Astrophysics and Space Science at the University of Leicester, highlighted that "it is very difficult to do things on your own if you are a medium-sized country", whilst RAND Europe argued that major space missions and operations are "too expensive for the UK to pursue as a middle-ranking power".[431] Dr Julia Balm, Research Associate at the Freeman Air and Space Institute at King's College London, stated that "the bigger the reliance on one's own assets, the bigger the proportional risk" and that international partnerships are a way to mitigate against such vulnerabilities.[432]

226. In broad terms, the UK has historically looked towards the European Space Agency (ESA) for collaboration on civil space exploration and has partnered closely with the US on the development of military space capabilities.[433] This generally remains the case but, in recent years, UKSA has also sought to expand bilateral programmes, albeit on a small scale, with other international partners, such as Japan, Canada and New Zealand.[434]

227. Several witnesses highlighted the UK's strategic choices on international collaboration as of critical importance to the future of its space sector.[435] This consideration emerges at a point of acceleration when it comes to global participation in space. The leading powers of space exploration and technology—the US, Russia, China, India and ESA—have now been joined by emerging space powers such Iran, Japan, Pakistan, Turkey, Brazil and Australia (amongst others).[436]

228. This changing global environment brings forth challenging questions for UK space policy. The first is a question of which partnerships best allow the UK to achieve its strategic aims in space, especially in the context of changing European and US approaches to space and the emergence of a new space powers as potential partners. The second is the extent to which the UK's finite funding for space technology should be allocated to ESA, bilateral partnerships or the development of sovereign missions and capabilities.

229. **Strong international partnerships are crucial to the development of the UK's space sector. The significant costs and technical challenges associated with space technology development and the UK's status as a mid-sized space power means that international collaboration is essential in delivering its strategic aims in space.**

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430 Written evidence from UK Space Agency (SPA0024)
431 Q 153 (Prof Martin Barstow); written evidence from RAND Europe Space Hub (SPA0043)
432 Written evidence from Dr Julia Balm (SPA0028)
433 Q 142 (Dr John B Sheldon); Q 133 (Dr Bleddyn Bowen)
434 Q 204 (Gabriel Elefteriu); written evidence from UK Space Agency (SPA0024)
435 Written evidence from Space Solar (SPA0048), Royal Aeronautical Society (SPA0057), Northrop Grumman UK (SPA0060) and The Chart Think Tank et al (SPA0066)
436 Written evidence from the Global Network of Sustainability in Space (SPA0063)

230. **Historically, the UK has looked towards the US as a core partner for defence space capabilities and the European Space Agency on civil space missions. However, the rapidly increasing number of spacefaring states, as well as space policy changes in both Europe and the US have altered the international landscape. Determining the optimal balance between sovereign, bilateral and multilateral programmes, as well as identifying the international partners who can enhance the UK's space sector are core strategic considerations for UK space policymakers.**

European Space Agency

Overview of the European Space Agency

231. ESA was founded by ten member states in 1975, which included the UK. It is an intergovernmental organization with a goal to foster European collaboration on space missions and currently has 23 member states. While it is not formally attached to the European Union (three of its member states, Norway, Switzerland and the UK are not in the EU), the two institutions enjoy a close relationship (see below).[437] According to its founding convention, ESA's focus is on the development of space for "peaceful purposes" and it has historically avoided contributing to the development of defence space capabilities.[438] However, recent shifts in the geopolitical environment have prompted movements within ESA towards the development of programmes with military applications.[439]

232. Funding for ESA programmes is separated into two streams: mandatory and optional. Mandatory programmes include studies on future projects, shared technical investments, information systems, space science and training programmes. Members contribute to these programmes based on their annual Gross National Product. Member states are free to decide their contributions to "optional" programmes, which include Earth Observation, telecommunications, satellite navigation and space transportation.[440] States make decisions about the level of investment into optional programmes at ESA Ministerial conferences, the last of which occurred in late 2022 and the next of which will occur in November 2025.

233. ESA funding works on the principal of *juste retour*. This means that countries who contribute to ESA can expect to get back the rough equivalent of their national investments in industrial contracts.[441] However, states do not always receive exactly what they contribute back in contracts—the value of contracts they receive as a percentage of investment is referred to as a state's "geo-return co-efficient".[442]

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437 European Space Agency, *Member States & Cooperating States*

438 Q 41 (Rasmus Flytkjaer); United Nations, *Convention for the establishment of a European Space Agency*, 30 May 1975

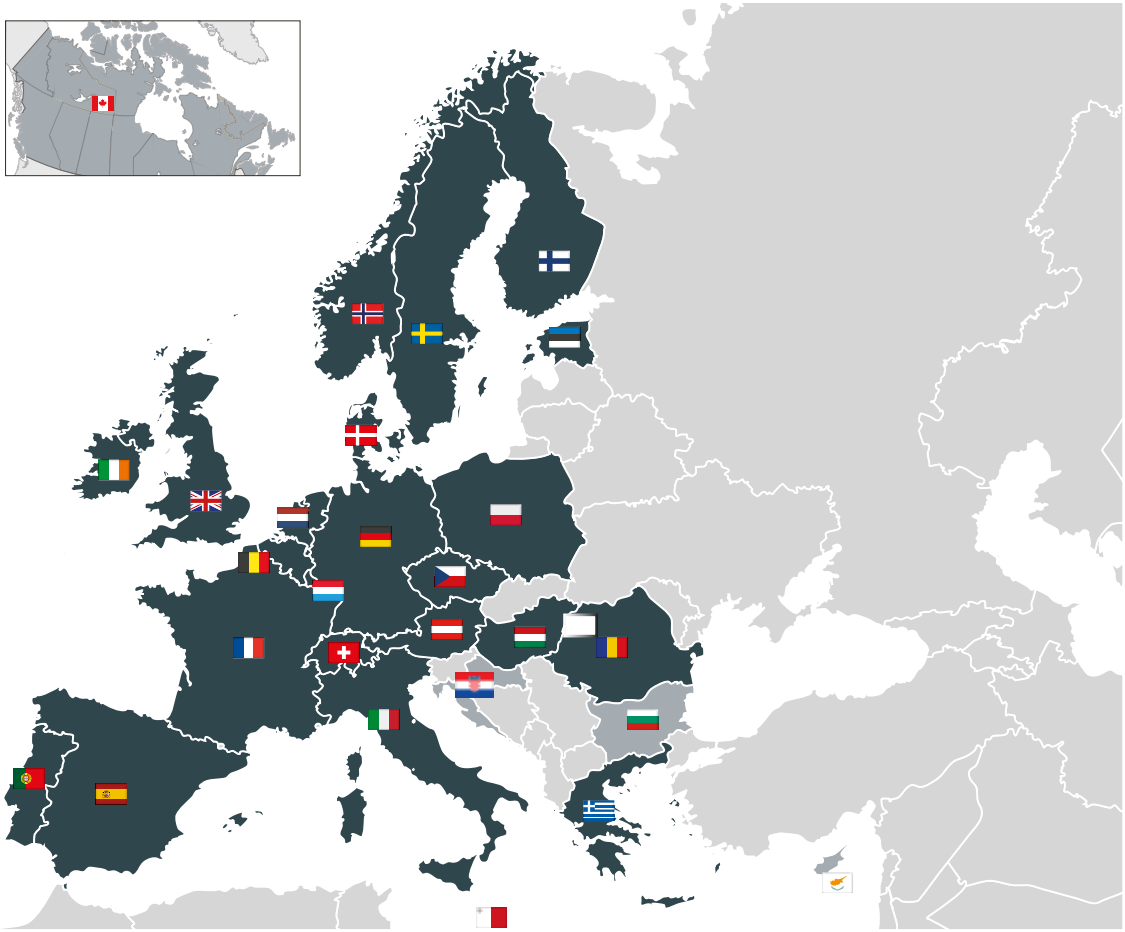
439 Financial Times, *European Space Agency seeks €1bn for satellite network with military capabilities*, 12 June 2025

440 European Space Agency, *Funding* ; Q 19 (Lord David Willetts); Q 22 (Dr Paul Bate)

441 Q 7 (Pro Brian Cox)

442 UK Space Agency, *Evaluating the benefits of the UK's investments in the European Space Agency: Executive Summary*, 7 August 2025

Figure 7: European Space Agency membership



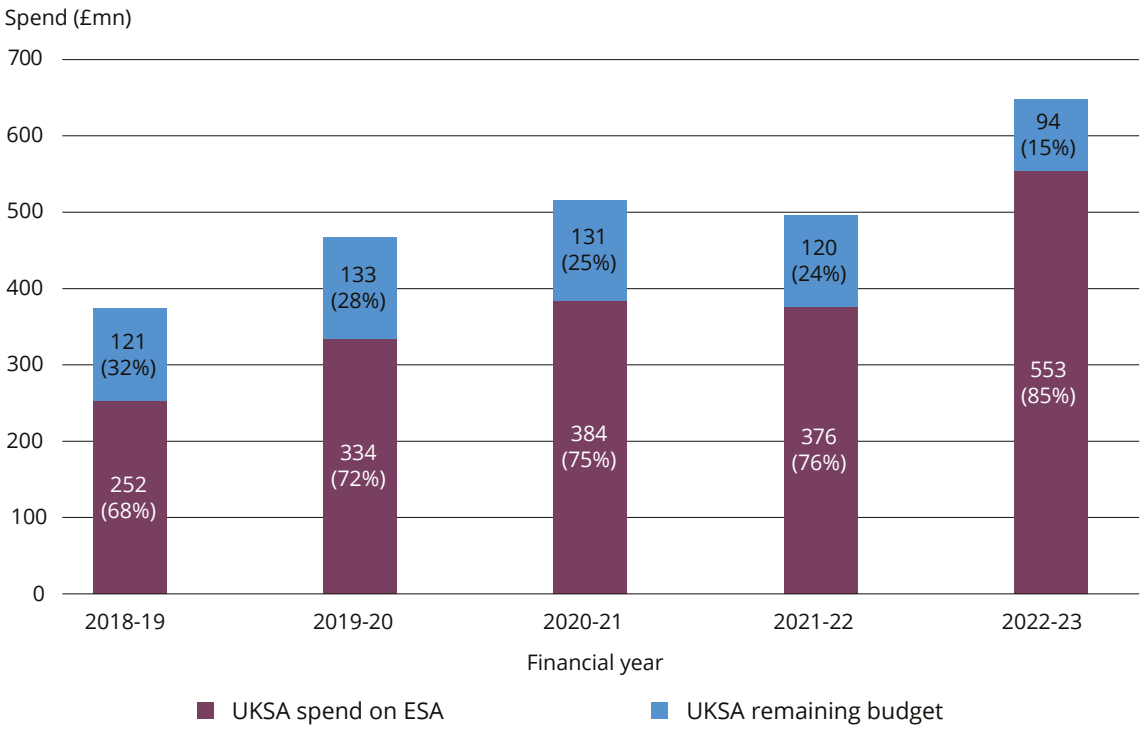
Source: European Space Agency, Member States & Cooperating States

UK/ESA Relations

234. RAND Europe described how "the UK has not historically prioritised a national space programme" but has instead relied on ESA as a key delivery body for UK civil space ambitions.[443] Over the last fifteen years, the UK has scaled its ESA investments significantly and is currently the fourth largest national contributor, though still some way behind France, Germany and Italy when it comes to total contributions.[444] In recent years, the UK's contributions to ESA have represented between 68% and 85% of its national space budget (which differs from comparator European states, which typically contribute around 40-50% of their space budgets to ESA).[445] The EU is a significant financial contributor to ESA, accounting for about 22% of its 2025 budget.[446]

443 Written evidence from RAND Europe Space Hub (SPA0043)
444 Q 9 (Prof Brian Cox); Q 193 (Colin Baldwin); UK Space Agency, *The ESA Council Meeting at Ministerial Level 2022 (CM22)*
445 Q 193 (Colin Baldwin); Q 201 (Gabriel Elefteriu)
446 European Spaceflight, *ESA Council Approves Initial €7.7B 2025 Budget*, 30 December 2024

Figure 8: UK Space Agency annual budget and contributions to ESA (2019–2023)



Source: National Audit Office, The National Space Strategy and the role of the UK Space Agency, 12 June 2024

235. We heard that the UK has made significant contributions to important ESA programmes in recent years. Laurent Jaffart, Director of Connectivity and Secure Communications at ESA, highlighted how the UK has contributed to the PLATO, ARIEL and ExoMars science missions, as well as contributing four astronauts to the ESA human spaceflight programme.[447] Alexandra Jones, Director General of Science, Innovation and Growth at DSIT emphasised the UK's leadership in the Vigil space weather programme, whilst Major Tim Peake CMG, British ESA astronaut, highlighted the European Centre for Space Applications and Telecommunications, an ESA facility based at Harwell Campus in Oxfordshire.[448] Both Lord Willetts, Chair at UKSA, and Dr Paul Bate, CEO at UKSA, emphasised that the most recent ESA Ministerial in 2022 was a success, with the UK achieving leadership in several major missions.[449] Through ESA, the UK also makes contributions to NASA-led programmes such as the Artemis lunar exploration programme and the James Webb Space Telescope.[450] Professor Brian Cox, Professor of Particle Physics at the University of Manchester, noted that, outside of mandatory contributions to the ESA science programme, the UK's contributions to optional programmes were "extremely small".[451]

447 Q 136 (Laurent Jaffart)
448 Q 24 (Alexandra Jones); Q 98 (Tim Peake)
449 Q 12 (Lord David Willetts and Dr Paul Bate)
450 Q 101 (Major Tim Peake); written evidence from The Chart Think Tank et al (SPA0066)
451 QQ 7-9 (Prof Brian Cox)

Figure 9: Artist's impression of the Rosalind Franklin Rover, part of ESA's ExoMars mission

Source: European Space Agency, ExoMars Rover

236. RAND Europe noted that "while the UK has struggled in the past to secure a favourable geo-return from its ESA investments … UKSA has worked successfully to rebalance this in recent years".[452] We heard that, as of Q4 2024, the UK's geo-return score has increased from 93% to 99% and that in the final quarter of 2024, the UK received the record for the highest value of contracts ever received by an ESA member state.[453]

Benefits and drawbacks of ESA membership

237. We heard strong evidence that ESA membership and the UK's approach towards the institution has been beneficial for the development of the UK's space sector. One of the key benefits is the economic impact of ESA membership—several witnesses cited research that indicated that, for every £1 invested by the UK in ESA, it sees a £9.80 return.[454] Additionally, Dr Adam Baker, Consultant and Co-Founder at UK Launch Services Ltd, noted that every Euro that is invested into ESA catalyses around €2.50 in private sector investment.[455] Mr Jaffart claimed that, in the three-year period since the 2022 ESA Ministerial, ESA contributed roughly £2.7 billion to the UK's GDP and supported 33,000 jobs.[456]

452 Written evidence from RAND Europe Space Hub (SPA0043)
453 Written evidence from Dr Julia Balm (SPA0028)
454 Q 15 (Dr Paul Bate); Q 41 (Will Lecky); Q 97 (Geoff Buswell); Q 101 (Major Tim Peake)
455 Q 70 (Dr Adam Baker)
456 Q 137 (Laurent Jaffart)

238. Others noted that being part of ESA affords the UK space sector opportunities to contribute to missions that are far beyond sovereign capacity. Rasmus Flytkjaer, Partner at London Economics, stated that "ESA offers things—activity, services and technical skills—that are hard to create otherwise",[457] Sir Martin Sweeting, Founder and Executive Chairman at Surrey Satellite Technology Ltd and Fellow of the Royal Society, emphasised that "there is absolutely no doubt that our membership of ESA provides us with access to technologies, but also participation in programmes and projects that we could not afford nationally".[458] Lord Willetts highlighted the importance of scale, stating that "our view is that being 10% of a project with 10 satellites is better than being 100% of a project with one satellite".[459]

239. Relatedly, a core benefit of ESA membership is that it affords states the opportunity to shape the direction of the institution. Will Lecky, Co-Founder at Know.Space emphasised that the UK's status as a distant fourth in terms of investment negatively affected its influence over the organisation, arguing that "the higher up you are, the more say you get in the direction".[460] Major Peake claimed that ESA membership was vital in enabling the UK to shape the European space economy to align with its national interest.[461]

240. The technical expertise obtained through working with ESA is seen as another core advantage. Patrick Wood, then-Head of Space Systems UK at Airbus, noted that "we use our work with the European Space Agency to train our teams, our engineers and the supply chain" and Joshua Western, CEO of Space Forge highlighted that ESA's technical expertise is crucial when it comes to the third-party vetting of technology.[462] UKspace argued that "ESA technical scrutiny enhances company credentials" and that the expertise provided by the organisation helps avoid technical mistakes.[463]

241. We also heard about other benefits of ESA membership. Witnesses noted that, due to the Ministerial process, the funding timeframes of ESA were generally longer-term than domestic funding streams and more resilient to shocks.[464] Moreover, UKspace highlighted how ESA places large numbers of contracts for work, which are more favourable for businesses wishing to scale than grant funding.[465]

242. However, other witnesses cited problems with the UK's engagement with ESA. Mr Flytkjaer highlighted two core problems with ESA: its closeness with the EU space programme (which is problematic for the UK as a non-EU member) and its historic ignorance of defence space capability building.[466] Prof Barstow noted that historic overreliance on ESA meant the UK was not providing enough resource to sovereign programmes, which in turn limited its ability to benefit from ESA.[467] RAND Europe questioned whether UKSA possessed the technical capacity to ensure the highest quality of ESA bids.[468]

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457 Q 41 (Rasmus Flytkjaer)
458 Q 199 (Sir Martin Sweeting,)
459 Q 19 (Lord David Willetts)
460 Q 35 (Will Lecky)
461 Q 101 (Major Tim Peake)
462 Q 50 (Patrick Wood); Q 64 (Joshua Western)
463 Written evidence from UKspace (SPA0085)
464 Q 97 (Geoff Buswell); Q 199 (Sir Martin Sweeting)
465 Written evidence from UKspace (SPA0085)
466 Q 41 (Rasmus Flytkjaer)
467 Q 153 (Prof Martin Barstow)
468 Written evidence from RAND Europe Space Hub (SPA0043)

Space Solar criticised the UK's relationship with ESA arguing that "it is easy to show things like reasonably strong returns on pounds invested" but that the UK underperformed on indicators such as the number of space unicorns and prime contractors it possesses.[469] Sir Chris Bryant MP, then-Minister of State for Data Protection and Telecoms, gave support for the UK's continued engagement with ESA but warned that "ESA needs to look very carefully at how it saves money and spends money in a way that really delivers".[470]

243. **Historically, the UK has invested significantly in ESA rather than pursue the development of a large national space programme. This process has been a successful one, with involvement in ESA programmes providing a strong return on investment, significant access to technical expertise, affording UK-based firms access to lucrative contracts and allowing the UK to take part in large international missions of scientific importance.**

244. ***The forthcoming ESA Ministerial presents not only an opportunity to participate in those ESA programmes from which the UK space sector can derive long-term economic benefits, but also—and especially in the present context—a chance to re-assess the UK's relationship with the EU Space Programme and, separately, to align the priorities of ESA programmes with the development of capabilities required by NATO, given that the great majority of ESA members are also members of NATO.***

European Union

Overview of EU Space Programme

245. The European Union Agency for the Space Programme (EUSPA) was officially launched in 2021 and oversees the EU Space Programme.[471] The programme has its lineage in longer-term EU space projects, such as the Galileo satellite navigation programme (established in 1999) and the Copernicus Earth Observation (EO) programme (established in 2014). Between 2021 and 2027, the EU Space Programme has a budget of €14.8 billion.[472]

246. The EU Space Programme consists of five key projects that develop common capabilities in Position, Navigation and Timing (PNT), Earth Observation (EO), satellite communications and Space Situational Awareness (SSA). EUSPA has a close working relationship with ESA in delivering these projects, with ESA responsible for designing and developing elements of them. The EU is investing over €9 billion of its budget into ESA in the 2021–27 period.[473]

469 Written evidence from Space Solar (SPA0048)
470 Q 182 (Sir Chris Bryant MP)
471 BBC News, *Lift-off for European Union's new space programme*, 23 June 2021
472 European Parliament Think Tank, *EU Space Programme*, 12 May 2021
473 European Space Agency, *ESA and the EU*

Box 7: Key EU Space programmes

There are five core elements of the EU Space Programme.

