



House of Commons
Science and Technology
Committee

**UK space strategy
and UK satellite
infrastructure:
Government Response
to the Committee's
Second Report**

**Second Special Report of Session
2022–23**

*Report, together with formal minutes relating
to the report*

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Science and Technology Committee

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Contacts

All correspondence should be addressed to the Clerk of the Science and Technology Committee, House of Commons, London, SW1A 0AA. The telephone number for general inquiries is: 020 7219 2793; the Committee's e-mail address is: scitechcom@parliament.uk.

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Second Special Report

On 4 November 2022 the Science and Technology Committee published its Second Report of Session 2022–23, *UK space strategy and UK satellite infrastructure* (HC 100). The Government Response was received on 9 March 2023. The Response is appended to this Report.

Appendix: Government Response

Introduction

The Government welcomes the second report of the Science and Technology Committee's 2022- 2023 session on UK Space Strategy and UK Satellite Infrastructure which was published on 4 November 2022 (HC100).

The Select Committee's thorough and detailed work has enabled them to produce a detailed and comprehensive report which makes 36 recommendations, and this paper provides the Government's response to those recommendations. As the report so rightly identifies, the UK space industry is a significant success story; a fast growing sector whose income has more than trebled since 2000, is now worth more than £16 billion per year and supports more than 47,000 jobs. It is increasingly integrated into our daily lives, and increasingly critical to the proper functioning of our national infrastructure, economy, and national defence.

We are pleased to see the Committee's recognition of the increasing strategic importance of space to the UK, and the steps the Government has taken to recognise and respond to that context. The National Space Strategy published in September 2021 represents a significant step forward by bringing both civil and defence strategic ambitions together, within wider frameworks such as the Integrated Review. In furtherance of that strategy, Government has taken several steps in the last year, including the publication of the first Defence Space Strategy and Joint Doctrine Publication, the launch of our first Plan for Space Sustainability, and significant improvements to cross-Government coordination through the National Space Council and the National Space Board. Taken together with the investments made to support the sector which are detailed in the UKSA Corporate Plan, the steps we have taken to date place the UK space sector in an excellent position to continue to grow and succeed. Over the spending review we are investing over £3 billion in space activities, just the first part of the nearly £10 billion we have already committed across the decade beginning financial year 22/23.

The Committee rightly notes the need for clear steps to implement the strategy, and we agree that there is further work to be done to develop and communicate the specific policies and interventions which are needed to fully achieve our ambition. Government is continuing in this work, and we intend to publish further detail on our space sector policy and the UK's civil space capability needs in early 2023 as part of our wider update on the implementation of the National Space Strategy. This will deliver on many of the objectives behind the Committee's recommendations for publishing implementation plans and roadmaps.

We agree with the Committee on the vital importance of ensuring the UK has access to the right capabilities. We note that in the weeks following the publication of this report, there have been several developments which demonstrate the success of the Government's approach. On the 16th of November, Spaceport Cornwall became the first fully licensed spaceport in the UK, and on 21st December, Virgin Orbit received their launch and range licences, both critical milestones in developing the UK's launch capability. Whilst Virgin Orbit successfully launched on 9th January, the satellites onboard were not placed into orbit and we are working with Virgin Orbit to understand what caused the anomaly. On the 23rd of November, the Government announced a £200 million package to support Earth Observation activities in light of the EU's continued delays to UK association to the Copernicus programme. And on the same day the UK made a record £1.84 billion commitment to the European Space Agency, supporting wide ranging UK capabilities including the Vigil mission which will give advanced warning of dangerous solar activities, the TRUTHS climate monitoring laboratory, and more than £200 million for telecommunications programmes. These commitments will keep the UK in a leading role in the heart of the European space programme and support us to build stronger global partnerships, helping to ensure that the UK can access the capabilities, technologies, and talent the sector needs.

We would like to thank the Committee for their hard work in producing this report. The space environment and sector are highly complex, and their findings capture many of the different issues which impact the UK's future in space, and our ability to achieve our ambitions. The recommendations of the report will help Government and stakeholders better understand these challenges and work together on ways to address them.

Responses to the Committee's Recommendations

Maintaining access to core space capabilities

1. We understand that, once fully launched, the OneWeb low Earth orbit constellation will provide broadband coverage, via broadband providers such as BT, to people in the UK and elsewhere, including those in remote areas. However, it is not clear to us what other benefits the Government's purchase of OneWeb will bring to UK citizens and whether the purchase represents value for money for UK taxpayers. Given that the Government purchased OneWeb from bankruptcy, we believe its investment in OneWeb is unusual. This is exemplified by the purchase requiring a ministerial direction. We were pleased to hear the then Secretary of State confirm that this model of investment is unlikely to be used in the future. Further, it remains to be seen what the UK will gain from the investment compared to other nations who have not invested in OneWeb. *As a considerable amount of taxpayers' money was used to complete the purchase of OneWeb, the Government should report to Parliament on the state of the Government's investment in OneWeb on a yearly basis. This should include information on how the company is contributing to scientific and technical advancements in the UK space industry. This unusual investment approach should be treated as exceptional and avoided in the future.* (Paragraph 26)

2. Since the UK's purchase of OneWeb, the number of shareholders has continued to grow. Although the Government has provided assurances that the proposed merger with Eutelsat will not affect the UK's shares and involvement in OneWeb, uncertainty remains over how the continued changing ownership will affect its management. *The proposed*

merger with Eutelsat must be subject to proper scrutiny under the National Security and Investment Act and the Government must provide assurance that OneWeb's operations in the UK will not be affected by the merger. Further, if the merger goes ahead, the National Audit Office should consider carrying out an assessment of the how well the taxpayer's investment has been protected to date and review the economic viability of continuing to hold shares in OneWeb. (Paragraph 27)

3. We acknowledge that OneWeb could bring additional benefits to the UK if it carried out satellite manufacturing for its Gen2 constellation in the UK, which would stimulate the UK space sector and create new jobs. However, where the Gen2 constellation will be manufactured is not yet confirmed. *The Government must obtain assurances that OneWeb will manufacture its Gen2 constellation in the UK so that the UK space sector can benefit as fully as possible from the Government's investment in OneWeb. (Paragraph 28)*

The Government's investment in OneWeb is a significant strategic investment, demonstrating our commitment to the UK's space sector and ambition to put the UK at the forefront of a new commercial space age. The Government notes the Committee's interest in the need for transparency and scrutiny of the investment but does not agree that it is necessary to provide a separate yearly report on the investment as the value of the Government's interest in OneWeb is published in the Department's Annual Report and Accounts, and significant updates on OneWeb's business and activities are made public through the Government's and OneWeb's press releases.

