



National Audit Office



REPORT

The National Space Strategy and the role of the UK Space Agency

Department for Science, Innovation and Technology

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HC 118

Key facts

2021

the year the government published the National Space Strategy, the first UK cross-government strategy for space

73%

increase in UK Space Agency (UKSA) spending from 2018-19 to 2022-23 (from £373 million to £647 million)

£17.5bn

estimated total UK space industry income in 2020-21

1,590

estimated UK-based organisations with space-related activities in 2020-21

£647 million

UKSA spend on space in 2022-23; the Department for Science, Innovation and Technology does not have a good understanding of the total government funding for civil space across all public bodies

85%
(£553 million)

of UKSA funding was on European Space Agency (ESA) programmes in 2022-23; ESA gives money through contracts to both industry and academia and provides access to large-scale space programmes which would be challenging to replicate nationally

48,800

estimated jobs directly provided by the UK space sector, while also supporting an additional 78,000 jobs across the supply chain in 2020-21

74%

of UKSA's high-level milestones in 2022-23 were delivered by planned deadlines

20%

vacancy rate within UKSA as of 31 March 2024

Summary

Background

1 Space science and technology plays a critical role in day-to-day life, shaping how society lives, works, and understands the world (**Figure 1** overleaf). Satellite services help to predict the weather, keep businesses connected and products moving, and are used to monitor the climate. Space also plays an important role in defence, enabling the defence of national interests as well as being an operational domain in its own right. The Department for Science, Innovation and Technology (DSIT) considers space to be a critical component to meeting wider government goals, including levelling up and becoming a science and technology superpower.

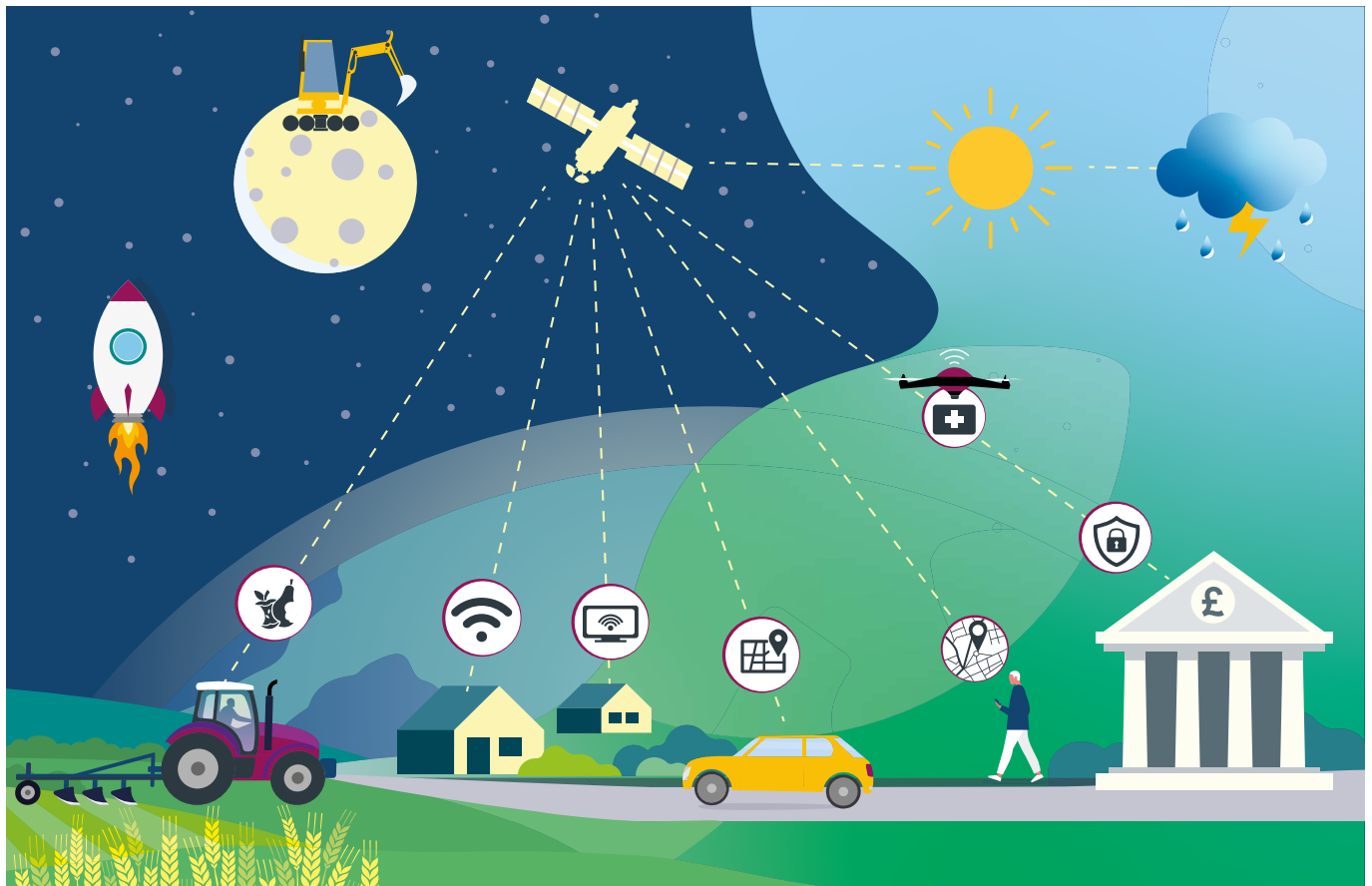
2 Space is an important and fast-developing sector. It has expanded from being an area of mainly scientific interest led by a few countries to a sector with increasing commercial use. A UK Space Agency (UKSA) commissioned report, undertaken by know.space, estimates that the total UK space industry income was £17.5 billion in 2020-21. Of the estimated 1,590 organisations with space-related activities, 162 generate space income of more than £5 million, with 14 organisations accounting for 81% of the total space-related income. The sector also directly provided an estimated 48,800 jobs while also supporting an additional 78,000 jobs across the supply chain in 2020-21.