- Copernicus is an EO system monitoring the planet's environment through satellite imagery. It supports environmental management to help mitigate climate change impacts, whilst also contributing to urban area management, planning, infrastructure development and civil protection.
- Galileo is a global satellite navigation and positioning system. It provides positioning and timing information which is used across economic sectors such as railways, aviation and agriculture, as well as providing secure functions to EU governments and military organisations.
- EGNOS (European Geostationary Navigation Overlay Service) is a satellite navigation system that augments the performance of satellite navigation systems to improve accuracy for critical applications such as aircraft and maritime navigation.
- The SSA programme develops joint capabilities in space surveillance, the identification of near-Earth objects and the monitoring of space weather events.
- GOVSATCOM uses extant member state satellite communication services and private operators to provide resilient and autonomous satellite communication services for EU member states. IRIS² (Infrastructure for Resilience, Interconnectivity and Security by Satellite) is a planned 290-satellite communications constellation and represents the next phase of the EU's satellite communication programme. The public-private partnership has a proposed budget of €10.5 billion (which is separate from the wider EU space budget) and will develop a sovereign EU communications constellation for government, business and individual use by 2030.

Source: European Commission, EU Space Programme

247. As part of the UK's withdrawal from the EU, it ceased to be a part of the EU's space programme. The UK no longer participates in the Galileo programme, which means UK firms cannot access industrial contracts and UK institutions cannot use Galileo's secure functionality, which provides an enhanced service for military and critical infrastructure purposes (though individual and business use of Galileo remains permitted).[474] The UK also no longer participates in the EGNOS programme and does not provide data or services to the EU SSA programme (although UK users can still access SSA services).[475] Following an agreement in September 2023, the UK gained access to the Copernicus programme again, which allows UK firms the opportunity for industrial participation.[476] The UK does not currently plan to contribute to the IRIS² constellation, though European Commissioner

474 UK in a Changing Europe, *What is the Galileo programme?*, 23 June 2021; Department for Science, Innovation and Technology and Department for Business, Energy and Industrial Strategy, *UK involvement in the EU Space Programme*, 7 September 2023

475 Department for Science, Innovation and Technology and Department for Business, Energy and Industrial Strategy, *UK involvement in the EU Space Programme*, 7 September 2023; Bird & Bird, *EU-UK Trade and Cooperation Agreement: consequences on UK involvement in the EU Space programmes*, 5 January 2021

476 Department for Science, Innovation and Technology and Department for Business, Energy and Industrial Strategy, *UK involvement in the EU Space Programme*, 7 September 2023

for Defence and Space Andrius Kubilius has claimed that participation from third countries (such as the UK, Norway and Iceland) remains a possibility.[477]

Changing EU policy

248. We heard about three core changes in EU space policy that will be of significance to the future of the UK space sector. The first was a tightening of relations between the EU and ESA. Whilst the institutions are separate, Lord Willetts described ESA as the "R&D arm of the EU" and Mr Flytkjaer described ESA as the "agent that delivers for the EU".[478] Gabriel Elefteriu, Senior Fellow (Space Power) at the Council of Geostrategy, told us that ESA and the EU have "perhaps the closest relationship they have ever had" and that relations are getting closer due to an increased focus on space capabilities at the EU level.[479] The Royal Aeronautical Society stated that a growing EUSPA footprint in space could marginalise ESA, which could "reduce the UK's impact in large global space programmes and influence over European space technology standards".[480] The then-Minister of State for Data Protection and Telecoms claimed that some European countries would like ESA to become an EU body or for "ESA to have a tighter body of EU members that make most of the decisions", but that the Government was firmly opposed to this.[481]

249. A second trend that will affect EU space policy is increased space expenditure. RAND Europe told us that the EU has assigned greater priority to ensuring the competitiveness of its space firms relative to the US.[482] We heard evidence that the EU was deploying funding from Horizon Europe and the EU Space Fund to capitalise innovative firms.[483] Mark Boggett, CEO and Co-Founder at Seraphim Space, argued that, in 2022, the EU had made over €600 million available for venture funds with a mandate to invest in space technologies.[484]

250. The pivot to increased defence expenditure across Europe will also affect space capability development. Dr Bleddyn Bowen, Associate Professor of Astropolitics at Durham University, described how the "EU recognises that European autonomy in space is really important" and that there is likely to be more spending on defence space capabilities at the EU level.[485] Mr Boggett highlighted that "defence funding across Europe has gone through a generational change" in recent months, which is likely to have a significant impact on the quantum of funding available for European space firms that can deliver technologies with defence applications.[486] Hermann Ludwig Moeller, Director at the European Space Policy Institute, told us that European investment in space and defence will likely increase "significantly" and some of this money may end up in ESA to fuel dual-use innovation.[487]

251. The third major shift in EU space policy is the development of an EU Space Act. Announced in June 2025, this proposed legislation seeks to develop a

477 Euractiv, *UK, Norway and Ukraine welcome to join EU's IRIS² space programme, says commissioner*, 28 July 2025
478 Q 19 (Lord David Willetts); Q 41 (Rasmus Flytkjaer)
479 Q 202 (Gabriel Elefteriu)
480 Written evidence from Royal Aeronautical Society (SPA0057)
481 Q 189 (Chris Bryant)
482 Written evidence from RAND Europe Space Hub (SPA0043)
483 Written evidence from The Chart Think Tank et al (SPA0066)
484 Q 107 (Mark Boggett)
485 Q 130 (Dr Bleddyn Bowen)
486 Q 109 (Mark Boggett)
487 Q 141 (Hermann Ludwig Moeller)

"harmonised framework for space activities across the Union" and addresses the fragmented regulatory landscape of member states.[488] The legislation is also intended to establish the EU as a leader in the global regulation of space.[489] It will be based around three pillars:

- Safety—the act will introduce robust rules for the tracking of space objects and the mitigation of space debris.
- Resilience—there will be cybersecurity requirements for European operators to protect critical space infrastructure.
- Sustainability—operators must reduce the environmental impact of their activities in space.[490]

252. As part of the scheme, all EU and non-EU providers of space data and services within the EU will have to apply for an e-certificate that attests to the conformity of the firm with the provisions of the Act. Satellite operators will have to meet EU rules in areas such as spacecraft manoeuvrability, debris mitigation, light and radio pollution and encryption (amongst others).[491]

253. We heard evidence on the impact that this legislation will have on the UK space sector. Dentons, a law firm, noted that the legislation will set a level playing field between EU and non-EU operators (all will face the same requirements) and highlighted the practical benefit of the legislation in leading to better co-ordination between orbital actors and lowering the risk of collisions. It also noted that non-EU entities wary of the burden of the legislation may instead choose to partner with the UK, offering a competitive advantage.[492] Fieldfisher claimed the major benefit of the proposed legislation for the UK was "the prospect of easy access to a harmonized EU space market".[493]

254. However, the proposed legislation may also impact UK operators negatively. Dentons noted that, if passed, the act will require UK-based providers of space-based data and services to comply with "extensive and relatively onerous conformity requirements".[494] The European Space Policy Institute estimated the potential cost burdens of the legislation to be 10% on satellite manufacturers and 20% on launch services firms. [495] Dentons also noted that third-country space companies operating in the EU will have to provide a legal representative in the EU for compliance purposes, which "will add an additional cost burden to affected UK operators".[496]

255. Fieldfisher noted that UK firms will have to consider whether aligning with the Space Industry Act in the UK and new EU legislation will "create inconsistent results" and may find the burden of dual compliance too

488 European Commission, *EU Space Act*, 23 June 2025
489 Written evidence from Dentons (SPA0101)
490 European Commission, *EU Space Act*, 23 June 2025
491 Written evidence from Dentons (SPA0101); Dentons provided the Committee with a full list of requirement areas under the legislation. These are: spacecraft manoeuvrability; orbital traffic rules; positioning in orbit; space debris mitigation; light and radio pollution; operation of spacecraft constellations; risk management through the lifecycle of space missions; risk assessments; physical resilience of assets; detection and monitoring of incidents; cryptography and encryption and business continuity policy and response and recovery plans.
492 Written evidence from Dentons (SPA0101)
493 Written evidence from Fieldfisher (SPA0103)
494 Written evidence from Dentons (SPA0101)
495 Written evidence from European Space Policy Institute (SPA0102)
496 Written evidence from Dentons (SPA0101)

onerous. It also noted that the value of ESA to the UK "may be undermined as a result of the regulatory centre of gravity moving to the EU", noting the potential for ESA grants and projects to become tied to compliance with EU regulation.[497]

Future UK/EU relations in space

256. Several witnesses opined on the future of the UK's relationship with the EU on space. James Black, Assistant Director of Defence and Security at RAND Europe, highlighted the need for stronger UK engagement with the EU, due to the likelihood of increasing EU influence over the direction of ESA.[498] Colin Baldwin, Executive Director at UKspace, noted that the increasing overlap between EU and ESA projects necessitates having more conversations with the EU about collaboration.[499] Astroscale asserted that access to the EU Space Programme must be a part of the UK's continuing dialogue with the EU, or there is a risk the firm will be "unable to support future EU space programmes".[500] Sir Martin stated that the "change in geopolitical flavours" would enable to UK to play a similar role to Norway and Canada, who have an effective relationship with the EU via ESA.[501]

257. With regards to Galileo, several witnesses advocated for the UK to seek access to the project again. Major Peake stated that access was important to ensure resilient PNT capabilities and that the UK should enter into discussions with the EU to explore future access.[502] Dr Bowen emphasised the importance of accessing Galileo's "high-grade, high-security, precision, military-grade navigation service" as a back-up to GPS due to the risk of the "spoofing" of GPS signals.[503] ADS Group argued that as a "major contributor to European security and technological innovation", the UK should seek to participate in "high-value" programmes such as Galileo and IRIS².[504] The Durham University Space Research Centre argued that recent changes in US foreign policy (see below) make it "imperative that Britain begin negotiations with the European Union over access" to Galileo.[505] Lord Willetts highlighted that the UK had to exit Galileo as the programme had a security function, but that a closer defence and security relationship between the UK and EU could eliminate this barrier.[506]

258. However, Mr Jaffart noted that the industrial benefits of UK participation in Galileo would be minimal, as the "industrial set-up is done".[507] Dr John B. Sheldon noted that Galileo was designed as a civilian capability and therefore it is far less well-equipped to survive a hostile environment than GPS.[508]

259. With regards to IRIS², both Professor Barry Evans, Professor of Information Systems Engineering at the University of Surrey, and Joanna Darlington,

497 Written evidence from Fieldfisher (SPA0103); The European Space Policy Institute (SPA0102). Note that "much of the Act's concrete impact remains difficult to assess in the absence of an implementing act". As such, the above evidence should be considered preliminary and subject to change.
498 Q 133 (James Black)
499 Q 199 (Colin Baldwin)
500 Written evidence from Astroscale (SPA0041)
501 Q 199 (Sir Martin Sweeting)
502 Q 101 (Major Tim Peake)
503 QQ 129–131 (Dr Bleddyn Bowen)
504 Written evidence from ADS Group (SPA0026)
505 Written evidence from Durham University Space Research Centre (SPA0058)
506 Q 19 (Lord David Willetts)
507 Q 139 (Laurent Jaffart)
508 Q 143 (Dr John B Sheldon)

Chief Communications Officer and Executive Committee Member at Eutelsat OneWeb, encouraged the UK to begin negotiations on entry into the programme, with the former claiming that participation will have both industrial and security benefits for the UK.[509] Mr Moeller noted that Europe is vulnerable both militarily and economically when it comes to satellite communication capability and that the development of IRIS² was a necessary bulwark against this.[510] Mr Jaffart told us that IRIS² is still at an early stage of development and that all of the industrial partners for the programme have not been selected. He noted that "participating in a programme from the beginning gives a lot more opportunity for the industry to have a chance to participate".[511]

260. BAE Systems called for more clarity on the UK's approach to both programmes. It claimed there is a need to examine the potential value of participation in these programmes, as this will be crucial in forming the UK's strategy for future negotiations with the EU. It argued that the Government must be "clear on national objectives and requirements, particularly as the consolidation of the industry across Europe progresses".[512]

261. When questioned about Galileo and IRIS², the then-Minister of State for Data Protection and Telecoms recognised the potential strategic advantages of the programme but emphasised that "the hard reality of money" means the UK is unlikely to obtain access.[513] Annelies Look, Director of Space at DSIT, informed us that the Government will closely monitor the development of both programmes and will assess whether the UK would obtain value from participation.[514]

262. **The EU is becoming an increasingly prominent actor in space, taking a firmer role in the development of core capabilities and the funding of space technology firms. The UK no longer has a formal relationship with the EU space programme but remains partially involved via access to Copernicus. Stakeholders expressed uncertainty over the Government's position on future participation in the IRIS² and Galileo programmes, which are of increasing significance in a changing geopolitical landscape.**

263. ***In light of the evidence presented to us, the Government must provide more clarity on the UK's position on future participation in the EU Space Programme. The Government should conduct an in-depth analysis of the opportunities and risks of UK participation in flagship EU programmes, such as Galileo and IRIS², and their findings should inform their decision making. Decisions on participation in these programmes are urgently required to provide industry with certainty about the future trajectory of UK space policy.***

264. ***The increasingly close relationship between EUSPA and ESA is a matter of utmost strategic importance for the UK. The UK's ability to influence the direction of ESA and maximise the benefits of its programmes may be fundamentally altered should ESA become***

509 Q 87 (Prof Barry Evans); Q 87 (Joanna Darlington)
510 Q 139 (Hermann Ludwig Moeller)
511 Q 139 (Laurent Jaffart)
512 Written evidence from BAE Systems (SPA0038)
513 Q 183 (Chris Bryant)
514 QQ 183-189 (Annelies Look))

more heavily influenced by EU policymaking. As the Government develops future strategies on UK/EU engagement, this issue should be a priority consideration.

United States of America

Overview of the US Space Programme

265. The US is the world's leading space power. In recent years, NASA's budget has been larger than the rest of the world's space agencies combined, and the US government and US-based firms currently own around 8500 satellites, more than China (1000), Russia (300) and Europe (1200).[515] In 2022, the US invested around $26 billion in civil space and $17 billion in non-classified military space spending.[516]

266. The US assumes a position of global leadership in military space capabilities. The US military developed the Global Positioning System (GPS) a constellation of satellites that provides PNT data to civilian and military users globally.[517] The US military also possesses world-leading satellite communication, Space Domain Awareness and Intelligence, Surveillance and Reconnaissance (ISR) capabilities.[518]

UK/US relations in space

267. The UK and US enjoy a close relationship when it comes to space policy. Dr Bowen claimed that, whilst the notion of a "special relationship" between the UK and US has been questioned, in the space sector a "special relationship" is clearly observable.[519] Mr Black described a "huge integration between the two countries" when it came to day-to-day military space collaboration, whilst Dr Peter L Hays, Professor of the Space Policy Institute at George Washington University, stated that "among the many partners that the United States has in space, the United Kingdom is in the first position".[520]

268. The strength of UK-US relations is most obvious when it comes to military space. Dr Sheldon and Dr Bowen each told us that the relationship dates back to the Cold War and is deeply rooted in historic collaborations in intelligence and nuclear defence.[521] As a result of this partnership, several witnesses described how the UK has become dependent on the US when it comes to military space capabilities.[522] Dr Sheldon noted that the UK relies on the US for ISR satellites, PNT, and ballistic missile early warning.[523] Dr Bowen characterised the UK as "extremely dependent" on the US. He stated that, unlike France or other Western European states, the UK has never felt the need to develop sovereign military capabilities because the US has always provided these.[524]

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515 Q 127 (Dr Bleddyn Bowen); Space Partnership, *UK Global Leadership Top 10 - Connected Economics*, 14 February 2024
516 OECD, *The Space Economy in Figures: Responding to Global Challenges*, 15 December 2023
517 United States Space Force, *Global Positioning System*, October 2020
518 Centre for Strategic and International Studies, *The Future of Military Power is Space Power*, 9 April 2025
519 Q 131 (Dr Bleddyn Bowen)
520 Q 131 (James Black); Q 142 (Dr Peter L. Hays)
521 Q 131 (Dr Bleddyn Bowen); Q 142 (Dr John B Sheldon)
522 Written evidence from ADS Group (SPA0026), RAND Europe Space Hub (SPA0043) and Prof James Osborn (SPA0058)
523 Q 142 (Dr John B Sheldon)
524 Q 131 (Dr Bleddyn Bowen)

269. Witnesses also noted that the UK makes significant contributions to the partnership. Mr Black told us that, whilst the US isn't as dependent on the UK as the UK is on it, the UK makes "important, niche contributions" through the provision of bases and the contribution of capabilities that provide back-ups to US systems.[525] Dr Hays asserted the importance of UK bases such as RAF Fylingdales, Menwith Hill and Molesworth, which he claimed are "irreplaceable co-operative ventures that [the US] would be in trouble without".[526] Several witnesses cited the transfer of Air Marshall Paul Godfrey of the Royal Air Force to a position within the US Space Force as an example of the strong military space ties between the UK and US.[527]

270. Nonetheless, both Mr Black and Mr Elefteriu encouraged the Government to develop more sovereign space capabilities to act as a hedge against future US policy changes.[528] Dr Sheldon claimed that it was "imperative for the UK to diversify" and decrease reliance on the US and argued that the UK should work more closely with European partners to develop alternative capabilities.[529] The Durham University Space Research cited Japan, India and South Korea as examples of spacefaring states who have, in recent years, sought to reduce their reliance on the US through the development of sovereign military space capabilities.[530] The UK also plays a role in US-led multilateral initiatives. It is a member of Operation Olympic Defender (a coalition of allied spacefaring nations), participates in the NATO space programme and is contributing to space capability development as part of the AUKUS agreement.[531]