The Government agrees that the investment approach should be treated as exceptional but would highlight the strategic importance of the investment and that OneWeb now employs over 500 people, of which approximately 70% are based in the UK, up from around 80 people when exiting bankruptcy.

The Government agrees that the merger between OneWeb and Eutelsat should be scrutinised under the National Security and Investment Act. However, Government does not comment on individual cases. Under the terms of the merger, the UK Government will retain the special share rights over OneWeb. The special share rights include a range of national security rights, including over security standards of the OneWeb network and the use of the OneWeb network for national security purposes, the UK being the preferred location for future OneWeb launches on a commercial basis, and OneWeb preferring businesses in the UK for future procurement on a commercial basis. OneWeb will continue to trade under its existing name, remain headquartered in the UK and operate the Low-Earth Orbit business for the combined group.

Decisions on the design and development of Gen2 are ultimately matters for OneWeb. The Government's special share rights of first preference for UK procurement only apply on a commercially competitive basis. This means we could not compel OneWeb to locate all elements of the manufacturing process for its Gen2 constellation in the UK where it does not make commercial sense.

The Government's special share does enable us to continue to champion British manufacturing opportunities as we have done successfully for Gen1. The design and manufacturing stages are where most of the value is added, and the UK space sector designs and manufactures many of the key components for OneWeb's Gen1 satellites. For example, the Gen1 payloads are manufactured in the UK by Teledyne.

The Government views OneWeb as an important partner and is working with the company to grow their supply chain and manufacturing activity in the UK as they look towards Gen2. We have supported many UK space companies, including OneWeb, through a variety of programmes, such as ESA's ARTES Programme and will continue to do so to ensure a robust and thriving UK space sector, in line with our National Space Strategy.

4. The UK has access to 'open' Position, Navigation and Timing (PNT) services, supplied through the US GPS system and the EU Galileo system, meaning that most users are not affected by the UK leaving the Galileo programme. The UK currently relies on the US GPS system for its secure PNT services that can be used for defence and critical national infrastructure purposes. The reliance on foreign systems is concerning due to the potential for the UK to be blocked from using them in the future. Reliance on space-based systems is also not advisable as these can be disrupted through jamming attacks or adverse space weather. The loss of PNT services would be detrimental to the UK, with power distribution, financial transactions, and transport systems all seriously affected, and the UK's national security put at severe risk. Although the UKSA, UKRI and BEIS, told us that work is underway to evaluate options for the UK's approach to gaining access to resilient and secure PNT, we understand that a significant amount of work, using large amounts of public funds, has already been carried out but a strategy is yet to be published. (Paragraph 41)

5. We are concerned that the Government seems to be progressing towards plans to use OneWeb's low Earth orbit (LEO) satellite constellation to provide PNT services in the future, despite suggestions from experts that there are many technical issues surrounding using LEO satellites for PNT signals. Ambiguity also remains about the development schedule for full PNT services from OneWeb and whether such services could be provided in a way that is appropriate for sovereign military and critical national infrastructure purposes. (Paragraph 42)

6. Considering the importance of developing secure access to PNT services, we are disappointed that the Department for Business, Energy and Industrial Strategy (BEIS) is delaying the finalisation and publication of the PNT strategy and therefore refusing to commit to the critical action that needs to be taken. Although BEIS is in the process of establishing cross-government strategy on PNT, we believe the responsibility for PNT should lie outside of any one Department. *The Government should establish the National Security Adviser (NSA) as having overall responsibility for the UK's access to secure PNT capabilities. The NSA should ensure that the importance of developing secure PNT systems is understood throughout Government and take responsibility for developing a programme and budget for the work that needs to be carried out. The NSA should take guidance from work that has already been undertaken within Government and publish the National PNT Strategy no later than the end of February 2023, including details of the space- and ground- based components that will be used to ensure the UK has sustained, resilient and secure access to PNT services. If the strategy includes the use of the OneWeb LEO Gen2 constellation, the solutions to the technical challenges drawn out in our evidence should be addressed and the Government should provide clarification on why LEO satellites have been chosen over other, more commonly used, space-based PNT systems. In summary, the strategy should set out:*

- a) *the updated review and estimate of the impact of loss of PNT services on the economy;*

- b) *the results of the Global Navigation Satellite System (GNSS) programme, and details of which aspects of the proposed system will be taken forward;*
- c) *the UK Space Agency's analysis of the space-based elements of PNT and details of which of these will be taken forward; and*
- d) *how secure PNT services can be delivered through LEO and the technical challenges that will need to be overcome to achieve this. (Paragraph 43)*

The Department for Business, Energy and Industrial Strategy recently created a cross government Position, Navigation and Timing (PNT) team to take forward this agenda, initially as a 'concept demonstrator' project to develop a cross-government position on national PNT resilience through a better understanding of national needs, risks, and mitigations. The team, which will now sit within the Department of Science, Innovation and Technology, has drawn on expertise and resource from across multiple government departments. This is in line with the commitment in the March 2021 Integrated Review to strengthen the resilience of PNT services that our critical national infrastructure and economy depend on.

The project is building on the existing evidence base and significant amounts of work already undertaken by the Government. The current phase of the work will be completed by Spring 2023 and will help decide the next steps on future PNT work across government, including decisions on what documents, strategies or plans should be developed and published to meet those aims. The Space-Based PNT Programme (SBPP) built on the United Kingdom Global Navigation Satellite System (UK GNSS) programme to develop recommendations to provide the UK with satellite navigation services. The programme successfully concluded and has provided a range of detailed analysis on options that will be considered by the DSIT-led cross- Government PNT team.