3 In September 2021 DSIT and the Ministry of Defence (MoD) jointly published the government's National Space Strategy (the Strategy).¹ It set an ambition to make the UK one of the world's most innovative and attractive space economies. The government did not set out the costs for implementing the Strategy, instead it stated that the Comprehensive Spending Review process would set budgets for government space activities for the coming years.

¹ On 7 February 2023 the government announced that the Department for Business, Energy & Industrial Strategy (BEIS) would close, and its responsibilities would transfer to new departments, including the Department for Science, Innovation and Technology (DSIT). References to DSIT that relate to events prior to this date therefore refer to BEIS.

Figure 1
Examples of the uses of space technology

There is a wide variety of current and potential future uses of space technology, affecting day-to-day life, some of which are captured below



- | | | |
|--|--|--|
| <p> Resources
e.g. mining asteroids, comets and planets for resources such as water and metals</p> | <p> Television
e.g. wider variety of channels through satellite television</p> | <p> Weather and climate
e.g. more accurate tracking and predictions</p> |
| <p> Tourism
e.g. human space travel for recreational purposes</p> | <p> Transport
e.g. self-driving cars use navigation satellites for routing</p> | <p> Health
e.g. satellite-enabled drones to carry medication to patients in remote areas</p> |
| <p> Agriculture
e.g. more precise farming using satellites to reduce food waste</p> | <p> Navigation
e.g. using navigation satellites to track location on a phone</p> | <p> Finance
e.g. satellites enable secure digital financial transactions</p> |
| <p> Internet
e.g. communication satellites provide internet access in rural areas</p> | | |

Source: National Audit Office analysis of publicly available documents

4 Earlier, in February 2021, drawing on the preparatory work of the Strategy, the government had completed a Space Landscape Review, which examined the existing distribution of space functions across government. It made recommendations aimed at improving the distribution of responsibilities across government. Prior to this review, UKSA led on civil space strategy and policy. Subsequent to this review, DSIT has been responsible for coordinating civil space policy and UKSA has been the government's key delivery agency, responsible for developing and delivering UK civil space programmes across the UK space sector and with international space institutions. The MoD is the lead for defence space policy and UK Space Command is the defence lead for space operations, space workforce, and space capability. Several other government departments and public bodies also continue to play an important role.

5 This report examines whether DSIT and UKSA are set to secure value for money from their work overseeing and delivering the National Space Strategy. It covers:

- **Strategy and objectives:** Whether DSIT has clearly defined its objectives for the civil space sector in the Strategy and is effectively overseeing and coordinating its delivery (Part One);
- **Delivery:** UKSA's role and progress in delivering the Strategy, and the extent to which it has the required capacity and capability (Part Two); and
- **Monitoring and evaluation:** Whether there are appropriate mechanisms to monitor progress against the Strategy and evaluate outcomes (Part Three).

6 This report focuses on the civil domain of space and does not examine the defence activities, which fall under the remit of the MoD.