271. In civil space, the UK enjoys a close working relationship with NASA. UKSA highlighted the UK's contribution to the NASA Helioswarm mission, which is dedicated to analysis of the sun and forecasting space weather.[532] Carol Buxton, Doctoral Researcher at the University of Birmingham, noted that UK contributed to the US-led Artemis programme and scientific missions such as the Perseverance Mars rover and the James Webb Space Telescope.[533] Prof Cox highlighted the value of the US as a space science partner but noted that Congressional funding makes missions "vulnerable to political uncertainty" and that the UK has little influence in NASA's decision-making process.[534]

Changing US policy

272. Since taking office in January 2025, the new US administration has made significant adjustments to space policy. Changes include proposed cuts to NASA's funding (which are currently being contested in Congress) and plans to develop a "Golden Dome" missile defence system that will be partially based upon advanced satellite technology.[535] More generally, the Trump administration has sought to recalibrate US foreign policy through policies

525 Q 131 (James Black)
526 Q 142 (Dr Peter L Hays)
527 Q142 (Dr John B Sheldon); Q 142 (Dr Peter L Hays); Q 203 (Gabriel Elefteriu)
528 Q 131 (James Black); Q 203 (Gabriel Elefteriu)
529 Q 143 (Dr John B Sheldon)
530 Written evidence from Durham University Space Research Centre (SPA0058)
531 Written evidence from ADS Group (SPA0026), RAND Europe Space Hub (SPA0043), Durham University Space Research Centre (SPA0058) and Northrop Grumman UK (SPA0060)
532 Written evidence from UK Space Agency (SPA0024)
533 Written evidence from Carol Buxton (SPA0061)
534 Q 9 (Prof Brian Cox)
535 Financial Times, *Donald Trump says $175bn 'Golden Dome' will be completed during his term*, 20 May 2025; Scientific American, *NASA Faces Deep Budget Cuts—Every Living Former Science Chief of the Agency Is Sounding the Alarm*, 5 August 2025

such as the introduction of "reciprocal tariffs" (on allies and adversaries alike), a hardline stance on increased defence spending by NATO members, and a prioritisation of Indo-Pacific security imperatives over the Euro-Atlantic region.[536]

273. Several witnesses made comments on how changing US policy, in both the space domain and beyond, was likely to impact UK/US relations in space. Dr Bowen stated that "given the events and the discourse of the past five or six months, my faith in the United States has been shaken" and worried about the implications of weakened UK/US relations on UK defence space capabilities. However, Dr Bowen noted that there have been no signs of significant shifts in space collaboration between the UK and US since the arrival of the second Trump administration.[537] Dr Balm claimed that the nature of the UK/US "special relationship" is "increasingly shaped by shifting political and economic dynamics, and is marked by tensions between shared interests and personal diplomacy". She cited the threat by US government negotiators to block Ukraine's access to the Starlink communications platform as an example of the "divergence between US and European goals and strategic priorities".[538] Dr Sheldon took a longer-term view and argued that, notwithstanding the policy changes in recent months, it has been clear for some time that the US' core strategic focus is in the Indo-Pacific and that it believes that "Europe has to do more for its defence, including in the space domain".[539]

274. With regards to civil space, Dr Hays told us that, whilst it is difficult to ascertain what the exact direction of US space policy will be in the coming months and years, it is clear that the current administration wished to take a step back from space science, which may present opportunities for UK space scientists to "pick up the slack".[540] Dr Sheldon noted that opportunities for UK space scientists and universities would be lost as a result of potential US cuts to space science funding, but believed the UK Government does not possess the necessary the strategic wherewithal to take global leadership on space science initiatives.[541] Dr Heidi Thiemann, Director at the Space Skills Alliance, claimed that potential US budget cuts will have a significant impact on UK space science and will result in the cancellation of missions, projects and components.[542] The Royal Astronomical Society and Space Solar warned that shifts in US science policy have led to concerns that NASA is no longer a "reliable partner".[543]

275. Despite the uncertain policy environment, we heard strong evidence of the importance of maintaining strong links with the US in the space domain. Mr Elefteriu claimed that, among UK allies, the US was "the only game in town" when it comes to space warfighting capabilities and that the UK remained in a good position to be a "trusted ally" of the US in defence space.[544] Alderman Professor Emma Edhem, Lord Mayor's Aldermanic Envoy for Space Technology and Innovation at the City of London from 2023–24,

536 Financial Times, *Donald Trump erects a protectionist barrier around America*, 3 April 2025 ; BBC News, *Trump says Nato defence spend rising to 5% of GDP is 'big win' for US and the West*, 25 June 2025
537 Q 131 (Dr Bleddyn Bowen)
538 Written evidence from Dr Julia Balm (SPA0028)
539 Q 143 (Dr John B Sheldon)
540 Q 143 (Dr Peter L Hays)
541 Q 143 (Dr John B Sheldon)
542 Q 162 (Dr Heidi Thiemann)
543 Written evidence from Royal Astronomical Society (SPA0028) and Space Solar (SPA0048)
544 Q 203 (Gabriel Elefteriu)

concurred, arguing that the UK must "look beyond the fog" and stay close to the US, which remains the leading spacefaring state by some distance.[545] Mr Black encouraged the Government to seek to make the relationship with the US more equitable, by providing resilient backup capabilities.[546]

276. **The UK's relationship with the US in space remains strong, despite changes in the US approach to space policy. The UK/US military space relationship remains robust, with the UK armed forces relying on US capabilities but also making useful contributions to US space power in niche areas. However, the UK's close ties with the NASA on civil space endeavours are in a place of great uncertainty given recent shifts in US policy.**

277. ***We recommend that the Government's current approach, which involves maintaining close collaboration with the US in space whilst also developing sovereign military space capabilities (such as ISR), continues. The development of greater sovereign capability will serve both to insulate the UK from potential future US policy changes but will also allow the UK to make greater contributions to the US' space capabilities and those of other allies.***

SpaceX and Starlink

278. SpaceX is a privately-owned American aerospace company. Its founder, CEO and largest shareholder is Elon Musk. Through pioneering technological and business model developments in orbital launch and satellite communications, SpaceX (and its subsidiary Starlink, which delivers the satellite communications element of the business) has established itself as a dominant player in the global space economy and is one of the largest privately-owned firms in the world.[547] Whilst estimates of total numbers vary, analysts highlight that the majority of functioning satellites in orbit are part of the Starlink communications constellation and that SpaceX accounts for around half of the global launch market.[548] Dr Sheldon emphasised the "fantastic things" SpaceX had done for the global space sector, which includes significantly cutting the cost of orbital launch and developing a communications platform which brings internet access to remote areas.[549]

279. Given the importance of SpaceX and Starlink to the global space economy, we received several reflections on the UK's relationship with SpaceX. Joanna Darlington asserted that through a combination of strong financial backing from Musk, a vertically integrated business model and significant support from the US government, Starlink represents a challenge to OneWeb's business. Joanne Darlington also noted that Starlink has been threatening to cut users off to gain political leverage, citing Ukraine, Brazil and Mexico as examples.[550] Prof Evans echoed this sentiment, warning of "Starlink dominance" of the global satellite communications market, which he saw as a "tremendous risk" to the UK and EU, due to the lack of sovereign alternatives.[551] Dr Hays told us that, over time, a competitor to Starlink may

545 Q 203 (Prof Emma Edhem)
546 Q 131 (James Black)
547 Financial Times, *SpaceX heads to $400bn valuation in share sale*, 8 July 2025
548 Q 40 (Will Lecky); Jonathan McDowell, *Satellite and Debris Population: Past Decade*
549 Q 145 (Dr John B Sheldon)
550 Q 80 (Joanna Darlington)
551 Q 80 (Prof Barry Evans)

emerge but that this is likely to take a while, leaving Starlink with a "position of dominance" that is "really stunning".[552]

280. With regards to launch, Dr Hays stated that "the world has become over-reliant on SpaceX" due to the quick and reliable services it provides. However, he claimed that there are dangers to overreliance on a single provider and that the UK should seek to reduce its own reliance on SpaceX.[553] Dr Sheldon concurred, noting that SpaceX has emerged as a monopoly player in the global space marketplace, which creates an overreliance on the business by governments.[554] Mr Western claimed his company Space Forge is "really able to access only one operational space launch provider" and that alternative launch providers were needed to break the SpaceX monopoly.[555] Mr Black told us that a stronger European space sector was necessary to balance against US space dominance and would act as "an alternative to having to buy stuff from SpaceX every time".[556]

281. **SpaceX has emerged as a dominant player in the orbital launch and satellite communication sectors. Whilst the services provided by SpaceX are competitively priced and reliable, this has led to an increased dependency on the firm in the UK. This reliance is challenging in the context of increased demand for SpaceX launch services and the potential politicisation of the Starlink service.**

282. ***Whilst there is no immediate indication that the UK's access to SpaceX's services could be compromised, future plans for UK space capabilities should reckon with the impacts of UK dependence on SpaceX and look to ensure access to diversified and/or sovereign services where possible. The Government should conduct research on the potential impacts of loss of access to SpaceX services.***

Other international partnerships

UK partnerships beyond Europe and the US

283. In recent years, the UK has sought to expand its international collaborative approach to space beyond traditional partners. Dr Bate told us of UKSA's efforts to stimulate the UK's international relationships in space, and explained how, in recent years, international collaborative approaches had moved from a bottom-up model (led by scientists) to a model with greater funding and support from UKSA.[557] However, Mr Elefteriu told us that, whilst the UK's desire to generate greater partnerships with allies is correct, the UK's "international space partnering is very small scale".[558]

284. In recent years, the UK has expanded funding for bilateral space missions through the establishment of the International Bilateral Fund (IBF) which provides grant funding to firms and academics seeking to collaborate internationally and a Science and Exploration Bilateral Programme which seeks to "target collaboration on high-quality multilateral space science and exploration missions with international space agencies".[559] The IBF has seen

552 Q 143 (Dr Peter L Hays)
553 *Ibid.*
554 Q 145 (Dr John B Sheldon)
555 Q 66 (Josh Western)
556 Q 133 (James Black)
557 Q 19 (Dr Paul Bate)
558 Q 204 (Gabriel Elefteriu)
559 Written evidence from UK Space Agency (SPA0024)

the UK develop partnerships with Australia (on water quality monitoring from space), Japan (on the development of a telemetry instrument for its H3 launch vehicle) and Canada (on a project that explores how to purify water beneath the moon's surface), amongst others.[560] The funding for the IBF was increased to £75 million over five years as part of the 2025 Modern Industrial Strategy.[561]

285. We heard favourable evidence about the introduction of the IBF, with several firms and researchers citing how it has opened doors for new projects and that it has attracted a high-level of interest.[562] The Cardiff Hub for Astrophysics Research and Technology (CHART) told us that international bilateral funding is a "very welcome initiative [that] has made it possible for the first time for many decades for the UK to participate in space missions outside the ESA programme".[563] However, the Space Academic Network stated that the UK's bilateral programmes "are based around the UK being a predominantly minor or junior partner".[564]

286. In 2021, the UK formed a "space bridge" with Australia, which seeks to increase cooperation in areas such as communications technology, satellite navigation and regulatory alignment.[565] The UK has also formed a partnership with New Zealand to collaborate on in-orbit servicing, debris removal and satellite refuelling.[566] UKSA has also established Memoranda of Understanding with Canada, India and Norway (amongst others) which promise to "facilitate exchanges of expertise and open doors for UK companies abroad".[567]

Future partnerships

287. We heard evidence about countries with which the UK should seek to expand partnerships. Foremost amongst these was Japan. Mr Western and Mr Wood described Japan as a strong partner for the UK, due to its advanced space sector and interest in UK technology.[568] Mr Black noted that the UK has a number of companies which also operate in Japan, most notably Astroscale, whilst Prof Barstow noted "long-standing relationships with universities in Japan going back decades".[569] Martin Soltau, Co-CEO at Space Solar, noted that Japan and the UK are world leaders in the development of space-based solar power and highlighted the potential for international collaboration in this space.[570]

288. Miss Buxton made the case for stronger UK/Japanese ties in space. She highlighted agreements to collaborate on advanced technologies, the strong existing partnership between UKSA and the Japanese Space Agency and

560 *Ibid.*
561 Q 184 (Sir Chris Bryant)
562 Q 64 (Josh Western); Q 153 (Prof Martin Barstow), written evidence from BAE Systems (SPA0038), The Open University (SPA0039), Richard Obsorne (SPA0073) and Space Scotland (SPA0096)
563 Written evidence from the Cardiff Hub for Astrophysics Research and Technology (SPA0037)
564 Written evidence from the Space Academic Network (SPA0010)
565 Written evidence from RAND Europe Space Hub (SPA0043) and The Chart Think Tank et al (SPA0066)
566 Written evidence from Astroscale (SPA0041) and the Department for Science, Innovation and Technology (SPA0082)
567 Written evidence from The Chart Think Tank et al (SPA0066)
568 Q 50 (Richard Wood); Q 64 (Josh Western)
569 Q 134 (James Black); Q 153 (Prof Martin Barstow)
570 House of Lords UK Engagement with Space Committee, Visit to Harwell Campus Note, 10 May 2025 (Appendix 4)

the links between UK and Japanese firms on space projects (which includes a partnership between Astroscale and Surrey Satellite Technologies Ltd and a partnership between Viasat and Mitsubishi Heavy Industries). She also noted that both states have a shared interest in promoting responsible behaviours in outer space.[571]

289. India was also cited as an important future partner for the UK. Dr Bowen described India as a "really serious space power" and observed that British companies are already using Indian launchers to reach orbit.[572] Dr Sheldon described India's Chandrayaan-3 Lunar Mission as "fantastic" and claimed that there were opportunities for the UK to collaborate with India on future projects. He also noted that Japan and India possess developed launch capabilities and urged the Government to consider these as an alternative to SpaceX or as potential partners for a future UK-led launcher.[573] Mr Elefteriu highlighted that the UK is currently working with India on the AXIS project (which will study Earth's X-ray aurorae) which is "a very small project at the moment, but it could grow bigger".[574]

290. Major Peake cited Australia and Canada as important partners, due to their alignment with UK strategic interests and participation in the Five Eyes community. He also claimed that the United Arab Emirates and several south-east Asian countries have active and growing space programmes.[575] Mr Black noted that partnering with Norway may be advantageous if the UK wishes to contribute to Arctic security.[576]

291. **The Government has made significant strides in expanding the UK's international space partnerships beyond traditional partners. Measures such as the International Bilateral Fund, the Space Science and Exploration Bilateral programme and the UK-Australia Space Bridge are examples of a government that is proactively seeking to diversify opportunities for collaborative space innovation.**

292. ***We welcome the UK Space Agency's pivot to supporting international bilateral partnerships with countries such as Australia, Canada, Japan and New Zealand. The Government should publish impact assessments on the UK-Australia Space Bridge and UK-New Zealand ISAM agreement, to inform the development of future bilateral initiatives.***

The UK's approach to international collaboration

293. Many witnesses shared views on the UK's overarching approach to international engagement. Mr Elefteriu claimed that the current balance between national, international and bilateral funding is the result of a "light-touch, low-funded and unstrategic space policy model" that does not seriously seek to build national capabilities. Mr Elefteriu claimed that the model is adequate if the purpose of UK space policy is economic growth but believed that it ignores the need for sovereign capability development in a more geopolitically contentious world.[577]

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571 Written evidence from Carol Buxton (SPA0061)
572 Q 134 (Dr Bleddyn Bowen)
573 Q 145 (Dr John B Sheldon)
574 Q 206 (Gabriel Elefteriu)
575 Q 102 (Major Tim Peake)
576 Q 134 (James Black)
577 Q 201 (Gabriel Elefteriu)

294. Both Mr Elefteriu and Dr Joanna Hart, Director of Space Partnership, highlighted that the UK's approach to international partnerships must be embedded in a wider space strategy. Mr Elefteriu claimed that the UK should view international partnerships from the perspective of national interest and ask what kind of missions the UK wishes to lead or co-lead and then seek partners.[578] Dr Hart claimed that two key questions needed to be answered before considering the question of partnerships. The first is for UKSA and UKRI to come to an agreement on what the key science and technology questions are for the sector. The second is to clarify what the roles are between these institutions (as well as others such as RAL Space and Satellite Applications Catapult). Dr Hart argued that, by answering these questions, it will be much easier to prioritise national goals and subsequently identify the correct international partners.[579] Mr Baldwin claimed that answering the question of "what do we actually want to do?" must precede the formation of an international strategy.[580]

295. Prof Cox asserted that the UK needed to play a larger role in ESA. He claimed that ESA is the most reliable partner the UK has and that the UK should increase its ESA funding to the same level as France, Germany and Italy, which would allow for maximisation of impact.[581] On the contrary, Dr Sheldon claimed that "it would not hurt Britain to diversify a little more" and encouraged the UK to greater explore how it could extract value from international bilateral deals. However, he claimed that the UK should also seek to work more closely with European allies on defence space.[582]

296. Dr Rory Holmes, UK Managing Director at ClearSpace, encouraged the Government to be more ambitious when it came to sovereign space missions, claiming that such missions would allow the UK to quickly develop new technologies that could give it a stronger foothold in the growing space economy.[583] Mr Elefteriu urged the Government to alter its entire approach to space by focusing on more "UK-led, UK-flagged" missions, which would propel domestic capabilities and allow the UK to assume international leadership in missions.[584] Open Cosmos stressed the need "for clearly defined UK national space capabilities as foundations for effective international collaboration".[585]

297. Sir Martin argued that "a national programme alongside European Space Agency programmes is particularly important" as it would allow the UK to develop technology, skills and make greater contributions to international projects. However, he asserted that the current balance, which sees the UK put 20% of space funding into sovereign programmes, was correct.[586]

298. Others highlighted how a sovereign space programme would allow the UK to achieve greater benefit from ESA. Dr Baker emphasised that, "ESA is quite a competitive environment" and that to obtain a successful geo-return, a "strong national programme" which produces "excellent technology" is

578 Q 204 (Gabriel Elefteriu)
579 Q 153 (Dr Joanna Hart)
580 Q 193 (Colin Baldwin)
581 Q 9 (Prof Brian Cox)
582 Q 142 (Dr John B Sheldon)
583 Q 64 (Dr Rory Holmes)
584 Q 201 (Gabriel Elefteriu)
585 Written evidence from Open Cosmos (SPA0036)
586 Q 199 (Sir Martin Sweeting)

required.[587] Professor John Remedios, Director at the National Centre for Earth Observation stated that strong sovereign missions are received well in ESA "because you have shown you have the capability to do it"[588] Whilst highlighting the value of ESA as an institution, Geoff Busswell, Vice President of Business Growth at Telespazio UK claimed the UK needs "enough of a national delta on the top to enable us to use ESA for our own means".[589]

299. **Given current funding levels, the UK's approach to international partnerships has been a success. The UK maintains access to defence space capabilities through a close relationship with the US, and contributes to civil and commercial space via ESA. The establishment of new funding streams for wider international partnerships has opened diversified opportunities for firms and researchers in the sector.**

300. **However, the success of the UK's international approach can only be measured against wider strategic aims. Without a clearer strategy on what the UK wishes to achieve from its space investments, it is difficult to ascertain the efficacy of the current approach. No specific partnership is sacrosanct, and the value of a given partnership must be closely tied to the UK's national interest.**

301. ***Given the wide benefits delivered to the UK space economy through ESA, the Government should seek to maintain its levels of funding in this institution. However, should the UK wish to be more ambitious in space policy, increased funding and support for national space programmes is essential. Such national programmes would not only boost skills, technology development and develop comparative advantages, but they would also form the bedrock of stronger international partnerships moving forward. These partnerships should also be aligned with the six priorities chosen by the Government.***

587 Q 75 (Dr Adam Baker)
588 Q 97 (Prof John Remedios)
589 Q 97 (Geoff Buswell)

CHAPTER 5: SECURING A SAFE OPERATING ENVIRONMENT IN SPACE

302. The provision of a safe operating environment in space is critical to civil, commercial and defence space. A safe operating environment refers to the security of the UK's assets in space and the continuous ability of UK-based firms to conduct commercial activities in space. As activity in space has grown, it has become increasingly congested, and developing a collective understanding of how to operate responsibly in space has become more essential. Without the provision of a safe operating environment in space, the economic and scientific opportunities presented by space will be hampered due to the potential risks and dangers.