7. We understand that the UK space sector has significant concerns about the current and future access to data currently supplied by EU's Copernicus programme, especially if the UK cannot remain a member. BEIS and UK Space Agency (UKSA) must ensure that they communicate clearly with the space sector to ensure that there is a good understanding about any impact on the UK's access to data from Copernicus if the UK does withdraw from the programme. BEIS and UKSA must conduct a consultation of how the space sector expects to be impacted if participation is not possible, with a particular focus on loss of access to data. The results of this consultation should be made public. Further, the UK Government should seek assurances from the EU, that if the UK does associate and invest the planned €750 million, its access rights will remain the same as all other countries participating in the programme. (Paragraph 52)

8. The UK is world-leading in Earth Observation (EO) science and technologies. The EO sector and the Government have recognised that these strengths can also be used to support other UK ambitions such as Net Zero. *Taking guidance from the UK Space Agency and UN Office for Outer Space Affairs (UNOOSA) joint review into how space technologies can be used to tackle climate change, the Government should set out detailed actions for how EO will be used to support the transition to Net Zero. This should include a package of financial support to ensure the UK remains a world leader in this area. (Paragraph 57)*

9. The UK space sector remains strongly in favour of maintaining the UK's participation in the EU's Copernicus Earth observation programme, for which the UK Government has

set aside €750 million. Despite this, it is imperative that the UK stands ready to adapt if an agreement with the European Union cannot be reached. *The Government should publish a 'Plan B' no later than the end of December 2022 which defines what actions it will take if an agreement with the EU cannot be reached over UK membership of the Copernicus programme and how the €750 million currently set aside for participation would then be spent.* (Paragraph 58)

Earth Observation (EO) is a vital science and a growing industry, and we are investing in projects which benefit our planet and grow our economy. EO supports the UK's strategic priorities and net zero ambitions—more than half of key climate variables are only measurable from space. The Government were acutely aware of the challenges facing the sector as a result of the EU's ongoing delays in confirming the UK's participation in the EU Copernicus programme. That is why on 23 November 2022 this Government announced almost £400m of new investment in Earth Observation.

Around £200m of this investment was through subscription to European Space Agency (ESA) EO programmes as part of our ambitious investment strategy secured at the ESA Council of Ministers.

On top of that, we committed a further £200m to an Earth Observation Investment Package of ESA and national activities that was designed to mitigate the impact of the ongoing non-association with the Copernicus programme. This funding comes from the budget we set aside for our association to Copernicus. The funding will be spread across 17 projects being delivered through the UK Space Agency (UKSA), The Met Office and UK Research and Innovation (UKRI).

Investing in the UK EO sector is a vital part of achieving our ambitions in space and aligning with the National Space strategy, but it is just the first step – providing an interim response to what we have been hearing are their biggest challenges. We will continue to work with the sector to identify strategic priorities to keep building on the world-leading excellence in UK EO for decades to come.

Participation in Copernicus remains an option, but these actions demonstrate the commitment to supporting the sector and mitigating the impacts of the ongoing delays.

Development of Launch

10. The Government and the UK space sector have made significant steps towards developing a UK launch capability, with the establishment of a horizontal launch site at Spaceport Cornwall and two vertical launch sites: SaxaVord Spaceport on Unst in Shetland and Space Hub Sutherland. Although spaceports have taken different financing approaches, we commend the UK Space Agency (UKSA) for the funding it has provided for the establishment of spaceports and launch systems and recognise that the development of the UK space sector would not have been possible without these initial injections of public funding. Having said this, further investment may be required to ensure that the UK launch sector is successful and sustainable. *The Government should continue to examine where further and continued funding may be required to secure the success of the UK launch industry.* (Paragraph 69)

The UK Space Agency is currently developing Phase Two of the programme (subject to HM Treasury approval), which will build on Phase One to support a commercially sustainable UK launch capability. The Department for Science, Innovation and Technology is also considering where further government support may be required over the longer term, following the conclusion of Phase Two, to ensure a successful UK launch industry that delivers growth to the economy.

11. We understand that the Civil Aviation Authority (CAA) is considering changes to its approach to setting liability caps for orbital licences, including changing to a variable liability limit approach, where liability bands are defined and the maximum value is recommended to be £50m. We believe this approach will be welcomed by the industry, who want further certainty on the liability caps that will be applied to their operations. *The Government should develop proposals for the variable liability approach as quickly as possible, opening the consultation on these by the end of December 2022. To ensure that the required certainty is brought to the space industry and that the UK's launch sector begins to flourish, it should seek to implement the proposals by June 2023.* (Paragraph 76)

Work is underway to develop formal proposals to follow up on the recommendations of the review of liability limits and insurance requirements for orbital operations (<https://www.gov.uk/government/consultations/call-for-evidence-to-inform-orbital-liability-and-insurance-policy>).

The UK Space Agency has established a working group of officials, orbital operators, insurers, academics and other industry experts to develop the world-first approach for setting variable limits of orbital operator liability using a safety and sustainability set of criteria. Good progress has been made in determining a set of criteria for the assessment. Development of the formal question set, scoring and implementation of the approach is also in progress.

Further assessment work is underway on the options set out in the call for evidence for alternatives to the current approach to insuring the third-party liability for orbital operators. These are:

- A sector-led mutual—the government is assessing potential adaptations to the model proposed by the space sector to consider how it could be used in conjunction with the variable limit approach.
- A collective insurance policy—this option would agree a single policy covering a number of licensees and negotiated by a sector organisation in the first instance and could be used in conjunction with the proposed mutual.
- A government Space Bond—this option is proposed as a longer-term option for increasing funding for the UK space sector as a whole.

The Government intends to consult in early 2023 on formal proposals on these matters and other recommendations from the review. We are aiming for implementation as soon as possible, although this will be dependent on the scope of the final methodology and insurance model(s) including any implementation measures that are needed to support these.