303. Witnesses such as the ADS group noted that a safe operating environment in space is "rapidly climbing" as a government priority due to its importance to national security and the economy,[590] and the Government has affirmed its commitment to providing a safe operating environment in space, seeking in particular to lead internationally in the management of space debris.[591] This commitment has been carried over from the previous government, which sought to drive space sustainability through measures such as working to establish a Space Sustainability Standard and funding the development of Active Debris Removal (ADR) technology.[592] Beyond space debris, the creation of a safe operating environment in space includes work to monitor space weather, management of radio spectrum, and the development of laws, norms and regulation to manage the use of space globally.

International law and standards in space

304. The basic framework for international space law is the 1967 Outer Space Treaty (OST). It established that outer space was not subject to national appropriation, ensured that all states had the right to explore space, banned the placing of nuclear weapons in orbit or on celestial bodies, made states responsible for all national space activities whether or not they are carried out by governmental entities, made states liable for damage caused by their own space objects, and decreed that states should avoid "harmful contamination" of outer space.[593] 115 states, including all major spacefaring powers, have ratified the OST.[594] It was followed up by three other widely-agreed international agreements on space:

- Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968)—Stipulates that all states take steps to rescue and assist astronauts in distress and return them to their launching state.

- Convention on International Liability for Damage Caused by Space Objects (1972)—Asserts that launching states possess absolute liability for damage cause by their space objects on Earth and are liable for damage caused in space due to faults.

590 Written evidence from the ADS Group (SPA0026)
591 Written evidence from Department for Science, Innovation and Technology (SPA0082)
592 Department for Business, Energy and Industrial Strategy, UK Space Agency and George Freeman MP, *Press release: Government announces package of new measures to drive space sustainability*, 23 June 2022
593 UNOOSA, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 1967
594 The Planetary Society, *What is the Outer Space Treaty?* 14 May 2024

- Convention on Registration of Objects Launched into Outer Space (1976)—Stipulates that states provide the United Nations with details about the orbit of objects launched into space.[595]

305. The Department for Science, Innovation and Technology (DSIT) told us that "international space law and regulation are increasingly important as space activities continue to expand and present new challenges."[596] This view was supported by Professor Sylvester Kaczmarek, who described how the existing framework "provides foundational principles but struggles to adequately address the complexities of the modern space environment" and stated that developments such as AI and the increase in commercial space activity "necessitate a significant evolution in international space law and regulation to ensure safety, security, sustainability, and responsible behaviour."[597] Dr Mark Hilborne, Senior Lecturer at King's College London. told us that the increased role of private actors in space has "creat[ed] new challenges in managing space traffic and ensuring long-term sustainability" and that space nations have realised the necessity of securing the space domain "if they wish to prevail in modern conflict."[598] Aarti Holla-Maini, Director of the UN Office for Outer Space Affairs (UNOOSA), stated that existing space treaties were not out of date and are, in fact, "coming to life now in a way that they were never called on to do before", citing the increased number of states implementing domestic space legislation as an example of international law ensuring states take their liabilities in space seriously.[599]

306. However, we also heard that the ability to create new international space law or treaties is limited. Ms Holla-Maini told us that the broader geopolitical environment is not amenable to the agreement of a new treaty and that there is very little chance of one being agreed.[600] Professor Hugh Lewis, Professor of Astronautics at the University of Southampton, told us that "there is no appetite for, and no possibility of, negotiating a new outer space treaty" in the current political climate.[601] Instead, he encouraged a focus on developing "international guidelines" which states can "implement … into their national practices and ways of working, knowing that a consensus has been built around them."[602]

307. Rather than attempting to introduce new international space law, "softer approach[es]" to the regulation of behaviour in space were advocated by witnesses.[603] Dr Hilborne told us that "there is a spectrum of governance, with hard legally-binding rules, at one end, to expectations of behaviour based on practices, policies, standards and procedures, at the other end." These informal norms can grow into "more binding forms" and create a "foundation" for responsible behaviour in space.[604] Ms Holla-Maini stated that "we now live in an environment where soft-law guidelines, principles and resolutions are the flavour of the day" and argued that such instruments

595 House of Commons Library, *International Regulation of Space*, CBP 9432, 26 January 2022
596 Written evidence from Department for Science, Innovation and Technology (SPA0082)
597 Written evidence from Prof Sylvester Kaczmarek (SPA0015)
598 Written evidence from Dr Mark Hilborne (SPA0054)
599 Q 210 (Aarti Holla-Maini)
600 *Ibid.*
601 Q 125 (Prof Hugh Lewis)
602 *Ibid.*
603 Written evidence from Dr Mark Hilborne (SPA0054); Q 210 (Aarti Holla-Maini)
604 Written evidence from Dr Mark Hilborne (SPA0054)

are effective in building consensus about responsible behaviour in space that can subsequently inform national policies.[605]

308. The UK contributes to many such "soft law" initiatives. It is a signatory to the Artemis Accords, a memorandum of understanding led by the US,[606] contributes to international forums, is involved with the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), and has a leading role in the UN Open Ended Working Group process addressing threats to space activity. [607] The UK has also funded two projects with UNOOSA on Long Term Sustainability Guidelines and the Registration of Space Objects.[608] In addition to diplomatic action, the UK seeks to influence the development of international space norms, standards and regulation through the Earth and Space Sustainability Initiative (ESSI) and Astra Carta, initiatives which seek to promote new sustainability standards and norms.

Box 8: The Long Term Sustainability Guidelines and the Registration of Space Objects

The UN Committee on the Peaceful Uses of Outer Space adopted the Guidelines for the Long-term Sustainability of Outer Space Activities in 2019.

These voluntary guidelines were developed with the goal of assisting UN states and international organisations to maintain an operationally safe and stable environment in a peaceful space that "is maintained for peaceful purposes and open for exploration, use and international cooperation by current and future generations, in the interest of all countries, irrespective of their degree of economic or scientific development, without discrimination of any kind and with due regard for the principle of equity."

The Register for Space Objects has been maintained by the UN since 1962. It is a "means of identifying which States' bear international responsibility and liability for space objects.". In 1976, the Convention on Registration of Objects Launched into Space came into force. It requires its states parties and international organisations to maintain their own registries of objects launched and provide information for the UN register. Approximately 88% of all space objects launched have been registered with the UN to date.

Source: United Nations, Guidelines for the Long-term Sustainability of Outer Space Activities, 2021; UNOOSA, United Nations Register of Objects Launched into Outer Space

605 Q 210 (Aarti Holla-Maini)
606 Written evidence from Dr Alessandra Marino and Dr Marjan Ajevski (SPA0020)
607 Written evidence from UK Space Agency (SPA0024)
608 Written evidence from Department for Science, Innovation and Technology (SPA0082)

Box 9: Artemis Accords

The Artemis Accords are a set of non-binding principles launched in October 2020. They emerged from the 1967 Outer Space Treaty and guide current civil space operations.

Their ten key principles are:

- Peacefulness—that cooperative activities in civil space should have peaceful outcomes and be in accordance with international law;
- Transparency—signatories are committed to sharing their respective national space policies and plans in line with national rules and regulations;
- Interoperability—enhancing the potential for safe and robust space exploration among cooperating nations;
- Emergency assistance—signatories are committed to taking all reasonable efforts to aid distressed personnel in outer space, to provide rescue and return for astronauts, and to aid the removal of objects launched to space;
- The registration of space objects—to help mitigate the risk of harmful interference as part of the Registration Convention;
- The release of scientific data—sharing scientific data with the global community in a transparent and timely manner to benefit wider space exploration;
- Protecting heritage—signatories are committed to preserving historically significant human and robotic landing sites, artifacts, spacecraft, and other evidence of celestial activity, and to contribute to multilateral attempts to enhance international practice and rules;
- Space resources—resources should be utilised in accordance with the 1967 Outer Space Treaty and in a way which benefits humankind and is critical to sustainable operations;
- Deconfliction of activities—signatories are committed to providing notification of their activities, including the location and purpose of operations, and coordinating with any relevant actor to avoid harmful interference; and
- Space debris and spacecraft disposal—planning to mitigate against space debris, as well as the safe disposal of spacecrafts, is critical to preserving a safe operational environment in space.

Source: US Department of State, Artemis Accords

309. Witnesses described the UK as having a respected reputation as a contributor to the development of international space law and norms,[609] with the Open University describing the UK as "driving the development of good practice in this area internationally".[610] UKspace told us that "the UK takes its role in the development of international space law extremely seriously. It is seen as an area of strength given our long history of diplomatic and soft power strategy."[611] Dr Alessandra Marino, Senior Lecturer of Geography and Astrobiology at the Open University, and Dr Marjan Ajevski, Lecturer in Law at the Open University, stated that the UK has had a "pivotal role in the

609 Written evidence from Dr Sam Richards (SPA0098)
610 Written evidence from the Open University (SPA0039)
611 Written evidence from UKspace (SPA0085)

development of international space law and regulation" and that it has been "fostering and supporting" a number of research groups and think tanks working on space sustainability and ethics.[612]

310. Prof Lewis told us that "these initiatives are really welcome and really necessary" and that "drawing together academia, Government and industry is the right approach".[613] TechUK noted that, as well as helping to grow "international consensus of space sustainability", these initiatives also "encourage private investment in sustainability, creating a growing market for space technologies that can drive commercial growth."[614] Professor Joanne Wheeler MBE, Director of ESSI, told us that 144 regulators, companies, and insurance bodies from a number of countries have signed the memorandum produced by ESSI and that it has been asked to join boards of "various" international organisations.[615] Prof Lewis stated that ESSI "has been very successful from a UK perspective" and "engagement with the United Nations has been very good".[616]

311. However, witnesses emphasised the need for international effort in this area. While the Royal Society described ESSI and the Astra Carta as "examples of ways in which the UK has strength in convening power", it noted that "continued participation in UNOOSA will also be critical."[617] This view was supported by Professor Sa'id Mosteshar, Director at the London Institute of Space Policy and Law, who told us that while "ESSI may provide useful input to UK policymakers", the UN is where the significant decisions about international standards and agreements for space will be made.[618] Professor Don Pollacco, Professor of Astrophysics at the University of Warwick, argued that "the reality is that until we get other international partners—Americans, Chinese—on board, then we are just part of this. It needs an international effort to be successful."[619]

Box 10: The Earth Space Sustainability Initiative (ESSI)

The Earth Space Sustainability Initiative (ESSI) brings together industry, academia, governments, international organisations, and the finance and insurance communities to work on space sustainability and is working to develop space sustainability standards through the British Standards Institution (BSI). The overarching aim of the body is to develop Environmental, Social and Governance (ESG) standards which would be recognised by global finance, insurance and policymaking communities. ESSI was established with the support of the UK Space Agency as part of its wider international mission to promote space sustainability.

Source: ESSI, What ESSI does, ESSI, Memorandum of Principles

612 Written evidence from Dr Alessandra Marino and Dr Marjan Ajevski (SPA0020)
613 Q 126 (Prof Hugh Lewis)
614 Written evidence from TechUK (SPA0032)
615 Q 118 (Prof Joanne Wheeler)
616 Q 122 (Prof Hugh Lewis)
617 Written evidence from the Royal Society (SPA0093)
618 Supplementary evidence from Prof Sa'id Mosteshar (SPA0097)
619 Q 122 (Prof Don Pollacco)

Box 11: Astra Carta

In 2023, HM the King launched the Astra Carta framework, which seeks to encourage "the private sector to embrace the next frontier of sustainability in space" by building upon the Terra Carta (which is a charter seeking to centre sustainability in the private sector) to act as a roadmap for global private companies to use space sustainably.

Source: Sustainable Markets Initiative, Terra Carta: For Nature, People and Planet, 11 January 2021, Sustainable Markets Initiative, Sustainable Markets Initiative Launches Astra Carta, 28 June 2023

312. The UK's existing reputation for regulation was seen as aiding its potential to influence the development of international space law and regulation. DSIT noted that the UK's "regulatory framework is considered one of the most advanced in the world",[620] and ADS Group highlighted the "opportunity" the UK has to "shape international space law and regulation" by "establishing regulatory leadership", particularly in ISAM.[621] TechUK agreed but emphasised that this will require "active engagement with key allies and institutions" and a focus on "collaboration with international partners" rather than "isolated regulatory actions".[622] Prof Lewis argued that the UK could help to "set a baseline" for the space regulatory environment through its work in international fora.[623]

313. **Whilst the likelihood of new treaties governing the collective use of outer space is small, various "soft law" instruments have emerged that provide guidance and best practices on the sustainable use of Outer Space. The UK's strong reputation for domestic regulation and its continuous engagement with various international fora means it is well equipped to shape the coming international regulation of the space domain.**

314. ***We support the Government's multi-pronged efforts to shape the global orbital environment. We endorse and encourage continued governmental support of initiatives such as the Earth Space Sustainability Initiative and the Astra Carta, as well as continued diplomatic efforts at the United Nations.***

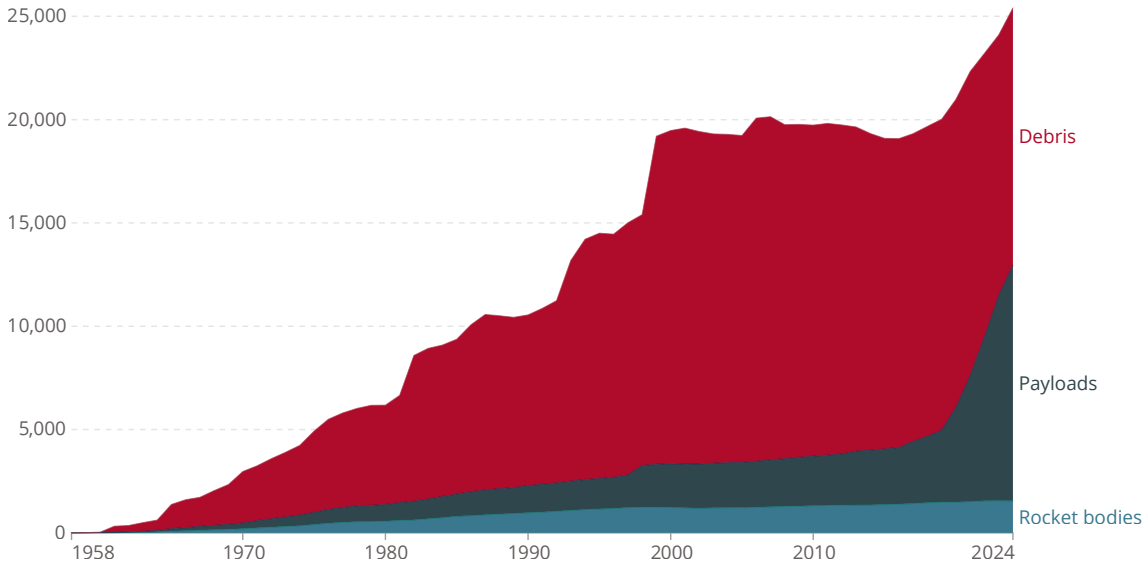
Space debris

315. One of the foremost challenges arising from the growing space economy is the issue of space debris. Space debris refers to "non-functional, man-made objects that are in Earth's orbit or re-entering Earth's atmosphere",[624] such as defunct satellites and fragments caused by disintegrated spacecraft. We heard that there is insufficient regulation over the launching of satellites, which has enabled the problem of space debris to grow.[625] Over the years, the number of objects launched into space has significantly increased, The Government has estimated that there could be over 60,000 satellites in orbit by 2030, up from the current number of 11,500.[626] It is estimated that there are over 40,000 tracked pieces of space debris in orbit, and almost a million

620 Written evidence from Department for Science, Innovation and Technology (SPA0082)
621 Written evidence from the ADS Group (SPA0026)
622 Written evidence from TechUK (SPA0032)
623 Q 122 (Prof Hugh Lewis)
624 European Space Agency, *What is space debris?*
625 Q 121 (Prof Don Pollacco)
626 National Space Operations Centre, UK Space Agency, and Ministry of Defence, *News story: The future space environment*, 16 May 2024; Q 120 (Prof Hugh Lewis)

smaller pieces that may still damage satellites due to the velocity of travel.[627] Dr Imogen Napper, Visiting Research Fellow at the University of Plymouth, made comparisons to the issue of plastic pollution in the oceans, stating that "it is almost as if we are in a pollution sandwich with our oceans being full of plastic and now unfortunately Earth's orbits also filling with debris."[628]

Figure 10: Tracked objects in Low Earth Orbit, by type



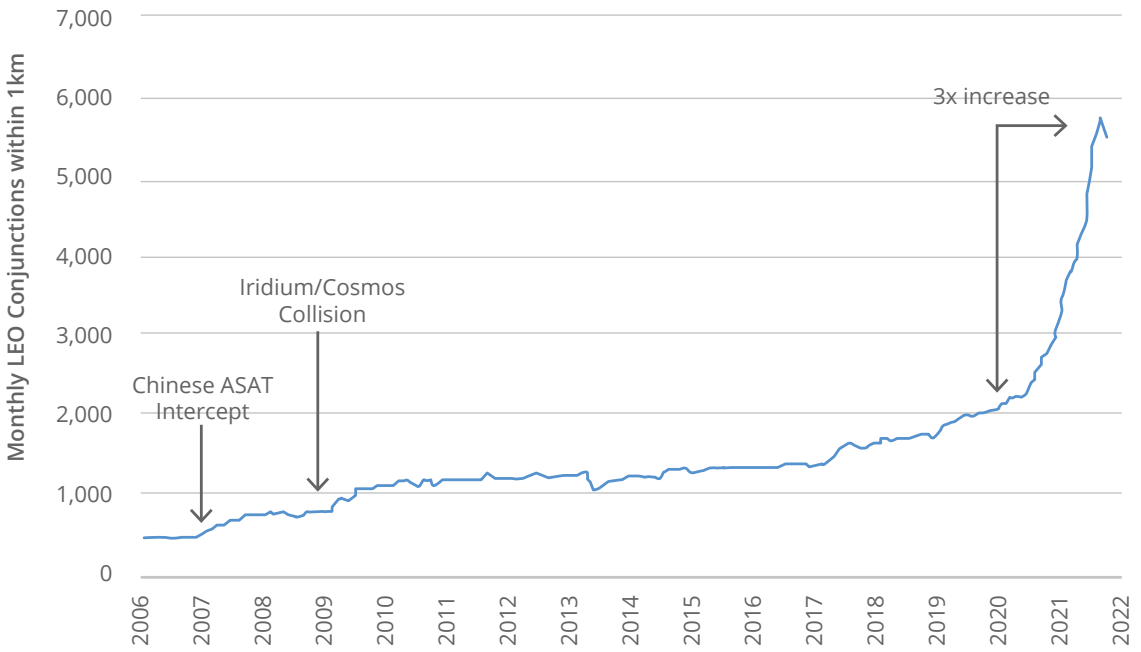
Source: Ourworldindata.org, Tracked objects in low Earth orbit, by type

316. Space debris poses a significant risk to the provision of a safe operating environment in space. Witnesses discussed the prospect of a Kessler Event, which describes a catastrophic collision resulting from the increased amount of space debris. A Kessler Event, also known as the Kessler Syndrome, is a theoretical scenario whereby collision between space objects creates a cascading effect. When two objects collide, they shatter into many fragments, each of which then becomes new debris. These new fragments increase the chance of further collisions, creating a chain reaction. If the cascade reaches a critical point, the debris field could become so dense that certain orbital altitudes become virtually unusable for satellites and spacecraft, due to the high risk of catastrophic collisions.[629] The Royal Astronomical Society told us that a Kessler Event could make near-Earth orbits "uneconomic to exploit" due to shortened lifetimes for satellites, potential litigation over damage, and increased difficulty and cost of planning missions.[630] Notwithstanding the prospect of a Kessler Event, the amount of debris in Earth's orbit already has an impact on human activities in space, with the International Space Station having to make course corrections "regularly" to avoid space debris.[631] The Global Network on Sustainability in Space told us that Starlink satellites now have to perform 275 collision-avoidance manoeuvres per day.[632]

627 Q 120 (Prof Hugh Lewis, Prof Don Pollacco). Estimates of the number of objects in orbit vary due to historically poor cataloguing of data, data transparency issues and the size of much debris making it difficult to track accurately.
628 Q 122 (Dr Imogen Napper)
629 Written evidence from Royal Astronomical Society (SPA0031)
630 Written evidence from the Royal Astronomical Society (SPA0031) and Global Network on Sustainability in Space (SPA0063)
631 Written evidence from Ms Jan Morgan (SPA0023)
632 Written evidence from the Global Network on Sustainability in Space (SPA0063)

Additionally, debris from Earth's orbit impacts the environment on Earth as well. The Royal Society stressed that large debris objects can re-enter Earth's atmosphere intact and land on Earth. While most of these landings have taken place in the ocean or sparsely inhabited areas, they can cause damage and disruption.[633] For example, in 2024 a piece of debris hit a home in Florida,[634] and in 2022, the potential landing of a rocket body in Europe caused airspace closures and flight delays.[635]

Figure 11: Number of satellite near misses(within 1km) in LEO, 2006–2021



Source: International Astronautical Federation, Evaluation of LEO conjuction rates using historical flight safety systems and analytical algorithms, 29 October 2021

317. The UK has taken an active interest in the issue of space sustainability and was described as an international leader in this area by witnesses.[636] In particular, the UK has sought to play a leading role in space debris mitigation by establishing itself as a hub for ADR technology (part of the ISAM priority capability), which is technology designed to facilitate "the process in which a space system is being captured to relocate it to a graveyard orbit or to accelerate its atmospheric re-entry at the end of the life of the satellite".[637] The UK has been a leader in developing ADR capabilities, with Surrey Space Centre leading the first mission to successfully demonstrate ADR technology in-orbit.[638] UK space policy has targeted developing ADR capabilities for a number of years, with the previous government committing to supporting

633 Written evidence from the Royal Society (SPA0093)
634 CNN, *NASA says it expected space station garbage to burn up. The debris smashed into a Florida home instead*, 24 April 2024
635 BBC, *Spain briefly closes airspace over risks from Chinese rocket debris*, 4 November 2024
636 Written evidence from the Space Academic Network (SPA0010) and Eutelsat OneWeb (SPA0017)
637 European Space Policy Institute, *On-orbit Servicing, Assembly, and Manufacturing: State of Play and Perspectives on Future Evolutions*, October 2023
638 Space South Central, *RemoveDEBRIS*, 30 April 2024

its development as part of its 2022 Plan for Space Sustainability.[639] On 3 July 2025, the UK Space Agency launched a £75.6 million tender for "the nation's first mission to actively remove [two] defunct satellites from orbit".[640] The UK also supports ADR development through ESA.[641]

318. Prominent companies within this sub-sector such as Astroscale, ClearSpace, D-Orbit, and OrbitFab have operations within the UK, with Astroscale, a company headquartered in Japan, attributing its choice to establish its first international entity in the UK in 2017 to the UK's "progressive" in-orbit servicing, assembly and manufacturing (ISAM) policy and regulations.[642] Prof Lewis told us that "the UK has positioned itself extremely well to be at the forefront of [ADR] technology".[643]

319. However, Astroscale highlighted that other nations, such as Italy, France, the US and China, are increasing international competition in this area. It argued that the UK "risks losing its competitive advantage within two to three years unless it maintains momentum" in developing ADR.[644] This view was supported by the ADS group, who told us that "to really be a world leader, the UK needs to help these companies become truly established" and that to be a leader, "real support" needs to be provided to the companies working in this area.[645]

320. We received mixed evidence about the potential market for space debris solutions. ADS Group told us that the emerging market is projected to be worth £15 billion by 2033, "with the UK best placed to capture 25% of this" (£3.5 billion).[646] However, other sources have challenged the commercial viability of ADR technology. Space Solar stated that "there is somewhere between a negligible and zero market for this until significant economic infrastructure is established in space" and that current work towards space sustainability "will entirely need to be funded by government".[647] Prof Pollacco felt that "a removal mission will cost serious money" and advocated that the "longer-term solution is going to be recycling."[648]

321. ADR technology can also provide the basis for further technologies that could enable growth. These applications could include other ISAM innovations such as satellite refuelling or repair and manufacturing in space. RAND Europe told us that "ADR investments serve as a pathway through which to develop technologies which underlie [ISAM]."[649] It concluded that by "investing strategically in the translation of technology from ADR to [ISAM], the UK could become a global leader in provision of in-orbit services."[650]

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639 Department for Business, Energy and Industrial Strategy, UK Space Agency and George Freeman MP, *Press release: Government announces package of new measures to drive space sustainability*, 23 June 2022
640 UK Space Agency, *Press release: UK launches tender for mission to clean up space and safeguard vital services*, 3 July 2025
641 UK Space Agency, *UK to play critical role in building 'the Claw' - the first ever satellite to remove space junk*, 17 November 2020
642 Written evidence from Astroscale (SPA0041)
643 Q 123 (Prof Hugh Lewis)
644 Written evidence from Astroscale (SPA0041)
645 Written evidence from ADS Group (SPA0026)
646 *Ibid.*
647 Written evidence from Space Solar (SPA0048)
648 Q 123 (Prof Don Pollacco)
649 Written evidence from RAND Europe Space Hub (SPA0043)
650 *Ibid.*

322. The UK has also worked to promote the importance of space sustainability by developing sustainability standards, as discussed earlier in this chapter. DSIT told us that the UK also "leads work in a number of areas" to address the risk of space debris, through UKSA and ESA and other international organisations.[651] The UK is a signatory to ESA's Zero Debris Charter, which commits member states to work towards debris-neutrality by 2030.[652]

323. **Space debris represents a fundamental challenge to the future development of the global space economy. The expansion of activity in Low Earth Orbit has been pursued without due consideration of environmental externalities and has subsequently led to a scenario in which in-space collisions have become increasingly likely. The space debris challenge is, by its nature, a collective action problem and international efforts are required to address the severity of the issue.**

324. ***We commend the Government's leadership in the development of ADR technology and welcome the news that the Government will deliver a contract for the removal of two defunct UK satellites. Whilst the market opportunities for satellite removal have not yet been fully established, the development of this technology will help pave the way for other ISAM activities such as satellite refuelling and repair, which could be lucrative future areas in which the UK could assert global leadership. The prioritisation of the development of debris removal technology also burnishes the UK's credentials as a global leader on space sustainability, reflects its commitments (as part of ESA) towards space debris neutrality and positions it well to lead on future collaborative debris removal missions.***

Space weather

325. Responsible, safe use of space goes beyond issues relating to space debris. One significant area is space weather, which can impact critical national infrastructure. Space weather primarily refers to solar phenomena, such as solar flares, which can cause changes to Earth's atmosphere and to conditions in Earth orbits.[653] Space weather events have led to disruption in the past—in 2017, flights needed to be re-routed to avoid airspace at risk of radiation impacts and a geomagnetic storm impacted radio and satellite communications across the world.[654] Dr Paul Bate, CEO at UKSA, described how strong solar flares "can knock out entire power grids".[655] Space weather features on the National Risk Register due to the potential threat it can pose,[656] but the "seriousness" of solar storms is not always understood by the wider public, or industry.[657] Space weather has been described as "an often underappreciated aspect of responsible space use", but one in which the UK has a particular strength.[658].

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651 Written evidence from Department for Science, Innovation and Technology (SPA0082)
652 European Space Agency, *Twelve countries sign the Zero Debris Charter*, 22 May 2024
653 National Space Operations Centre, *Space weather and the National Space Operations Centre (NSpOC)*, 19 May 2024
654 Department for Business, Energy and Industrial Strategy, *UK Severe Space Weather Preparedness Strategy*, September 2021
655 Q 14 (Dr Paul Bate)
656 Cabinet Office, *National Risk Register 2025*, 16 January 2025
657 Written evidence from Mr Richard Osborne (SPA0073)
658 Written evidence from RAND Europe Space Hub (SPA0043) and The Chart Think Tank et al (SPA0066)

326. The Met Office Space Weather Operations Centre (MOSWOC), established in 2014, is the only centre in Europe which provides constant space weather predictions.[659] RAND Europe outlined how the expertise of MOSWOC and the Met Office helped "lay the groundwork for the UK's leading role in the development of Vigil", an ESA space weather mission.[660] The Royal Astronomical Society also described the UK's contributions to space weather science through ESA's Space Situational Awareness programme.[661]

327. DSIT and the Met Office noted the potential for space weather to be an area of international collaboration for the UK. DSIT told us that by collaborating internationally, the UK "can develop comprehensive space weather mitigation strategies" and "enhance the UK's ability to contribute to a resilient and safe space environment"[662] The Met Office told us that "UK capabilities [in space weather] now surpass the US in some respects", which in turn "provides an opportunity to develop UK interests and influence in this partnership." They also noted ongoing work with the Five Eyes partnership to improve space weather data and monitoring as well as with other countries in Europe through EUMETSAT. [663] [664]

328. Despite recognition of the UK as a leader in space weather, some concerns were raised. RAND Europe noted that "many in the sector are concerned that there may not be sufficient funding in downstream space weather exploitation", despite the reliance of other sectors on accurate space weather forecasting.[665] Dr Ingrid Cnossen also emphasised that "continued investment in space weather science is essential" to maintain a safe operating environment in space.[666] RAND Europe also identified potential improvements that could be made to the UK's approach to space weather, such as proactively connecting operators of critical infrastructure with space weather expertise and making the creation of space weather preparedness strategies mandatory for said operators.[667]

329. **Space weather events have the potential to disrupt critical infrastructure both in space and on the ground. The UK has a strong capability in space weather, but it requires sustained investment and support to maintain its strength.**

Spectrum management

330. Most satellites use radio spectrum, which can be understood as "the range of invisible electromagnetic waves that enable all wireless technology", to communicate with other satellites and ground stations on Earth.[668] Professor Barry Evans, Professor of Information Systems Engineering at the University of Surrey, told us that "spectrum is the lifeblood of satellite communication", whilst the Royal Society told us that spectrum is a "scarce natural resource".[669]

659 Written evidence from the UK Space Agency (SPA0024)
660 Written evidence from RAND Europe Space Hub (SPA0043)
661 Written evidence from the Royal Astronomical Society (SPA0031)
662 Written evidence from Department for Science, Innovation and Technology (SPA0082)
663 Written evidence from the Met Office (SPA0088).
664 EUMETSAT is an intergovernmental satellite agency, which monitors weather from space. It is a separate institution from ESA and the EU and has 30 member states, which include the UK. EUMETSAT, *About EUMETSAT*
665 Written evidence from RAND Europe Space Hub (SPA0043)
666 Written evidence from Dr Ingrid Cnossen (SPA0080)
667 Written evidence from RAND Europe Space Hub (SPA0043)
668 Department for Science, Innovation and Technology, *Policy paper: Spectrum statement*, 11 April 2023
669 Q 82 (Barry Evans); written evidence from the Royal Society (SPA0093)

The growth in the number of satellites in space requires increasingly careful management of spectrum, as spectrum is a finite resource—if too many satellites use the same frequencies, their signals can interfere with one another.[670]

331. Spectrum in the UK is coordinated through Ofcom, which works with UKSA and the Met Office and represents the UK's interests to the International Telecommunication Union (ITU).[671] The ITU is responsible for "coordinating the global use of the radio frequency spectrum and satellite orbits to prevent interference and enable the efficient use of space-based services."[672] Joanna Darlington, Chief Communications Officer and Executive Committee Member at Eutelsat OneWeb, noted that increasingly, the work of the ITU is at risk of being undermined by the actions of individual nations, with some national regulators, such as the Federal Communications Commission in the US, becoming "much more partisan and aggressive."[673]

332. Eutelsat OneWeb told us that Ofcom is "widely recognised as a world-leading regulator in spectrum management" and takes a "proactive approach" to regulation of space technologies.[674] However, recent shifts in the use of space and satellites, such as the emergence of mega-constellations like Starlink, may require a shift in the approach taken by regulators, who are "really rushing to catch up".[675] The RPO Consortium, representing companies Astroscale, Clear Space and D-Orbit wrote to us claiming that there has not been "a coherent UK position at the ITU to support spectrum access" for ISAM missions, creating "serious obstacles" in obtaining necessary spectrum for ISAM operators.[676] This view was supported by UKspace, which argued that:

> "while foreign regulators are actively working to build and maintain their industries' interests in space, the UK and Ofcom have taken an overly-narrow and non-interventionist approach on space issues. This risks disadvantaging the UK space industry and diminishing UK space capability."[677]

333. **The international regulation of spectrum will become increasingly important as Low Earth Orbit becomes increasingly congested. Some states have already become more assertive and are challenging international rules when it comes to spectrum allocation.**

334. ***Ensuring access to finite radio spectrum should be a priority when it comes to UK space and telecoms policy. The UK Space Agency should continue working closely with Ofcom to ensure that UK interests are represented at the International Telecommunications Union, especially spectrum allocation for ISAM technologies.***

670 Written evidence from Eutelsat OneWeb (SPA0017) and the Met Office (SPA0088)
671 Written evidence from the Met Office (SPA0088) and the RPO Consortium (SPA0092)
672 Written evidence from Eutelsat OneWeb (SPA0017)
673 Q 83 (Joanna Darlington)
674 Written evidence from Eutelsat OneWeb (SPA0017)
675 Q 83 (Joanna Darlington)
676 Written evidence from the RPO Consortium (SPA0092)
677 Written evidence from UKspace (SPA0085)

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Introduction

1. The value of space to modern society is underappreciated. Satellite technology is fundamentally intertwined with the modern UK economy, underpinning multiple critical economic sectors. Satellite services are a Critical National Infrastructure, the disruption of which would create significant challenges across British society. And space scientific missions help drive technological innovation, provide a crucial customer for space firms and inspire future generations of scientists and engineers. (Paragraph 11)

2. Several trends in the global space economy are observable. The first is one of growth—the size of the global space economy, the amount of investment in space, the number of objects in space and societal reliance on space are all growing. This growth is linked to a more commercial space sector, with falling launch costs and innovations in satellite technology allowing new commercial players to enter the field. Low Earth Orbit in particular is becoming increasingly congested, with space debris an existential threat to future growth. (Paragraph 19)

A strategy for space

3. The UK's spending commitments on space are not commensurate with its ambitions in terms of both capability development and international leadership. Compared with peer states, the UK invests relatively little in its space sector, which will limit its ability to capitalise on the opportunities that emerge in years to come. Given the degree of state support that is traditionally required to achieve success in space, the UK risks seriously falling behind competitor states at current funding levels. (Paragraph 45)

4. *We acknowledge that the current fiscal environment makes a significant uplift in funding for space capability development unlikely. The Government has recognised space as part of the UK's Critical National Infrastructure and should prioritise funding for space within the budget available accordingly. The stability of funding ensured with the current three-year spending review cycle is welcome, but the current spending on space should represent a floor, not a ceiling.* (Paragraph 46)

5. *Like AI, space technology is a utility with use cases across multiple government departments. Given the fast-moving nature of the global space sector and the huge potential upsides of investment in space, the Government should ensure that all departments are aware of the value of space technologies and that funding across government departments is aligned to maximise impact.* (Paragraph 47)

6. The National Space Strategy was a good first step in establishing a coherent, cross-government space strategy that functions as a lodestar for government, industry and academia. However, the document, and subsequent follow-up documents, still do not provide detailed and costed implementation plans that can provide certainty to stakeholders.(Paragraph 51)

7. The current strategy is ambitious but insufficiently focused, and risks spreading resources too thinly. A targeted approach is essential for maximising the impact of public investment and fostering successful space businesses in the UK.(Paragraph 52)

8. *Rather than producing a new strategy, the Government should focus on improving the implementation and delivery of the current strategy. The Government should*

set out clear implementation plans for the delivery of capability goals laid out in the Modern Industrial Strategy. (Paragraph 53)

9. The UK Space Agency's performance has received recent criticism, though evidence indicated that it was taking the necessary steps to address the problems identified in the 2024 National Audit Office report prior to the announcement of its merger with the DSIT Space Directorate. Stakeholders held mixed views about how effective UKSA has been, but we did not hear evidence arguing for the integration of the Agency with the DSIT Space Directorate. (Paragraph 67)