In addition, the Government is also exploring options to address the liability issue raised in the report by the Taskforce on Innovation, Growth and Regulatory Reform (recommendations 15.1).¹ This was included in the Government's response to the call for evidence referenced above.²

12. We were pleased to hear that the Civil Aviation Authority (CAA) has been working with spaceports, satellite manufacturers, and launch suppliers to ensure that the spaceflight regulations and licence application processes are fit for purpose. However, we are concerned that the CAA is not providing enough support for applicants which could cause delays in the licensing process. *The Department for Transport (DfT) should ensure that the CAA is suitably resourced to be able to provide an effective liaison service for each licence applicant to support them with navigating the application process.* (Paragraph 79)

The DfT fully funds the CAA's spaceflight regulation functions and works with the CAA to ensure it has the resources necessary to discharge its duties. The DfT and CAA engages proactively with all potential licensees and the CAA works with potential applicants to provide guidance as they navigate the regulatory framework. There is no shortfall in required funding in this current financial year and subsequent settlements will be agreed with this in mind.

The regulations that are in place are new, as are many of the applicants to the process, and as is the regulator in this role. The CAA is working with stakeholders and government to continuously review and evaluate its processes and they have already made changes in response to the individual needs of the applicants, which can vary significantly. As part of this process, they are undertaking work with current licensees to develop additional guidance to support new and existing operators in understanding the application process.

13. The Government must take steps to ensure that the CAA is appropriately resourced to meet the demands of processing increasing numbers of licence applications. *Quarterly review meetings should be held by the CAA and DfT to review whether the CAA's staffing complement is sufficient and further funding should be provided by the Government to the CAA if required and in good time to allow induction and training of such staff.* (Paragraph 80)

Quarterly review meetings are part of the governance framework between CAA and DfT. As part of this, key performance indicators are used to evaluate both short- and long-term resourcing requirements as well as understand the efficacy of the UK regulatory framework and the wider UK space programme.

There is no shortfall of financial resources identified through this process and the CAA is on track to deliver against its established budget for the FY22/23. Significant efforts were put in place between CAA, DfT and UKSA prior to the formation of the regulator in July

1 <https://www.gov.uk/government/publications/taskforce-on-innovation-growth-and-regulatory-reform-independent-report-recommendation-15.1-on-page-124-Amend-the-Space-Industry-Act-2018-to-cap-liability-and-indemnity-requirements-for-licence-applicants-to-launch-and-operate-satellites-from-the-UK>.

2 'The government is currently exploring options for amending section 12(2) of the Space Industry Act to make clear in legislation that all operator licences must specify a limit on the amount of the licensee's liability under section 36. As set out in the guidance document 'Guidance on insurance requirements and liabilities under the Space Industry Act 2018' on the Civil Aviation Authority's website, the government's published policy is that all licences issued under the Space Industry Act 2018 contain a limit of operator liability with respect to claims made under both section 34 and section 36 of the Act. Therefore no operator faces unlimited liability. This change would provide legislative certainty on this.'

2021, including the transfer of staff from UKSA into the CAA and access to expertise from the US FAA. Staffing requirements are kept under review and the CAA has continued to recruit staff since its formation in July of 2021 in order to meet its commitments.

14. We are disappointed that a launch from the UK has not yet been achieved, especially as we were assured on several occasions that the first horizontal launch would take place in summer 2022. *The Department for Business, Energy and Industrial Strategy and the Department for Transport must prioritise working towards achieving the first launch from UK soil as soon as possible.* (Paragraph 86)

On 9th January, Virgin Orbit conducted their launch from Spaceport Cornwall. Whilst the rocket successfully launched, the second stage engine experienced an anomaly meaning that the satellites being carried onboard were not successfully placed into orbit. We are working with Virgin Orbit to understand what caused the anomaly and remain firmly committed to developing the UK's launch capability, with further vertical launches planned from Scotland from 2024 onwards.

15. We are concerned that the delay in achieving the first UK launch is partly due to the Civil Aviation Authority (CAA) being unable to process licence applications in a timely manner. *For this initial set of licence applications, the Department for Transport must provide additional resource to the CAA to ensure that the licensing process does not impede the feasibility of a launch this year. After this, we expect that the application process will become streamlined and therefore the timeline for processing licence applications should be reduced to 3–6 months for all licences by 2024.* (Paragraph 87)

The timeline to licensing for any of the licenses required under the Space Industry Act has a range of factors, many of which are not in the control of the regulator and are driven by readiness and capability of operators and third parties. Since its appointment as the spaceflight regulator in July 2021, the CAA has been resourced sufficiently. It has worked at the pace of industry in the delivery of the licence process this year and we have processes in place to review their performance and resource requirements and make adjustments as needed.

UK spaceflight licensing covers a broad range of activities and the timelines are subject to that activity, including its complexity and scope, which can range from single launch approvals to multiple or indefinite approvals. The guidance currently for spaceflight licenses indicates 9–18 months for all applications, which is highly competitive internationally and based on an understanding of the capabilities and plans of the operators in the market and their likely complexity.

While we expect that the process of licensing will become easier for the regulator and operators to manage, it is unlikely that industry would be able to meet the requirements for a 3–6 month target for licences from 2024. Setting an arbitrary target would have a significant risk of driving behaviour in the regulator and industry that could significantly increase the regulatory burden, as approvals would need to be far more limited in nature than the current system allows for.

16. The publication of the Space Industry Regulations in July 2021 was a vital step that set out the licensing processes for launch activities, including establishing the Civil Aviation Authority as the regulator. *The Civil Aviation Authority, with the support of the Department*

for Transport and the Department for Business, Energy and Industrial Strategy, should continue to take guidance from other authorities such as the Federal Aviation Authority on how to best operate the licensing process. (Paragraph 88)

The UK works closely with international authorities, including the US Federal Aviation Authority (FAA). This includes having staff seconded from the FAA as part of the CAA regulatory team providing direct advice. The Department for Transport is also working closely with the FAA and US Government to negotiate a bilateral agreement on regulatory cooperation. This will allow operators to move more easily between countries and reduce the regulatory burdens on those that require dual licensing in both the US and UK.