10. *Absorbing UKSA into the DSIT Space Directorate risks diluting the focus and expertise that exists within UKSA as well as access to independent expertise. Concerns have been raised about the fragmentation of space policy across Government. If properly implemented, this merger could help address these concerns. However, the lack of details provided by the Government at the time of announcement mean that there is insufficient clarity about how space policy will be handled going forward. The Government should provide a detailed plan outlining the aim of the merger and how it will improve the coherence of space policy across Government.* (Paragraph 68)

11. Space policy cuts across the work of multiple departments which makes policy co-ordination difficult. Developing a working intragovernmental system for co-ordination is a necessary endeavour to ensure the UK maximises the value of its expenditure on space. The need for cross-governmental collaboration is especially pronounced given the dual-use nature of space technology which means that civil and military policy must be closely aligned. (Paragraph 69)

12. *The portfolio of the Minister currently responsible for space is too broad, and the importance of space as a policy area is significant enough to warrant concentrated attention. Therefore, the Government should create a Minister for Space sitting across both DSIT and MoD, who would hold responsibility for leading on cross-governmental co-ordination and have access to the National Security Council. The Government should also appoint a dedicated champion for space to coordinate between government, industry, and universities.*(Paragraph 70)

13. The lack of societal understanding of the value of space technology can limit the potential of the UK's space sector. It impacts business utilisation of space-based data and services, impedes skills development and makes it more difficult for the Government to make the case for space as a national priority.(Paragraph 75)

14. *The Government should work to promote awareness of space amongst the wider public, focusing on the benefits and potential applications of space technologies and programmes, highlighting career opportunities in the space sector to young people, and promoting the value of satellite applications to businesses. This could be done in part by building upon the success of existing organisations such as Speakers for Schools. The media should also be encouraged to consider how and when they cover space and the space economy in news and other programming.* (Paragraph 76)

15. Government's efforts to streamline the UK's strategic approach to space to six core capabilities are welcome and will provide greater certainty to the sector about what the Government is hoping to achieve in space. However, each of these six areas require sufficient funding and strategic support to succeed. There remains a concern that UK space policy will still be spread too thin and that world-leading capability development will be blunted as a

result. Under current budgetary restraints, strategic prioritisation is essential. (Paragraph 79)

16. *The Space Industrial Plan, published in March 2024, promised the publication of a National Space Capability Development Plan by Autumn 2024, which would outline how the Government plans to deliver on the development of its space capabilities. We understand that this document has been delayed because of the election and spending review. The National Space Capability Development Plan must not be delayed past the end of this year, as it is key to providing stakeholders with greater certainty about the implementation of government strategy.* (Paragraph 80)

17. *The plan should make clear why the six capability goals were selected and outline achievable, funded measures that will be taken to achieve these capability goals. The plan should differentiate between established capabilities such as space data integration and use and satellite communication technologies, which should be UK strengths in a commercial marketplace compared to capabilities such as ISAM, which will need significant government contracts for services to be a basis for developing UK leading businesses in a worldwide market. This plan should also provide some clarity of indicative expenditure on each capability area in the next ten years, including the balance of spending between ESA and UKSA and an indication of the grant funding and government contracts that to be awarded.*(Paragraph 81)

18. *The Advanced Research and Invention Agency (ARIA) should consider funding exceptional space technology projects outside the six capability areas, ensuring that curiosity-driven research can continue to be carried out, maintaining the UK's reputation for new inventions.* (Paragraph 82)

19. Space Domain Awareness is a critical space capability that is crucial in protecting UK assets in space from both orbital debris and malicious activity from enemy actors. The establishment of the National Space Operations Centre has been a positive move to align civil and military capability. (Paragraph 87)

20. *The Government should report on the progress of the National Space Operations Centre after three years of operation and highlight what lessons can be drawn from the MoD/DSIT cross-working approach and how these lessons may be applied to other capability areas.* (Paragraph 88)

21. The UK has developed a position of global leadership in the high-potential ISAM economy. Debris removal, in-space manufacturing and satellite repair and refuelling will be a significant part of the global space economy in years to come, and the Government has been proactive in providing financial and regulatory support to innovative firms in this area.(Paragraph 93)

22. The UK has a strong heritage in the design and manufacture of Earth Observation satellites, as well as a strong capability in the analysis of EO datasets that can positively impact the functioning of government programmes and also stimulate downstream economic activity. EO technology is essential in the analysis of climate change and also provides significant use cases in agriculture, disaster management, the maritime sector and national security. (Paragraph 100)

23. *Further investment in EO should be facilitated jointly by UKRI and Government departments by calling for proposals for Prosperity Partnerships between universities and UK space companies dedicated to EO, similar to the existing Prosperity*

Partnerships in the aerospace sector facilitated by the Engineering and Physical Sciences Research Council. (Paragraph 101)

24. PNT capability is fundamental to the functioning of modern economies and increasingly underpins national resilience and economic activity. The UK is reliant on the US GPS for secure PNT capability but is making progress in building PNT resilience in the absence of participation in the EU's Galileo programme. (Paragraph 105)

25. *The Government should provide clarity over their plans to improve the UK's PNT resilience to address the current vulnerability and dependence the UK holds in this area. In light of the new Security and Defence Partnership signed between the UK and the EU in May 2025, the Government should explore whether there is potential to re-join Galileo. In the absence of re-joining Galileo, the Government should provide a clear indication of its strategic plans for PNT resilience.* (Paragraph 106)

26. The global satellite communications sector is expected to grow as governments, businesses and individuals strive for seamless and resilient connectivity. The global market is increasingly dominated by the Starlink LEO constellation, but there is likely to be increasing competition from other national or private sector constellations in coming years. The UK potentially possesses a strategic asset in the form of its "golden share" in Eutelsat OneWeb, but it is unclear how the Government intends to exploit this; and whether the stake in Eutelsat OneWeb may be taken forward as a long-term commercial investment. (Paragraph 113)

27. Orbital launch represents an opportunity for the UK, given its advantageous geographic position. Whilst the market opportunities for UK-based launchers remain unclear, the security case for sovereign launch capability is strong. A sovereign launch capacity would strengthen national security, underpin the growth of the UK's space and satellite industries, and ensure that Britain remains a trusted and resilient partner within the allied space operations. It would also enable government policy to align more coherently across the Strategic Defence Review, the National Industrial Strategy and broader ambitions for regional regeneration and technological innovation. (Paragraph 122)

28. *We recognise that a case has been made for the development of UK launch capabilities for national security purposes. However, we believe that the business case for a UK-based launcher and UK-based spaceports has not been fully proven, and that economic viability should be considered. The question of launch requires serious consideration. The Government needs to provide clear answers about the commercial opportunities available for a UK-based launcher, what kind of launch capability is needed (vertical or horizontal), the military and civil need for sovereign launch capability, and whether there is a case for building more than one spaceport.* (Paragraph 123)

29. *If the Government wishes the UK launch programme to be competitive, it should continue to support UK participation in the European Launcher Challenge. Early-stage launch enterprises usually require a significant degree of state support to achieve success and the contracts that would emanate from participation in the Launcher Challenge would be pivotal in allowing a UK-based launch provider to grow towards commerciality.*(Paragraph 124)

30. *If the Government wishes to progress with the pursuit of sovereign launch capability, it should consider designating UK spaceports as Critical National Infrastructure, as*

they are built, to underscore their strategic importance. Furthermore, the Government should consider whether strategically supporting multiple spaceport initiatives across the UK would ensure critical resilience and sovereign access to space, preventing single points of failure. We also encourage the Government to consider advancing programmes such as NATO STARLIFT, which will allow the UK to bolster allies by providing launch services.(Paragraph 125)

Growing the UK's space economy

31. The space sector faces the same capital access challenges as many other high-tech sectors in the UK. The sector has a vibrant start-up and R&D ecosystem but firms struggle to commercialise and scale-up due to inability to access requisite finance in the UK. There is a risk that UK-based firms will move abroad if they are not able to acquire necessary funding in the UK.(Paragraph 137)

32. *We note that several other committees in the House of Lords have produced reports highlighting the challenges faced by technology firms in the UK in obtaining access to the capital required to commercialise their technologies and grow. Whilst we welcome recent Government initiatives to address these issues, we affirm the critical importance of Government policy in addressing funding challenges faced by innovative UK tech firms.* (Paragraph 138)

33. *We welcome government efforts to promote the UK space sector to the investment community and facilitate greater understanding about the potential of UK-based space firms. The Government should create another five Science and Technology Venture Capital Fellowships, which should focus specifically on space technology.* (Paragraph 143)

34. *We urge the British Business Bank to take a more proactive, ambitious, and tailored approach to financing space technology, comparable to leading European counterparts. This is critical to ensure that UK-based space firms have access to the capital they require to commercialise and grow into national champions.* (Paragraph 144)

35. One of the core functions of the UK Space Agency is to provide grant funding to support firms in developing innovative technology. However, we heard that UKSA's approach to grant funding faces significant issues. Its approach is fragmented, providing small amounts of funding to many businesses, which limits the impact government investment has. Funding timelines, for reasons beyond UKSA's control, have been too short term, which prevents businesses from planning ahead and creates uncertainty for investors. And the current funding environment, with many different programmes and stakeholders, remains challenging for businesses, especially SMEs, to navigate. (Paragraph 149)

36. *Grant funding calls from UKSA should be streamlined and occur at a known cadence within each 3-year spending review cycle.* (Paragraph 150)

37. Providing public procurement opportunities for innovative space firms is the most effective way that government can attract private capital into the UK space sector and facilitate the growth of national champions with global competitive advantage. We have heard extensive evidence that the award of government contracts allows businesses to demonstrate they have an initial customer and crowd-in private investment.(Paragraph 158)

38. *We support the Government's commitments to become a smarter procurer of space-based data and services. However, it remains unclear what concrete plans are underway to achieve this aim. UKSA (within DSIT) should therefore publish a procurement strategy, outlining the steps it intends to take in this area and how government departments can better utilise space data and services produced by UK firms.* (Paragraph 159)

39. *Whilst recognising the importance of R&D grant funding, we recommend that UKSA realign its funding system to offer more public contract opportunities relative to small-scale grant funding. By acting as an anchor customer for firms developing novel space systems (e.g. ISAM), UKSA can help generate private sector investment in UK-based space firms, build the UK's industrial base and help create globally competitive space businesses. UKSA should publish annual data on the number and value of space-related contracts it (and other government departments) tender, alongside the number and value of grant awards it issues.*(Paragraph 160)

40. The UK has developed a strong regulatory environment for its space sector which maintains general support from industry. The UK's outcome-focused approach, alongside the ability of industry to work with regulators are core features of a space regulatory environment that enables innovation. (Paragraph 166)

41. *We welcome recent announcements on the Regulatory Innovation Office's space remit and the results of the RPO sandbox. Initiatives like these indicate a desire for the UK to position itself at the regulatory frontier for space technology and a willingness to engage with novel mission types. The pursuit of regulatory innovation, including the simplification and streamlining of licensing and regulatory processes for spaceports and launch activities, should remain a central goal for Government.* (Paragraph 167)

42. The UK possesses a strong and internationally renowned regulatory regime for space technologies. However, future technological developments will necessitate an adaptive regulatory regime capable of enabling new technologies whilst ensuring public safety and compliance with international agreements. In-space manufacturing, debris removal, space-based solar power and in-orbit servicing may have seismic impacts on the space economy, and businesses operating in this area will require an enabling regulatory environment. (Paragraph 174)

43. *We welcome the establishment of a dedicated team within DSIT that will focus on maintaining UK regulatory competitiveness. Addressing the time, cost and complexity of the licensing process, as well as ensuring innovative technologies can be brought to market in the UK should be a matter of priority for this new unit and it should be backed with the authority to make an impact.* (Paragraph 175)

44. *The Government should consider introducing a maximum time limit of six months for the licensing of established activities in space. Such a move would give confidence to investors that innovative UK-based businesses will not suffer from extended periods of regulatory uncertainty.* (Paragraph 176)

45. *Furthermore, we recommend that the Government evaluate the benefits and risks of merging the Outer Space Act 1986 and the Space Industry Act 2018 into a single, comprehensive framework. This would aim to simplify and streamline regulatory processes for spaceports and launch activities, fostering a more agile and competitive environment.* (Paragraph 177)

46. The UK space sector faces a significant skills challenge which will act as an impediment to growth if left unsolved. The UK space skills landscape is characterised by significant competition with other high-tech sectors for data, AI and software development talent; a lack of early-career roles for talented graduates; skills shortages at the mid-career level; a highly international workforce that is subject to visa challenges; and a lack of gender, ethnic and socio-economic diversity. (Paragraph 185)

47. *We note that the Government has been proactive in addressing the space skills issue and has followed through on many of the recommendations made in the 2016 skills strategy. However, fundamental challenges still remain that are proving difficult to solve. We recommend the establishment of a Space Skills Task Force, which would mirror similar task forces in other sectors (such as nuclear and quantum). This body should be responsible for bringing together government, employers and academia, providing a cohesive analysis of space skills issues in the UK and fashioning policy recommendations for addressing these issues.* (Paragraph 192)

48. *Success in the emerging space economy will require the UK to be flexible in attracting high-skilled sectoral experts, and the Government should ensure that immigration rules enable companies to attract the talent and skills necessary to make the UK space sector world-leading.* (Paragraph 193)

49. *However, the Government must also seek to develop homegrown space talent. It should consider funding a greater number of PhD studentships and postdoctoral fellowships specifically designed to provide development opportunities for UK-domiciled students. (*Paragraph 194)

50. The UK possesses a world leading university sector when it comes to space science and engineering. Generally, the UK's academic sector remains in good health when it comes to space—it produces significant numbers of high-quality graduates and UK institutions contribute to leading international missions. However, universities are concerned about the wider funding environment for academia, which has squeezed institutions' ability to deliver. Universities have also been hampered by recent short-termism when it comes to grant delivery. (Paragraph 205)

51. *We encourage UKSA and UKRI to work towards integrated and strategic alignment on long-term funding. The merger between UKSA and the DSIT Space Directorate provides an opportunity to ensure a more coherent funding system that aligns with UK priorities.* (Paragraph 206)

52. The Government's approach to delivering space clusters has largely been a success. There are now a number of established space clusters across the country which function as valuable focal points for industry, academia and other stakeholders to engage and harmonise their working. They also provide valuable shared infrastructure that facilitate the growth of space firms. Most of the UK's space clusters are located outside London and the Southeast and help spread high-value jobs across the country. (Paragraph 210)

53. *We note that some space clusters are experiencing financial challenges. It should be a matter of priority for DSIT, UKSA and UKRI to ensure the continued functioning of space cluster infrastructure.* (Paragraph 211)

54. International trade in space data, services and manufactured goods is likely to increase as more countries develop space programmes and firms seek to utilise space data to improve their business models. There are

currently concerns that the UK's approach to international space trade is underdeveloped and that UK-based firms are losing out on international opportunities as a result.(Paragraph 215)

55. Currently, adoption of space-based data and services amongst "non-space" businesses is too low, with many firms losing out on the potential benefits of space technology to their enterprises. Space remains poorly understood by businesses that could potentially benefit from it, which subsequently inhibits the growth potential of the UK space sector. (Paragraph 219)

56. *The Government should accelerate efforts to increase understanding of space technology across the wider economy, with a view to building a stronger domestic market for space-based data and services. The Government should continue supporting the Satellite Applications Catapult to achieve these aims, as well as championing initiatives such as the EO Data Hub, which is simplifying access to EO data for downstream users. The Government should consider making public sector EO data available through the National Data Library, if it has not already done so. Other measures recommended above, such as the prioritisation of cluster infrastructure, will aid in supporting downstream adoption of space-based data and services.* (Paragraph 220)

Leveraging international partnerships

57. Strong international partnerships are crucial to the development of the UK's space sector. The significant costs and technical challenges associated with space technology development and the UK's status as a mid-sized space power means that international collaboration is essential in delivering its strategic aims in space. (Paragraph 229)

58. Historically, the UK has looked towards the US as a core partner for defence space capabilities and the European Space Agency on civil space missions. However, the rapidly increasing number of spacefaring states, as well as space policy changes in both Europe and the US have altered the international landscape. Determining the optimal balance between sovereign, bilateral and multilateral programmes, as well as identifying the international partners who can enhance the UK's space sector are core strategic considerations for UK space policymakers. (Paragraph 230)

59. Historically, the UK has invested significantly in ESA rather than pursue the development of a large national space programme. This process has been a successful one, with involvement in ESA programmes providing a strong return on investment, significant access to technical expertise, affording UK-based firms access to lucrative contracts and allowing the UK to take part in large international missions of scientific importance. (Paragraph 243)

60. *The forthcoming ESA Ministerial presents not only an opportunity to participate in those ESA programmes from which the UK space sector can derive long-term economic benefits, but also—and especially in the present context—a chance to re-assess the UK's relationship with the EU Space Programme and, separately, to align the priorities of ESA programmes with the development of capabilities required by NATO, given that the great majority of ESA members are also members of NATO.* (Paragraph 244)

61. The EU is becoming an increasingly prominent actor in space, taking a firmer role in the development of core capabilities and the funding of space technology firms. The UK no longer has a formal relationship with the EU

space programme but remains partially involved via access to Copernicus. Stakeholders expressed uncertainty over the Government's position on future participation in the IRIS² and Galileo programmes, which are of increasing significance in a changing geopolitical landscape.(Paragraph 262)

62. *In light of the evidence presented to us, the Government must provide more clarity on the UK's position on future participation in the EU Space Programme. The Government should conduct an in-depth analysis of the opportunities and risks of UK participation in flagship EU programmes, such as Galileo and IRIS², and their findings should inform their decision making. Decisions on participation in these programmes are urgently required to provide industry with certainty about the future trajectory of UK space policy.* (Paragraph 263)

63. *The increasingly close relationship between EUSPA and ESA is a matter of utmost strategic importance for the UK. The UK's ability to influence the direction of ESA and maximise the benefits of its programmes may be fundamentally altered should ESA become more heavily influenced by EU policymaking. As the Government develops future strategies on UK/EU engagement, this issue should be a priority consideration.* (Paragraph 264)

64. The UK's relationship with the US in space remains strong, despite changes in the US approach to space policy. The UK/US military space relationship remains robust, with the UK armed forces relying on US capabilities but also making useful contributions to US space power in niche areas. However, the UK's close ties with the NASA on civil space endeavours are in a place of great uncertainty given recent shifts in US policy. (Paragraph 276)

65. *We recommend that the Government's current approach, which involves maintaining close collaboration with the US in space whilst also developing sovereign military space capabilities (such as ISR), continues. The development of greater sovereign capability will serve both to insulate the UK from potential future US policy changes but will also allow the UK to make greater contributions to the US' space capabilities and those of other allies.* (Paragraph 277)

66. SpaceX has emerged as a dominant player in the orbital launch and satellite communication sectors. Whilst the services provided by SpaceX are competitively priced and reliable, this has led to an increased dependency on the firm in the UK. This reliance is challenging in the context of increased demand for SpaceX launch services and the potential politicisation of the Starlink service. (Paragraph 281)

67. *Whilst there is no immediate indication that the UK's access to SpaceX's services could be compromised, future plans for UK space capabilities should reckon with the impacts of UK dependence on SpaceX and look to ensure access to diversified and/or sovereign services where possible. The Government should conduct research on the potential impacts of loss of access to SpaceX services.* (Paragraph 282)

68. The Government has made significant strides in expanding the UK's international space partnerships beyond traditional partners. Measures such as the International Bilateral Fund, the Space Science and Exploration Bilateral programme and the UK-Australia Space Bridge are examples of a government that is proactively seeking to diversify opportunities for collaborative space innovation. (Paragraph 291)

69. *We welcome the UK Space Agency's pivot to supporting international bilateral partnerships with countries such as Australia, Canada, Japan and New Zealand.*

The Government should publish impact assessments on the UK-Australia Space Bridge and UK-New Zealand ISAM agreement, to inform the development of future bilateral initiatives. (Paragraph 292)

70. Given current funding levels, the UK's approach to international partnerships has been a success. The UK maintains access to defence space capabilities through a close relationship with the US, and contributes to civil and commercial space via ESA. The establishment of new funding streams for wider international partnerships has opened diversified opportunities for firms and researchers in the sector. (Paragraph 299)

71. However, the success of the UK's international approach can only be measured against wider strategic aims. Without a clearer strategy on what the UK wishes to achieve from its space investments, it is difficult to ascertain the efficacy of the current approach. No specific partnership is sacrosanct, and the value of a given partnership must be closely tied to the UK's national interest. (Paragraph 300)

72. *Given the wide benefits delivered to the UK space economy through ESA, the Government should seek to maintain its levels of funding in this institution. However, should the UK wish to be more ambitious in space policy, increased funding and support for national space programmes is essential. Such national programmes would not only boost skills, technology development and develop comparative advantages, but they would also form the bedrock of stronger international partnerships moving forward. These partnerships should also be aligned with the six priorities chosen by the Government.* (Paragraph 301)

Securing a safe operating environment in space

73. Whilst the likelihood of new treaties governing the collective use of outer space is small, various "soft law" instruments have emerged that provide guidance and best practices on the sustainable use of Outer Space. The UK's strong reputation for domestic regulation and its continuous engagement with various international fora means it is well equipped to shape the coming international regulation of the space domain. (Paragraph 313)

74. *We support the Government's multi-pronged efforts to shape the global orbital environment. We endorse and encourage continued governmental support of initiatives such as the Earth Space Sustainability Initiative and the Astra Carta, as well as continued diplomatic efforts at the United Nations.* (Paragraph 314)

75. Space debris represents a fundamental challenge to the future development of the global space economy. The expansion of activity in Low Earth Orbit has been pursued without due consideration of environmental externalities and has subsequently led to a scenario in which in-space collisions have become increasingly likely. The space debris challenge is, by its nature, a collective action problem and international efforts are required to address the severity of the issue. (Paragraph 323)

76. *We commend the Government's leadership in the development of ADR technology and welcome the news that the Government will deliver a contract for the removal of two defunct UK satellites. Whilst the market opportunities for satellite removal have not yet been fully established, the development of this technology will help pave the way for other ISAM activities such as satellite refuelling and repair, which could be lucrative future areas in which the UK could assert global leadership. The prioritisation of the development of debris removal technology also burnishes the*

UK's credentials as a global leader on space sustainability, reflects its commitments (as part of ESA) towards space debris neutrality and positions it well to lead on future collaborative debris removal missions. (Paragraph 324)

77. Space weather events have the potential to disrupt critical infrastructure both in space and on the ground. The UK has a strong capability in space weather, but it requires sustained investment and support to maintain its strength. (Paragraph 329)

78. The international regulation of spectrum will become increasingly important as Low Earth Orbit becomes increasingly congested. Some states have already become more assertive and are challenging international rules when it comes to spectrum allocation. (Paragraph 333)

79. *Ensuring access to finite radio spectrum should be a priority when it comes to UK space and telecoms policy. The UK Space Agency should continue working closely with Ofcom to ensure that UK interests are represented at the International Telecommunications Union, especially spectrum allocation for ISAM technologies.* (Paragraph 334)

APPENDIX 1: LIST OF MEMBERS AND DECLARATIONS OF INTEREST

Members

Baroness Ashton of Upholland (Chair)
Baroness Bonham-Carter of Yarnbury
Lord Booth-Smith
Lord Clement-Jones
Baroness Donaghy
Lord Lansley
Baroness Mobarik
Lord Shamash
Viscount Stansgate
Lord St John of Bletso
Baroness Stowell of Beeston
Lord Tarassenko

Declarations of interests

Baroness Ashton of Upholland (Chair)

No relevant interests declared

Baroness Bonham-Carter of Yarnbury

No relevant interests declared

Lord Booth-Smith

No relevant interests declared

Lord Clement-Jones

Chair of the Council at Queen Mary University of London

Baroness Donaghy

No relevant interests declared

Lord Lansley

Member of the Strategic Counsel to Law Associates SRL, which was contracted by the European Commission to arrange workshops across Europe, to showcase uses of Copernicus data for SMEs (2017–2019)

Baroness Mobarik

Owns a second home in Sutherland close to the Melness Spaceport site, where work has been on hold, and is supportive of the local community's wish for this project to eventually come to fruition

Lord Shamash

No relevant interests declared

Viscount Stansgate

President of the Parliamentary & Scientific Committee

Trustee and Council Member of the Foundation of Science & Technology

Trustee of the Parliamentary Science and Technology Information Foundation

Fellow of the Royal Society of Biology

Lord St John of Bletso

No relevant interests declared

Baroness Stowell of Beeston

No relevant interests declared

Lord Tarassenko

Fellow of the Royal Academy of Engineering, Fellow of the Academy of Medical Sciences, and Fellow of the Institution of Engineering and Technology

A full list of Members' interests can be found in the Register of Lords' Interests: https://www.parliament.uk/hlregister

Specialist Adviser

Michelle Howard

Associate - PA Consulting - Adviser on civil space activities

Policy Adviser - The D Group - Space Working Group Lead

APPENDIX 2: LIST OF EVIDENCE AND COMMITTEE ACTIVITY

Evidence is published online at https://committees.parliament.uk/work/8966/uk-engagement-with-space and available for inspection at the Parliamentary Archives (020 7219 3074).

Evidence in alphabetical order

ADS Group	SPA0026	
Ian Annett	SPA0105	
Astron Systems Ltd	SPA0002	
Astroscale	SPA0041	
Airbus UK	SPA0091	QQ 45–56, Patrick Wood, Head of Space Systems UK
BAE Systems	SPA0038	
Dr Julia Balm, Research Associate, Freeman Air and Space Institute (FASI), King's College London	SPA0028	
Professor Martin Barstow, Professor of Astrophysics and Space Science, University of Leicester		QQ 147–157
Professor Lucy Berthoud, Professor of Space Engineering, University of Bristol		QQ 158–164
BioOrbit		QQ 57–67, Dr Katie King, CEO
Dr Bleddyn Bowen, Associate Professor of Astropolitics, Durham University		QQ 127–134
Blue Skies Space Limited	SPA0070	
Professor Michael Bohlander, Chair in Global Law and SETI Policy, Durham Law School	SPA0025	
Miss Carol Buxton, Doctoral Researcher, University of Birmingham	SPA0061	
Dr Cherry Canovan, Research Fellow, University of Central Lancashire, and Professor Robert Walsh, Professor of Solar Physics, University of Central Lancashire	SPA0013	
Cardiff Hub for Astrophysics Research and Technology (CHART)	SPA0037	

Centre for Satellite Data in Environmental Science (SENSE) Centre for Doctoral Training (CDT)	SPA0040	
CFMS	SPA0077	
Dr Chris Chaloner, Director, Trym Systems Ltd	SPA0011	
The Chart Think Tank	SPA0066	
Nikita Chiu, Associate Professor in Space Innovation & Technology Governance, Durham University	SPA0094	QQ 127–134
City of London		QQ 201–208, Alderman Professor Emma Edhem
ClearSpace		QQ 57–67, Dr Rory Holmes, UK Managing Director
Dr Ingrid Cnossen, Independent Research Fellow, British Antarctic Survey	SPA0080	
The Council on Geostrategy		QQ 201–208, Gabriel Elefteriu, Senior Fellow (Space Power)
Professor Brian Cox, Professor of Particle Physics, The University of Manchester		QQ 1–11
Dentons, and Dentons	SPA0101	
Department for Science, Innovation and Technology	SPA0082	QQ 24–34 Ian Bishop, Deputy Director of Space Strategy, Strategic Engagement and UKSA Sponsorship in DSIT Space Directorate; Alexandra Jones, Director General, Science Innovation and Growth, DSIT QQ 179–189 Sir Chris Bryant MP, then-Minister of State for Data Protection and Telecoms; and Annelies Look, Director for Space
Durham University Space Research Centre	SPA0058	
Earth-i Ltd		QQ 88–97, Richard Blain, Founder & Chairman
Earth Space Sustainability Initiative		QQ 114–119, Professor Joanne Wheeler MBE, Director

Dr John Elliott, Coordinator [Director], SETI Post Detection Hub, University of St Andrews	SPA0090	
European Space Agency		QQ 135–141, Laurent Jaffart, Director of Connectivity and Secure Communications
European Space Policy Institute	SPA0102	QQ 135–141, Hermann Ludwig Moeller, Director
Eutelsat OneWeb	SPA0017	QQ 78–87, Joanna Darlington, Chief Communications Officer & Executive Committee Member
Professor Barry Evans, Professor of Information Systems Engineering, University of Surrey		QQ 78–87
Excelerate Technology Group		QQ 78–87, Simon Hill, Chief Technology Officer
Fieldfisher	SPA0103	
Fire Arrow	SPA0099	QQ 172–178, Stuart Fyvie, Director, Fire Arrow, and Independent Advisor, the space industry
Rasmus Flytkjaer, Partner, London Economics		QQ 35–44
Fragomen LLP	SPA0046	
Professor Michael Garrett, Professor of Astrophysics, The University of Manchester	SPA0095	
Global Network on Sustainability in Space	SPA0063	
Dr Peter L. Hays, Professor, Space Policy Institute, George Washington University		QQ 141–146
Dr Mark Hilborne, Senior Lecturer, King's College London, Duncan Blake, Lecturer, Air Force legal advisor, RAAF/University of New South Wales, Canberra, Prof Diana Bowman, Professor, Arizona State University, and Dr Michelle Chase, Researcher, University of New South Wales, Canberra	SPA0054	

Professor Anna Hogg, Professor, University of Leeds, and Dr Benjamin Wallis, Research Fellow, University of Leeds	SPA0021	
Innovation & Research Caucus	SPA0081	
Professor Sylvester Kaczmarek	SPA0015	
Know.Space		QQ 35–44, Will Lecky, Co-founder
Dr Sharon Lemac-Vincere, Academic, Strathclyde University	SPA0065	
Professor Hugh Lewis, Professor of Astronautics, The University of Southampton		QQ 120–126
LinkGevity Limited	SPA0003	
Maersk		QQ 165–172, David Browne, Director, Corporate and Social Affairs
Magnetosphere, Ionosphere and Solar Terrestrial (MIST)	SPA0053	
Dr Alessandra Marino, Senior Lecturer, Open University, and Dr Marjan Ajevski, Lecturer in Law, Open University	SPA0020	
Lauren Marshall	SPA0083	
MDA Space UK	SPA0084	
Met Office	SPA0088	
Dr Joseph Mhango, Senior Lecturer - Applied Data Science, Harper Adams University		QQ 165–172
Dr Mehdi Montakhabi, Associate Scholar, University of Oxford, Prof. Benn Lawson, Professor, University of Oxford, Prof. Marc Ventresca, Associate Professor, University of Oxford, Prof. Jens Roehrich, Professor, University of Bath, Prof. Brian Squire, Professor, University of Bristol, Dr. OÄŸuz Karasu, Associate, University of Oxford, Dr. Sebastian Herbert Fuchs, Associate, University of Oxford, Prof. Tim Vorley, Professor, Oxford Brookes Business School, and Mr. Edoardo Mancini, Associate, University of Oxford	SPA0079	
Mr Kenechi Mordi	SPA0051	

Ms Jan Morgan, Founder, The Hazels - the UK Space Skills Awards	SPA0023	
Professor Sa'id Mosteshar, Director, London Institute of Space Policy and Law	SPA0097	QQ 114–119
Dr Michael Mulvihill	SPA0104	
Dr Imogen Napper, Visiting Research Fellow, University of Plymouth		QQ 120–126
National Centre for Earth Observation (NCEO)	SPA0067	QQ 88–97, Professor John Remedios, Director
National Physical Laboratory	SPA0076	
Newton Launch Systems	SPA0069	QQ 172–178, Dr Martin Heywood, Director
Northrop Grumman UK	SPA0060	
Northumbria University	SPA0072	
Prof Karen Olsson-Francis, Director Astrobiology, The Open University, and Prof Mark Sephton, Professor of Organic Geochemistry, Imperial College, London	SPA0022	
Open Cosmos	SPA0036	
The Open University	SPA0039	
Orbital Express Launch Limited (Orbex)	SPA0075	QQ 172–178, Phil Chambers, CEO
Orbyts	SPA0074	
Mr Richard Osborne	SPA0073	
Major Tim Peake CMG, British ESA Astronaut		QQ 98–104
Professor Don Pollacco, Professor of Astrophysics, The University of Warwick		QQ 120–126
RAND Europe Space Hub (RESH)	SPA0043	QQ 127–134, James Black, Assistant Director, Defence and Security
The Remote Sensing and Photogrammetry Society	SPA0035	
Dr Sam Richards, Director, Meridian Space Command	SPA0098	
RPO Consortium	SPA0092	
Dr Robert Rowlingson	SPA0016	
Royal Aeronautical Society (RAeS)	SPA0057	

Royal Astronomical Society	SPA0031	
Satellite Applications Catapult	SPA0049	QQ 105–113, Nayen Pankhania, Strategy and Consulting Director
Giorgio Savini, Professor of Astrophysics (Instrumentation), University College London (UCL), Ralph Schoenrich, Professor of Astrophysics, University College London (UCL) (Mullard Space Science Laboratories), Victor Buchli, Professor of Anthropology, University College London (UCL), Anna Parkin, Space Domain Coordinator, University College London (UCL), and Kemil Thomas, Principal Partnership Manager, University College London (UCL)	SPA0064	
SaxaVord Spaceport		QQ 68–77, Scott Hammond, Deputy CEO
Science and Technology Facilities Council		QQ 105–113, Professor Michele Dougherty, Executive Chair
Professor Christopher Scott, Professor of Space & Atmospheric Physics, University of Reading	SPA0042	
Scottish Government Space Group	SPA0087	
Seraphim Space		QQ 105–113, Mark Boggett, CEO and Co-Founder
Dr John B. Sheldon		QQ 141–146
Dr Khurrum Siddiq, Founder and CEO, Caviar Data Limited	SPA0001	
Skyrora		QQ 68–77, Alan Thompson, Head of Government Affairs
Mr Daniel Smith	SPA0068	
Space Academic Network	SPA0010	
Space Energy Initiative	SPA0062	
Space Forge	SPA0019	QQ 57–67, Joshua Western, Co-founder & CEO
Space Partnership	SPA0030	QQ 147–157, Dr Joanna Hart, Director
Space Scotland	SPA0096	
Space Skills Alliance	SPA0018	QQ 158–164, Dr. Heidi Thiemann, Director

Space Solar	SPA0048	
Space Universities Network	SPA0050	
Space4Climate	SPA0029	
Surrey Satellite Technology Ltd (SSTL)	SPA0027	QQ 190–200, Professor Sir Martin Sweeting, Founder and Executive Chairman of Surrey Satellite Technology Ltd (SSTL) and Fellow, Royal Society
Sutherland Launch Ltd	SPA0071	
Leslie Tennen, Attorney at Law, Law Offices of Sterns and Tennen	SPA0055	
STFC Solar System Advisory Panel (SSAP)	SPA0056	
techUK	SPA0032	QQ 165–172, Rory Daniels, Senior Programme Manager - Emerging Technologies
Telespazio UK		QQ 88–97, Geoff Busswell, Vice President of Business Growth
Thales Alenia Space UK		QQ 45–56, Richard Thorburn, COO
Professor Giovanna Tinetti, Vice-Dean Research, Faculty of Natural, Mathematical & Engineering Sciences, King's College London, and Ariel team	SPA0059	
The Royal Society	SPA0093	QQ 190–200, Claire Hurst, Public Affairs Adviser, Royal Society
UK Centre for Polar Observation and Modelling	SPA0045	
UK Launch Services Ltd		QQ 68–77, Dr Adam Baker, Consultant & Co-Founder
UK Research and Innovation (UKRI)	SPA0044	
UKspace	SPA0085 SPA0106	QQ 190–200, Colin Baldwin, Executive Director
UK Space Agency	SPA0024 SPA0100	QQ 12–23, Lord Willetts, Chair, and Dr Paul Bate, CEO
Unhidden Foundation	SPA0034	
UN Office of Outer Space Affairs		QQ 209–216, Aarti Holla-Maini Director

University of Strathclyde	SPA0033
Professor Tim Varley, Oxford Brookes University, and Professor Jen Nelles, Oxford Brookes University	SPA0086
Richard Varvill, Co-founder and CTO, Reaction Engines	SPA0089
Professor Tim Vorley, Dr Sebastian Herbert Fuchs, and Professor Marc J. Ventresca	SPA0052
Professor Phil Williams, Professor of Biophysics, University of Nottingham	SPA0078

Evidence taken in concurrent session with the Scottish Affairs Committee

AAC Clyde Space	QQ 56–106, Dr Pamela Smith, Vice President
Centre for Signal and Image Processing at University of Strathclyde	QQ 56–106, Professor Malcolm Macdonald, Director
Department for Science, Innovation and Technology	QQ 56–106, Sir Chris Bryant MP, Minister of State for Data Protection and Telecoms QQ 56–106, Chris White-Horne Interim Space Director and Deputy CEO at UK Space Agency
UK Civil Aviation Authority	QQ 56–106, Colin Macleod, Head of the UK Space Regulator QQ 56–106, Rosie Whitbread, Head of Space Regulation Policy
UK Space Agency	QQ 56–106, Matthew Archer, Missions and Capabilities Director for Launch
University of Glasgow	QQ 56–106, Professor Patrick Harkness, Professor of Exploration Technology
University of Strathclyde	QQ 56–106, Dr Christie Maddock, Senior Lecturer, Mechanical and Aerospace Engineering

APPENDIX 3: CALL FOR EVIDENCE

Aim of the inquiry

The House of Lords Select Committee on UK Engagement with Space was appointed on 30 January 2025. It is chaired by Baroness Ashton of Upholland and will report by 30 November 2025.