Growing new technologies

17. Although we believe that UK Space Agency (sponsored by BEIS) and the Ministry of Defence are both right to commit to improving their abilities to track and recognise objects in orbit (Space Situational Awareness /Space Domain Awareness), the two departments appear to be developing these capabilities independently, despite the previous Secretary of State for Business, Energy and Industrial Strategy's claims about efforts to integrate and find synergies. We believe a joint approach to serving civil and military needs from these capabilities should be established. *The Government should bring UKSA and MoD Space Situational Awareness/Space Domain Awareness services under one roof to maximise the use of knowledge, technology, and resources. The UK Space Command would be a perfect candidate for this as it already works alongside the UK Space Agency and Ministry of Defence to deliver joint national space capabilities. (Paragraph 93)*

UKSA, MoD (and other HMG departments) work jointly to deliver the UK SST and SDA capability. Phase one of a joint civilian-military National Space Operations Centre is expected to go-live in April 2024 – formally uniting UK civilian and military SST/SDA capabilities under a single entity. Joint UKSA/MoD/Cross-HMG SST/SDA delivery boards are in place to consider and take decisions regarding operations, joint development and future joint capabilities.

Several services providing support to UK industry and government stakeholders are jointly delivered through the combined work of the Space Operations Centre (SpOC) and UKSA Orbital Analysts (who are based in the SpOC).

UKSA and MoD have jointly agreed the UK's first set of HMG SST/SDA civil-military requirements that identify key areas for investment to support combined requirements. Space Command and UKSA jointly fund dual-use software and we are jointly investing in infrastructure at priority locations across the UK and in our Overseas Territories (and other locations). We share data from our commercial procurements.

18. We commend the Department for Business, Energy and Industrial Strategy's approach to promoting the sustainable and safe use of space by developing a "regulatory road map" for the sustainable use of space and working with like-minded nations to promote the safe use of space. *The Department should publish this roadmap no later than the end of February 2023 and include what steps it will take to try and establish the "critical mass" required to form a consensus on the sustainable and safe use of space. (Paragraph 95)*

Work is underway to maintain momentum on the commitments made in the National Space Strategy to deliver goals on sustainability. We are working at pace to develop a road map which brings together government and sector ambitions and actions to prioritise and seek innovative solutions for the sustainable use of space. We hope to reach consensus and deliver a roadmap that all stakeholders can support by the summer of 2023. This will build on the recently announced Plan for Space Sustainability which set out four priority areas of activity, including regulatory reform, investment in and support to global adoption of Long-Term Sustainability standards through UNOOSA, investments in core sustainability programmes for Active Debris Removal and In Orbit Servicing and Manufacturing, and development of an industry led Kitemark, or standard, for sector wide sustainable operations. All have been progressed since their announcement in June 2022 and form part of our space sustainability roadmap development work.

The UK already has the most modern space regulatory framework in the world, and we are building on this in collaboration with industry to utilise use our regulatory regime to bolster the UK, and create new standards which incentivise and reward best practice in this modern space age.

19. We commend the Government's latest announcements which will encourage the UK space industry to use space sustainably. *As space is global in nature, the Government should set out how it intends to work with international partners to establish an International Space Sustainability Standard, rather than focusing on UK only interventions.* (Paragraph 98)

On June 23 2022, Minister Freeman (Minister for Science, Research and Innovation) launched the Government's Plan for Space Sustainability. In line with the National Space Strategy, this Plan demonstrated the UK's leadership in sustainable space.

The Plan includes measures to provide global leadership and support for the adoption of internationally agreed standards, whilst also ensuring we keep pace with the space industry sector in parallel workstreams. To support this the DSIT Space Directorate, along with UKSA and FCDO colleagues, have increased our presence at the UN Committee on the Peaceful Uses of Outer Space (COPUOS), as well as stepping up work bilaterally with international partners. This enables UK to champion the adoption of the Long-Term Sustainability Guidelines through continued funding of the UN Office for Outer Space Affairs (UNOOSA) projects; provide funding to support UNOOSA work on the Registration of Space Objects; and prioritise sustainability goals for further international guidelines such as Space Traffic Coordination standards; increased sharing of Space Situational Awareness data; and development of Rendezvous and Proximity Operations (RPO) guidance to enable debris removal, life extension servicing and on orbit assembly. We also work with like-minded partners in several forums to develop common understanding of sustainability issues and drive closer collaboration that will enable accelerated agreement on the critical issues we face.

20. The Government has taken positive steps towards supporting the establishment of space debris removal missions and we look forward to seeing further work in this area, especially on ensuring that regulation of these activities is fit for purpose. *Space debris removal missions should remain a clear focus of Government support and facilitation for the foreseeable future.* (Paragraph 100)

The Government remains committed to Active Debris Removal missions, which are a central part of the UK's strategy on space sustainability, both to enable the prevention of further debris creation and the removal of legacy debris. The UK remains at the forefront of this pioneering work through its contributions to both ESA programmes and its commitment to a national Active Debris Removal mission and continues to attract Active Debris Removal mission providers through its innovative and world leading regulatory framework.

21. Research has already shown the UK has the potential to be a world leader in the growing in-orbit services and manufacturing (IOSM) market. The Government should seize this opportunity. *The Department for Business, Energy and Industrial Strategy and UK Space Agency (UKSA) should work with organisations and companies such as the Satellite Applications Catapult and Space Forge who have already set out the steps that the UK needs to take to maintain leadership in this area. UKSA should set out which parts of the Catapult's proposals it plans to take forward and should set a budget for this work.* (Paragraph 103)

Technology developed through Active Debris Removal missions will enable greater access to wider In Orbit Servicing and Manufacturing (IOSM) capability in the future, including life extension programmes such as refuelling, payload enhancements and increased manoeuvrability capability. The Government is working with several organisations such as UKspace and companies to identify the best approach to enabling IOSM and exploiting the significant technological leadership the UK has in this field.