This inquiry will consider UK space policy, and the opportunities and challenges faced by the space sector.

This is a public call for written evidence to be submitted to the Committee. The deadline is 10am on Thursday 17 April. The Committee is keen to hear from a diverse range of individuals and organisations.

Questions

The Committee would welcome views on UK space policy and the UK space sector. It would particularly welcome views on the following issues:

1. The opportunities and challenges relating to the UK space sector, including:

    - where the UK's space sector has comparative strengths;
    - how the UK's space sector's growth can be supported;
    - trends in the global space economy and how these may affect the UK's space sector;
    - how the UK may capitalise on new space technologies, such as nuclear engines, space-based solar power, in-space manufacturing, resource extraction, active debris removal, in-orbit servicing and artificial intelligence;
    - opportunities, challenges, and potential for growth in the different sub-sectors operating in the space sector, including;
        - satellite communications services;
        - space manufacturing;
        - space launch and the development of UK launch sites;
        - earth observation;
        - downstream uses of space technology by businesses, individuals, and government;
        - in-space manufacturing; and,
        - space-related financial, legal, and regulatory services.

2. From a business perspective, the opportunities and challenges resulting from operating in the UK, including:

    - access to capita—the opportunities for, and availability of, investment in both emerging and established businesses;
    - government relations—the level of engagement from and with the Government and the ease of collaborating with relevant departments;
    - regulation—whether the UK's regulatory environment prohibits or enables growth;

- market access—whether UK-based firms have adequate access to international markets to allow them to scale-up; and,
- international competition—the ability of UK firms to compete against firms based in other countries.

3. Existing international partnerships that the UK is involved in, and the potential for future partnerships with both state and commercial actors.
4. The importance of the provision of a safe operating environment in space, and how the UK can contribute to this, in particular regarding space weather and space debris.
5. The development of international space law and regulation.
6. The collaboration between academic institutions, government, and commercial space firms in the UK, including but not limited to space research and development and space spin-out and start-up firms.
7. Education and skills; in particular the skills gap in the UK space sector.
8. The future of UK space science and civil exploration.
9. The impact of space on national security and resilience, for example:

- the national security benefits of a strong commercial space sector;
- the dual-use nature of space technology;
- the implications of geopolitical developments on the UK's activity in space; and,
- potential threats to the UK's assets in space.

APPENDIX 4: VISIT

1. On 9 May 2025, we attended a visit at the Harwell Science and Innovation Campus. The visit was attended by the following members: Baroness Ashton of Upholland (Chair), Baroness Bonham-Carter, Lord Clement-Jones, Baroness Donaghy, Lord Lansley, Baroness Mobarik, Lord Shamash, Lord Stansgate, Lord St John of Bletso, and Lord Tarassenko.

Campus overview with Sarah Beardsley, Roger Eccleston, Hugh Mortimer, Paul Bate, Laurent Jaffart, and Jim Stretton

2. We were welcomed to the Harwell Campus with an introduction by Roger Eccleston, Jim Stretton, Sarah Beardsley, Paul Bate, and Laurent Jaffart.

3. Harwell contains over 100 space companies on its campus and is the leading space cluster in the UK. It provides a unique concentration of research facilities together with space businesses. Emphasis was placed on the benefits of co-location on the campus—the space industry relies heavily on inter-organisational collaboration, and co-location at Harwell has enabled increased cooperation (including co-funding of projects) between organisations on campus.

4. The Harwell Campus would like to expand, but is limited in doing so, in part because to expand would require the decontamination of former nuclear land. They noted they had experienced delays with the Nuclear Decommissioning Authority.

Tour of the National Satellite Test Facility with Sarah Beardsley and Sean Stewart

5. The Committee was led on a tour of the National Satellite Test Facility (NSTF) by Sarah Beardsley, Director of RAL Space, and Sean Stewart, Acting Head of Environmental Test at RAL Space.

6. The decision to build the NSTF was made in 2015 and the facility was opened in 2024. The facility is the first of its kind in the UK, but is similar to other facilities in mainland Europe. Its creation was viewed as necessary due to the demand for satellite testing in the UK exceeding supply; and British satellite manufacturers having to travel to France to conduct testing. The location of the NSTF was chosen due to its 70-mile proximity to all major UK space prime contractors, and its co-location with RAL Space.

7. The NSTF conducts space environmental testing, including acoustic testing, vibration testing, a Mass Properties facility, and large vacuum chambers which simulate the orbital environment. The facility is seeking to become commercially self-sustainable. Satellite manufacturers can buy testing slots (usually around 6 months in length) to ensure their satellites are able to perform in-orbit. The cost of a testing slot is variable, but typically above £10 million. The facility has capacity for two large satellites to be tested at once. The NSTF recently completed the testing of their first customer, the Skynet 6A military communications satellite, built by Airbus in Portsmouth.

Roundtable on space SMEs

8. The first roundtable hosted by the Committee was focused on the topic of SMEs in the space sector. The participants of the roundtable were: Andrew Faiola (Commercial Director, Astroscale), Rafel Jorda Siquier (CEO, Open

Cosmos), Dr Adam Baker (Senior Project Engineer, Magdrive), and Sean Sutcliffe, (CEO, Oxford Space Systems).

9. Each participant gave a short presentation about their company, followed by questions from the Committee.

10. Andrew Faiola, Commercial Director of Astroscale, presented first. He described Astroscale, founded in 2013 and established in the UK in 2017, as the only in-orbit servicing company in the UK with proven capability. He noted that of the £130 million the company had attracted in investment, £100 million was from abroad. He identified in-space servicing, assembly, and manufacturing as a key UK capability and comparative advantage.

11. Astroscale as a company relies heavily on UK supply chains, much of which sit outside of London and the South-East. Their main priority as a company is the UK's national ADR mission, but they are also doing work with the Ministry of Defence and European Space Agency (ESA). He noted the ability of Astroscale's work to support military applications, including in-space observation and the support they could provide to valuable military assets in space.

12. Astroscale has invested heavily in recruitment and skills, including hosting apprenticeships and graduate schemes. In terms of skills, Mr Faiola felt that it was important not to forget about soft skills for space, including financial, HR and policy roles in the industry. He noted that Astroscale had experienced difficulty sponsoring visas for international candidates for jobs, and highlighted that from his perspective, easier labour mobility between the UK and the EU would be beneficial.

13. Mr Faiola told the Committee that the UK struggles with scaling-up businesses and pulling-through innovation, and emphasised that space is capital-intensive and that the UK must pick its "champions". He also felt that the UK needed to gain access to the EU Pathfinder Innovation Programme to make it easier to receive Copernicus contracts.

14. Significant attention was paid to regulation, which Mr Faiola described as crucial. He noted that DSIT are working to develop regulatory sandboxes, but that Astroscale experienced a two-year wait to be able to licence their ELSA-D mission. He highlighted that to be a thriving industry, in-orbit, servicing and manufacturing (ISAM) companies need to be able to have licenced missions enabled by a legal and regulatory framework in place to support them. The regulatory and legal aspects of space are currently quite nascent; he noted that there has never been a contract for interaction between different pieces of spacecraft.

15. The vast majority of spacecraft in orbit today were not built with their eventual removal in mind. Mr Faiola expressed that he would like to see more incentives for spacecraft to be built with removal in mind. He noted that that the impact of satellites polluting the atmosphere as they burn up is under-researched but argued that this would be happening regardless of Astroscale's actions as a company.

16. Rafel Jorda Siquier, CEO of Open Cosmos, presented next. Open Cosmos is an SME that is experiencing significant growth across Europe, with around 180 staff, over £160 million in contracts signed to date and over £50 million in capital raised. They design, launch, and operate satellites

for Earth Observation (EO), and host an Open Constellation programme allowing people to bring satellites together and share data. They are also currently developing expertise in telecoms satellites, including the testing of 6G satellites for ESA. They are also competing to build high-end scientific missions. Mr Siquier highlighted their ability to do so at a fraction of the cost of large primes due to speed of development and the weight of their satellites.

17. Mr Siquier noted the difference between work on EO and telecoms, and ISAM capabilities. While ISAM capabilities are futuristic, space technology is already massively used, with telecoms and EO having critical applications in the present day. He gave the example of Open Cosmos' contract with the Greek government for the monitoring of wildfires.

18. Rather than the Government needing to pick champions, Mr Siquier felt they should deliver infrastructure and a good regulatory framework for UK space companies to utilise. He noted that the UK, and Europe in general, are lagging far behind the US and China when it comes to investment in space, but also mentioned that budget cuts and policy changes made to NASA in the US could enable UK space companies to benefit by employing ex-NASA scientists.

19. Dr Adam Baker, Senior Project Engineer at Magdrive presented next. Magdrive was founded in 2019, has 32 staff, and focuses on electric propulsion for spacecraft. He described Magdrive's mission as building next-gen engines for space transport by enabling a move towards electric power, allowing for more efficient movement when in space. Magdrive has received grant funding from UK Space Agency and ESA, and has also secured private sector investment. The market is still maturing for their technology, and they have not yet sold anything. They are currently developing an in-orbit demonstration of their technology. They see their eventual customers being UK space primes, as well as SMEs such as Open Cosmos and Astroscale.

20. Dr Baker outlined the challenges faced by Magdrive, including intense competition from American firms, and an inability to sell tech to geopolitical competitors. He highlighted that Magdrive and similar SMEs need more grant funding from the Government in order to cross the "valley of death", need greater support to engage with the defence and security ecosystem, require facility support and infrastructure, and need export support for the EU and a rebuilding of the trading relationship between the UK and EU. He noted that the Government needs to decide which capabilities it wants to pursue and target them accordingly, as it is impossible to be successful at everything.

21. Dr Baker also reflected on his experience working on both the industry and academic side of space, noting a need for stronger links between businesses and universities to continue creating "the next generation of problem-solvers" for the space sector.

22. Sean Sutcliffe, CEO of Oxford Space Systems, presented next. Oxford Space Systems develop deployable antennas to be used in space. They have an annual revenue of £10 million, with 100 staff and an export-driven business model. They are co-owned by the National Security Investment Fund.

23. Mr Sutcliffe highlighted that the global market is fragmented, but that they want to tap into the EU and US market more. He felt they would benefit from

the UK negotiating easier access to the EU market. He also noted that he thinks the UK should have a greater focus on supporting company through ESA via grants and export funding, and that the UK should be a part of EU space projects, including IRIS².

24. On skills and recruitment, Mr Sutcliffe disagreed that it is difficult for companies to hire international talent, instead praising the "laissez-faire" visa process for businesses. He also noted that Masters and PhD programmes in the UK are excellent and create a strong pipeline of talent for space companies.[678]

Roundtable on downstream applications

25. The second roundtable hosted by the Committee was focused on the topic of downstream space applications. The participants of the roundtable were: Mark Saxon (Chief of External Affairs, Satellite Applications Catapult). Nayen Pankhania (Strategy and Investment Director, Satellite Applications Catapult), Mo Belal (Programme Director of the Microwave Technologies Group, Spire Global), and Martin Soltau (Co-CEO, Space Solar).

26. Each participant gave a short presentation about their company, followed by questions from the Committee.

27. Mark Saxon, Chief of External Affairs at Satellite Applications Catapult, and Nayen Pankhania, Strategy and Investment Director of Satellite Applications Catapult, presented first.

28. The Satellite Applications Catapult is one of nine catapults ran by Innovate UK that target high-tech areas of the UK economy. They work primarily in commercial development, seeking to connect businesses with customers, and providing business growth support. They also deliver R&D projects to unlock technology development. They are based at Harwell and also have a sister site at Westcott to allow for the simulation of in-orbit proximity operations, and conduct work around the UK's fourteen space clusters. Mr Saxon described the regional space clusters as driving local growth, investment, and job creation.

29. Mr Saxon highlighted their key workstreams as: Sustainable Earth, Autonomous and Connected Earth, and Beyond Earth. In terms of downstream applications of space, they noted that software businesses are better at raising money than hardware businesses, which are capital-intensive. He noted that UK companies are good at starting up, and less good at scaling up. He expressed a desire to find the highest-potential companies within the space sub-sectors of EO, position, navigation and timing, and ISAM to support.

30. They expressed concern that UK space businesses will go overseas, and emphasised the need to make the UK more attractive to invest in, in part through a positive regulatory environment rather than a restrictive one. They highlighted the pharmaceuticals sector as having a very clear regulatory environment for companies to navigate, with clear milestones that indicate progress, and noted that the space sector does not have the same clarity. It was noted that being able to give companies a clear regulatory framework to

678 Mr Sutcliffe followed up in writing after the roundtable to note that the proposed changes to visa rules announced the week after the visit would be "deeply damaging" to Oxford Space Systems; Home Office, *Restoring control over the immigration system: white paper*, 12 May 2025

follow appeals more to investors. They also noted that the UK already has a good financial and insurance industry, and needs to build upon that existing strength to serve the space sector.

31. Mo Belal, Programme Director of the Microwave Technologies Group at Spire Global presented next. Spire delivers multi-purpose satellite constellations with a wide range of capabilities, supporting key industries such as maritime, aviation, and weather. Spire is a global company, with offices in the US, Asia, and Europe, and with most of its employees based in the UK. It considers itself to be a data company as well as a space company, manufacturing and deploying satellite constellations from which they acquire data to sell to end-users.

32. Mr Belal described the UK as having an incredible environment for intellectual property but noted that the UK and EU have lagged behind the US in terms of their approach to procuring data. The US model has shifted to a more commercial model, where governments no longer take the lead in developing satellite platforms and instead buy services from private sector firms who own the satellite platforms. This has opened more avenues to capital investment, and inspired new entrants to the market. The end-user then has a better choice of data to procure.

33. Mr Belal felt that the UK and Europe as a whole takes a much more cautious, bureaucratic approach and that the UK is less willing to try new approaches. He also argued that the geo-return system of the ESA model distorts markets. Mr Belal also noted that Spire currently launches its spacecraft using SpaceX, as they are the cheapest launch provider, and noted that SpaceX dominates the launch landscape. He stated that Spire would be interested in potentially launching from the UK.

34. Mr Belal highlighted the importance of weather data, with about 3% of GDP impacted by weather and recent increases in the number of extreme weather events. He pointed to AI models as a gamechanger for interpreting weather data for forecasts. He noted that Spire has a grant from the UK Space Agency to work with the Met Office but are not allowed to supply data to them due to the UK data procurement system. Mr Belal described the selling of weather data as an emergent, nascent, industry, and felt that new procurement approaches could be introduced slowly.

35. Martin Soltau, co-CEO of Space Solar presented next. Space Solar is a company working in developing space-based solar power harvesting. The aim is to provide "the ultimate form of clean energy", which he described as now being economically viable for the first time. Space Solar has conducted £5 million worth of engineering work and are working closely with the MoD and security services on their product. He noted that space-based solar power can potentially leverage significant investment from the existing energy sector into space.

36. Space Solar is currently raising a seed funding round and aim to have their first commercial system live in six years. They have received government support from both the Department for Energy, Security and Net Zero and the UK Space Agency, but feel there needs to be a clearer government lead in this area. Mr Soltau expressed that the Government does not want to have to pick winners in the space industry, but that they need to if they want to

develop world-leading capabilities. Mr Soltau feels that they would benefit from high-profile support, for example from the Prime Minister.

37. He noted that another country developing space-based solar power capability is Japan, but that they feel Space Solar as a company is more advanced than their rivals. Mr Soltau emphasised the potential for Japan to be a viable international partner for the UK in this area.

Strategic presentation from ESA with Laurent Jaffart, Professor David Parker, Emily Newton, Clement Albergel, Paul Fisher, Christian Walter, and Natalie Alves

38. The Committee received a strategic presentation from the European Space Agency offices in Harwell. The presentation was delivered by: Laurent Jaffart (Directory of Connectivity and Secure Communications at ESA and Head of Establishment at ECSAT). Professor David Parker (consultant for ECSAT development, ex-ESA Director of Exploration and ex-Chief Executive of the UK Space Agency), Emily Newton (Policy and Member States Relations Officer, DG's Cabinet, ESA HQ Paris), Clement Albergel (Head of Actionable Climate Information Section, Directorate of Earth Observation Programmes, ECSAT), Paul Fisher (Climate Office, Directorate of Earth Observation Programmes, ECSAT), Christian Walter (Directorate of Commercialisation and Industry and Competitiveness, ECSAT), and Natalie Alves (5G/6G Hub Coordinator, Directorate of Connectivity and Secure Communications, ECSAT).

39. ESA has 120 unique missions, and has a total budget of over €7.6 billion. It is a leader in EO, producing 350 terabytes of EO data per annum. ESA is planning to focus significantly on dual-use technologies as a response to the changing geopolitical environment and wants to see an increase in Europe's satellite manufacturing capacity also.

40. On the Harwell Campus, ESA has its Business Incubation Centre and ECSAT (European Centre for Space Applications and Telecommunications). ESA's Business Incubation Fund is managed by the STFC, and has allowed companies to provide more than £240 million in private investment.

41. The UK is the fourth-highest funder of ESA. It was a major contributor to Galileo, but its future relationship with the programme remains uncertain. The UK also contributed one of the four components to the James Webb space telescope, and the ExoMars rover was built in Stevenage by Airbus. The UK is not participating in the development of the IRIS² project, which is a network of satellites that will provide military and commercial communications. It was expressed that the time for the UK to join IRIS² is now, if it wants to have the potential to win valuable contracts.

APPENDIX 5: GLOSSARY

Copernicus	The EU's Earth Observation satellite programme
Earth Observation (EO)	Satellites which use imaging equipment to collect information about the Earth
European Union Agency for the Space Programme (EUSPA)	EU Agency which implements the EU space programme
European Space Agency (ESA)	Non-EU intergovernmental organisation dedicated to space exploration and technology development. The UK is one of 23 member states
Galileo	EU satellite constellation which provides Position, Navigation and Timing services
Geostationary Orbit (GEO)	Orbit of 36000 above sea-level, which hosts telecommunications, weather and missile warning satellites
In-Orbit Servicing, Manufacturing and Assembly (ISAM)	Novel technologies which provide manufacturing, refuelling, repairing and debris removal services in orbit
IRIS²	The EU's proposed satellite communications constellation
Low-Earth Orbit (LEO)	Orbit of between 100 and 2000km above sea level which is becoming increasingly congested with satellite communications constellations
Position, Navigation and Timing (PNT)	Satellite constellations which provide users with accurate location and timing data. The US' Global Positioning System (GPS) is the most prominent example
Satellite communications	Satellites which provide television, broadband, telephone and data transfer services
Space Domain Awareness (SDA)	The ability of states or private actors to detect, track and identify space objects
UK Space Agency (UKSA)	Executive Agency overseen by Department for Science, Innovation and Technology (DSIT), with the responsibility for delivering the UK's civil space ambitions. It will be merged with the DSIT Space Directorate in 2026