Supporting the UK space sector

22. Space-based projects, including fundamental research and development of new and especially wholly novel technologies, generally occur on long timescales and therefore require long-term funding. We were pleased to see the announcement of a three-year budget for the Department for Business, Energy and Industrial Strategy for 2022–23—2024–25 which should bring some certainty to the sector. *The Government should reflect on the consequences of the recent one-year settlements on the space sector and provide a commitment to deliver at least three-year budget settlements to facilitate a more strategic approach to the allocation of public support for these technologies of the future.* (Paragraph 108)

The Government recognises the benefits that are associated with providing greater budgetary certainty for projects developing new and novel technologies. Government budgets are set through the Spending Review process that needs to balance budgetary and spending certainty with risks of future uncertainty and events. It is also appropriate for the Government of the day to be able to ensure government spending reflects their priorities. There is potentially more that can be done to share lessons learned from other organisations, such as UKRI, on how to approach multi-year programmes within shorter term settlements. The positive outcomes of the recent ESA CMIN22 negotiations highlight how effective forward planning and cross-government working can support partner organisations in mitigating the impacts of long-term uncertainty.

23. The current procurement systems are limiting the growth of the UK space sector and SMEs require further support to access new customers and expand. *The Government should further consider how procurement could be used to support businesses and leverage*

further private investment. The Department for Business, Energy and Industrial Strategy should work with the Ministry of Defence to establish improved procurement mechanisms. (Paragraph 113)

The National Space Strategy highlights the work the Government has already done to launch a new Dynamic Purchasing System for space that helps the public sector procure space-enabled technologies. The Government is also undergoing procurement reform following the UK's departure from the EU. This change should afford public organisations greater flexibility to adapt their procurement approaches. UKSA is working with DSIT and Cabinet Office to support capitalising on the potential such changes offer in 2023/24.

The Strategy also commits us to ensure that the UK embeds civil-defence dual use at the heart of our approach to government procurement, including in space. The MOD's Space Capability Management Plan, published in November 2022, sets out Defence's future requirements in space, while DSIT will next year agree with other departments their civil space capability needs. This will allow government to make strategic decisions as to how it develops, collaborates, or accesses space systems and capabilities, following the approach set out in the Integrated Security and Defence Review.

24. Clusters, such as those in Harwell and Glasgow, can be established in different ways and clearly bring benefits to the UK space sector. We welcome UK Space Agency's (UKSA's) announcements of at least some funding for the establishment of further clusters, and we particularly commend any such innovation outside the South East of England and London. However, the funding provided to support these new clusters was very limited and is therefore likely to prevent new clusters developing at pace. *The UKSA should set out in response to this Report its plans for each of the new clusters, what support it plans to provide and what outcomes it is aiming at, including how many companies it aims to attract to each region and how many jobs it aims to create. (Paragraph 118)*

Through equal access to funding and support, the UK Space Agency aims to create the environment for space clusters to emerge and flourish. It is right that local space sector plans are designed and led at the local level, with UKSA providing the support mechanisms to enable delivery.

To date, this support has enabled local clusters to map their space capabilities, identify addressable markets and develop and deliver local space strategies, including targets for jobs and business growth. UKSA is also in the process of awarding further grant funding to clusters to enable them to manage and coordinate their local space community, secure investment, forge partnerships between academia and industry and help businesses to access markets and investment.

Funding has also been awarded to deliver locally-led, high-impact projects that can help to develop local space capabilities, improve public services using space or increase knowledge exchange. Recipients of funding are required to set targets against UKSA metrics for jobs, business growth and investment and report against these as a condition of their funding.

UKSA will be working with its delivery partner, the Satellite Applications Catapult, to develop capabilities propositions for each of the clusters to help catalyse inward investment. UKSA will also be working alongside DSIT to develop the Space Sector Policy, including a shared strategic approach to cluster development across Government.

In addition, as highlighted in the UKSA Corporate plan 2022–25, £65m has been allocated to the Space Clusters Infrastructure Fund (SCIF) to stimulate private investment in UK space infrastructure to help increase the attractiveness of the UK as a destination for R&D investment. SCIF is being designed to work with industry to make place-based infrastructure investments, creating new opportunities and jobs.

25. The Satellite Applications Catapult has been instrumental in securing the establishment and development of space sector SMEs and driving the growth of Harwell space campus. *The Government should provide further support to the Satellite Applications Catapult, which will in turn stimulate the growth and success of space companies. Given that the Government’s levelling up white paper says that “the Department for Business, Energy and Industrial Strategy will aim to invest at least 55% of its total domestic R&D funding outside the Greater South East by 2024–25”, we would encourage the Government to be even more ambitious. Support for space R&D undertaken outside of Harwell should be in line with the proportion of the UK population living outside of the Greater South East. This would promote the growth of new space clusters and expand the space sector’s reach.* (Paragraph 119)

The Satellite Applications Catapult is a UKSA delivery partner for local growth, providing co- investment into Centres of Excellence for Satellite Applications since 2016 and working collaboratively to provide bespoke and targeted interventions at the regional level to promote and grow the space sector.

UKSA awarded the Satellite Applications Catapult a multi-year grant in 2022 for ‘local growth collaboration’, harnessing the Catapult’s unique expertise and resource to deliver business support and cluster development activities across UKSA’s local growth programmes.

Levelling Up is a Government priority. We are growing the space economy in every region of the UK by promoting space in local economic strategies, supporting the development of local space clusters that build upon regional expertise and facilities, funding incubators and business support for space companies and entrepreneurs and supporting knowledge exchange across the country.

Government is now working to agree a shared strategic vision and approach for growing the UK space ecosystem through its support for clusters.

International considerations

26. The UK’s involvement in the European Space Agency (ESA) has brought a wide range of benefits to the UK and its space sector, but there is a need to re-address the balance between funding for ESA programmes and funding for national space programmes. *The Government should not diminish its funding via ESA but should increase its investment in national space programmes; and both funding streams should reflect and focus on the objectives of the National Space Strategy as far as possible.* (Paragraph 124)

The National Space Strategy and the UKSA Corporate plan 2022 – 25 reiterated our commitment to delivering a coherent set of national space programmes. The nature and scale of space programmes can mean that some bi- and multi-lateral programmes deliver better value of money for the tax-payer, but the opportunity to deliver the UK’s objectives

through national programmes is a key consideration in shaping investment decisions. The further details that will be made available in early 2023 on the space sector policy and capabilities will provide a next layer of detail on how government interventions will ensure that programmes and funding align with the National Space Strategy objectives.

27. The UK has already benefited from new international agreements that have been established outside of the European Union, such as with the US on the Artemis Accords and the UK-Australia Space Bridge. More needs to be done to ensure that the UK increases its international reach and benefits from the skills and technologies being developed in other countries. *The UK should focus on forming new bi-lateral and multi-lateral agreements, like the UK-Australia Space Bridge, that support the UK's aims for space and provide access to new trade opportunities, collaborative R&D projects, and access to new technologies.* (Paragraph 130)

The Government recognises the importance of international bi- and multi-lateral agreements. In addition to the significant investment through the European Space Agency (ESA), DSIT and UKSA are working with government departments to develop two international programmes to enable up to £40m investment in suitable projects. These programmes will be focused on exploration and science to support academic communities and research, and on promoting international collaboration. While the overall investment from the UK into these programmes is £40m, the overall investment into the sector will be significantly larger due to e.g. match-funding and investment from international partners.

The focus of the new science and exploration bilateral fund is to develop individual programmes to support UK academic R&D teams to work on space science/exploration science missions with international partners. The objectives are a) to complement our existing involvement in ESA by increasing the cadence of opportunities to work on globally significant science missions with other space agencies as well, increasing robustness and vibrancy of the existing community and pulling through new teams, and b) to use science to strengthen existing international partnerships and to build new ones.

In addition to the science and exploration bilateral fund, a second fund is being launched which focusses on pillar 2 of the National Space Strategy, to collaborate internationally. This fund will target opportunities to work with strategic priority countries such as the US and Australia, as well as partnerships with emerging space nations such as Singapore. This fund will leverage investments across the space sector with a focus on building stronger relationships, increasing inward investments and exports for the UK space sector, and developing capabilities in collaboration with our international partners.

Addressing the skills shortage

28. The space sector is suffering from a skills shortage, with experienced employees and those with skills such as programming being particularly hard to find. Higher Education institutions struggle to provide training that keeps pace with technical advancements happening in the sector's industries. *The UK Space Agency's newly convened Space Skills Advisory Panel (SSAP) should look to establish a working group, including representatives from Higher Education institutes, Doctoral Training Centre's, and industry, who should develop joint training programmes that address the skills gap and allow future space employees to gain experience in the most advanced technologies.* (Paragraph 144)

The UKSA Inspiration Programme will commit over £4 million in 2023/24 and 2024/25 to establish the National Space Skills Institute (NSSI – note, this is a working title and subject to change). The NSSI will provide access to training for workers in the space sector and for those entering it, focusing on the skills and knowledge most in demand among space sector employers (including academia and government) and those identified by horizon scanning to support future suitably qualified and experienced workforce needs. It will increase the opportunities for those outside the sector and across government to develop their knowledge and understanding of how space can help deliver their objectives. It will expand capacity by promoting existing courses, by combining elements of existing provision to create new training opportunities, and by funding the development of new training programmes, courses and opportunities for learning that are co-developed between industry and academia.

To identify the most in demand skills and knowledge, the UKSA will commission the Space Skills Survey 2023 to provide an up-to-date picture of the skills issues experienced by the space sector, with initial findings to be presented in summer 2023. The UKSA will also continue to convene the Space Skills Advisory Panel (SSAP), which will play a key role in the establishment of the NSSI. The evidence presented in the survey will be combined with valuable insights from the SSAP to produce a Space Skills Action Plan by the end of 2023 which will hold all parties across government, industry, and academia accountable for actions needed to address the sector's skills shortage.

29. Companies often find it difficult to recruit employees with considerable experience, but we think companies are also hesitant to invest money and time into training staff. This is partly due to the short-term nature of grant funding, creating a need for companies to have immediate access to the correct expertise. Further, space organisations fear that they will lose early career workers through competition with similar sectors, such as the tech sector, which require similar skills but often offer higher salaries. *Industry players should move away from requiring applicants to have years of experience and should instead strengthen their early career training programmes, including the use of apprenticeships so that not all applicants require a degree. The Government should make it easier for businesses to do this, by offering multi-year grants which allow companies to plan and offer employees longer contracts.* (Paragraph 145)

The establishment of the National Space Skills Institute (NSSI) will also seek to alleviate hesitancy from companies to invest money and time into training staff by catalysing investment into new and innovative training programmes, courses and learning opportunities that provide flexibility for both employers and employees. Further, the NSSI will seek to establish co-designed programmes focused specifically on 'employability', including courses that bridge the gap between graduate's practical understanding and industry's expectations upon hiring. Additionally, the NSSI will co-design 'career conversion' opportunities for highly skilled workers from adjacent sectors seeking to pursue a career in the space sector. The NSSI will also work collaboratively across government, industry and academia to support the development of more space-specific apprenticeships, alleviated the need for all new hires into the sector to require a degree.

The UKSA will continue to deliver the Space Placements in Industry (SPIN) Programme, which brokers projects that provide real experience of work in the space sector for university students to tackle the UK space sector skills shortage. This highly successful scheme has already seen over 400 students take part, and approximately 60% have gone on

to employment in the sector since participating. Many more continue their studies before going on to employment in space or other technology sector. In 2023, up to £150,000 of grant funding will be available for space sector organisations seeking to host interns, more than ever before, with the intention of brokering a record number of intern placements. The UKSA seeks to expand the SPIN Programme further in 2024 and 2025.

30. If the UK is to address the space skills shortage it is currently facing, then it will need to inspire future generations to take up a career in space. Although the UK Space Agency has programmes in place that are seeking to do this, we believe there is a disconnect between what the UK space sector does and how the wider population perceives it. Most associate space with space exploration and may not associate it with the range of vital services that it provides. *The UK Space Agency should ensure that its “inspiration” programme addresses the breadth of the UK’s activities in space and uses local role models who reflect this.* (Paragraph 146)

UKSA has planned to expand several projects under the Inspiration programme that will use a wide range of UK space missions and activities to provide an inspirational context for teaching. It will highlight space careers and the value of space in people’s lives, challenge misconceptions, and work to improve diversity and equality of opportunity.

These evidence-based projects will intervene across the three major touch points in young people’s lives: the classroom (ensuring links to the curriculum), the home and family (ensuring parents are engaged and supported), and their social lives (ensuring our interventions are relatable), to critically ensure multiple high-quality interventions across their formative years.

This includes an uplift and rebranding of the “One Million Interactions” programme, which provides the framework and mechanism for space professionals to act as role models and perform space outreach to young people around the UK. The programme, which has run for three years, recently exceeded its targeted 1 million interactions per year by achieving over 1.5 million interactions in the last school year, performed by 1000 space ambassadors. The uplifted programme will be called “Space Inspirations” and will aim to recruit more of the 47,000 UK space professionals and exceed 1.5 million interactions per year.

Conclusions and next steps for the National Space Strategy

31. We welcome the publication of the National Space Strategy, which provides a good overarching vision for future civil and defence space applications. However, the strategy lacks details on how its broad aims will be achieved and does not specify on which areas the Government will focus its efforts. Additionally, the strategy does not clarify what funding will be made available to the sector to ensure the success of the strategy’s initial ten-point plan. (Paragraph 156)

32. We are reassured that the Government has set up a national space board that is developing a cross-Government implementation plan to sit alongside the National Space Strategy. *To ensure that the space sector understands what steps the Government is taking to support the sector, the plan should indicate which areas of space the Government intends to focus. The Government should publish its implementation plan no later than the end of February 2023. It should publish annual progress reports to show how the goals of the*

strategy are being met. (Paragraph 157)

The Government is committed to delivering the National Space Strategy. Through the UKSA Corporate Plan 2022–25, additional information has been set out regarding the Agency’s approach to programme design to deliver government’s priorities. This included further detail on how budgets have been allocated within UKSA. Alongside this DSIT has taken other steps, such as the publication of our Plan for Space Sustainability, in addition to the Defence Space Strategy and the Joint Doctrine Publication have been published by the Ministry of Defence.

Government engages the sector widely and continually in the development of policy to support the National Space Strategy and will continue to do so. Such industry engagement has been crucial in helping shape proposals for developing space sector policy and identifying the UK’s civil space capability needs which the Government intends to publish in in early 2023, alongside a broader update on progress.

33. We share the space sector’s concern that there has been no announced uplift in public funding for space to accompany the National Space Strategy and support the achievement of its objectives. This is all the more concerning given that the UK’s overall investment in space lags behind comparable nations such as France, Germany or Japan. *The implementation plan should set out at what level, and how, the Government plans to fund the additional mechanisms and systems inherent in its ambitions for the space sector. Further, the implementation plan should set out what steps the Government will take to enable the sector to leverage increased private investment.* (Paragraph 158)

The budgets for civil space are set through the Spending Review process, through which we are investing a record £1.75bn in the UK space sector through UKSA budgets. Space activity also benefits from many of the wider interventions the Government makes in the economy, including through R&D investment by UKRI.

We recognise the vital role that leveraging private investment will play in enabling us to deliver on our ambitions for space—this is a key priority for the Government. The UKSA corporate plan 2022–25 sets out how their budget will be invested across different programmes, including highlighting the emphasis UKSA will be placing on catalysing investment in the sector.

34. While we accept that the scope of the UK space industry is quickly changing and that the Government must take an adaptable approach to measuring its success, dropping headline targets when producing strategies and plans indicates a lack of ambition. If the implementation of the new National Space Strategy is to be assessed effectively, we must be able to observe if positive changes have been achieved in the space sector against some indication of what success looks like. *The Government and UK Space Agency should publish the metrics by which the progress of the UK’s space sector will be measured (including a justification for why these metrics have been chosen) and set a clear target against which the success of the sector can be judged. These should be published alongside the implementation plan.* (Paragraph 162)

Government acknowledges the importance of monitoring and evaluating government’s progress in delivering the National Space Strategy and achieving our goals and objectives. A monitoring and evaluation framework is being developed by DSIT.

35. As the National Space Strategy stressed that civil and defence capabilities would be brought together wherever possible (so called ‘dual use’), more needs to be done to identify where overlapping capabilities can be brought together to exploit synergies and remove any unnecessary work and reduce costs. One example of this is considering whether the Skynet system, which is continuing to receive significant public investment, could provide civilian communication services. *The Department for Business, Energy and Industrial Strategy and the Ministry of Defence should map out the civil and defence uses and potential uses of other aspects of space and identify areas where existing and emerging capabilities could safely provide joint value. This work should be published no later than the end of February 2023, including an implementation plan of how civil and defence applications will be linked further over the next 5–10 years.* (Paragraph 167)

DSIT are leading work across government to identify a coherent set of UK space capability needs. This work is identifying priority space use cases across government, and particularly where shared by multiple departments. The work will further develop Government’s understanding of how the public sector currently uses space, and identify opportunities for partnering with the sector, academia, and international partners to maximise the benefits of public investment. The developed capability goals, along with more detail on how our space sector policy will enable them, will be published in Spring 2023. By developing a coherent set of capability goals for the whole of government, this work will help communicate our longer term ambitions and priorities, helping ensure the sector can receive clear demand signals to support effective planning and prioritisation by the sector.

Following publication of the capability goals in early 2023, further work will identify how the capabilities could be achieved, including consideration of the benefits of accessing commercial solutions, collaborative development with international partners, or developing UK-owned sovereign capabilities. The potential for dual use, and the requirements that would place on capabilities, will be a core aspect of these considerations.

36. Despite some potentially purposeful activity—including the establishment of the National Space Council and the National Space Board and the publication of two over-lapping high-level strategies (the National, and the Defence, space strategies)—the disbanding of the National Space Council is set to undo these efforts, with the responsibilities and interaction of the departments and agencies involved in space remaining very unclear. This is preventing the Government from making well-informed and productive decisions on space policy. *In response to this Report the Government must provide an explanation for the disbanding of the National Space Council and set out what new governance structures will be put in place and how these will ensure the success of the National and Defence Space Strategies.* (Paragraph 172)

The Prime Minister has re-established the National Space Council as an Inter-Ministerial Group, reaffirming government’s commitment to Space. The National Space Council will be Chaired by the DSIT Secretary of State and will consider issues relating to prosperity, diplomacy and national security in, through and from space, as part of coordinating overall Government policy. Items will be referred to the appropriate Cabinet Committee for collective decision, as required.