Key findings

Developing and coordinating the Strategy

7 The government has set out the UK's high-level approach to space, which has been welcomed by industry. In September 2021, the government recognised the growing importance of the space sector and level of government spending (estimated to have grown from £300 million in 2014 to £700 million in 2019 in the civil sector) and published the first civil and defence cross-government strategy.² The space sector is complex and cuts across science, commerce and defence, and does not have a universally applied definition. The Strategy set out the government's view of the opportunities for the UK in space and brought together civil and defence space activities for the first time. It identified five goals as well as the actions that government, academia and industry would need to take to achieve them. Examples of activities included launching rockets taking satellites into orbit from the UK; monitoring the sun for space weather events such as solar flares; and building a fleet of self-driving shuttles. Space sector stakeholders we spoke to told us that the Strategy helped to stimulate interest from investors and industry in the sector (paragraphs 1.6 to 1.12).

8 The government restarted its cross-government ministerial council on space in July 2023, after a two-year hiatus. DSIT is responsible for coordinating civil space activity in the Strategy, which is delivered through several other principal public bodies. Effective cross-government governance arrangements are therefore important for successful delivery. The government has two key arrangements for coordinating cross-government space policy: the ministerial level National Space Council (the Council) and the senior civil servant-level National Space Board (the Board). Both the Board and Council are advisory and include representatives or ministers from the main departments and delivery bodies with space policy interests. The Board aims to ensure coherent delivery of the Strategy between departments and to maintain cross-government momentum. The Council is responsible for coordinating government policy on space. However, it did not meet for over two years, until it was re-instated in July 2023. This may have reduced the government's ability to work effectively across departments and to make well-informed and productive decisions on space policy (paragraphs 1.17 to 1.19).

² We have not audited these estimates.

9 DSIT has not provided enough clarity or detail on its strategic ambitions to allow delivery bodies and stakeholders to plan to achieve them. Although the Strategy set out high-level roles and responsibilities across government, it did not set out clear and specific aims, or provide guidance on the outcomes that the government wants to achieve in a set timeframe, or priorities for guiding departments' and industry's efforts. DSIT recognised that the Strategy is broad, and had originally intended to provide more detail through an implementation plan. However, DSIT told us the minister at the time decided not to do so. Nearly two years after publishing the Strategy, DSIT and the MoD published the National Space Strategy in Action policy paper. This provided an update on what had been achieved so far and a broad high-level view of upcoming policy work. However, it lacked detail on how the government intended to prioritise delivery of the rest of the Strategy. Departments and industry stakeholders we spoke to were also not always clear on the roles and responsibilities or which team or department was leading on certain areas. Without clarity and transparency there is a risk of gaps or duplication of effort or funding within government, and loss of confidence and insufficient support for industry (paragraphs 1.13 to 1.16 and 1.20 to 1.22).

10 DSIT does not yet fully understand the government's overall funding and requirements for the space sector. DSIT needs this understanding so that it can support the government to optimise how public money and activity is used to effectively allocate available resources and prevent gaps and duplication, and shape the sector in the way the government requires. It has visibility of UKSA spending, which has increased from £373 million in 2018-19 to £647 million in 2022-23, an uplift of 73%. However, DSIT does not have a good understanding of the total government funding for civil space across all public bodies. For example, DSIT knows UK Research & Innovation (UKRI) funds space activities, including through Rutherford Appleton Laboratory (RAL) Space, but UKRI does not separately track space funding as distinct from its overall budget.³ Other areas of government spending that draw upon space capabilities include using satellite data to map crops to support more productive agriculture, or electronic monitoring tags to track offenders (paragraphs 1.23 to 1.29 and Figure 4).

³ Rutherford Appleton Laboratory (RAL) Space is the space hub within UK Research & Innovation (UKRI) and carries out space research and technology development.

11 DSIT has identified that the government’s commercial approach to the sector will need to change, and it will need to develop capabilities across government in order to achieve this. DSIT believes that, as the space sector grows, the government will need to change from being a primary funder to an influential customer of the sector. It is therefore aiming to increasingly use public procurement to shape and grow the industry rather than principally using grant funding. Government contracts can increase a company’s visibility and credibility, enabling it to attract further private investment, and providing a more secure income stream than grants. In March 2024, two-and-a-half years after the Strategy was published, DSIT published its *Space Industrial Plan* (the Plan). The Plan identified a need to change the way the government works with industry, defined the capabilities it is seeking to develop in the UK, and set out a number of levers it seeks to use to influence the sector to achieve its ambitions. These levers include changes to its relationship with industry and the regulatory environment; the government’s approach to space procurement; and increasing access to finance. The success of some of these interventions will be dependent on the government developing its capability in areas where it is currently immature. For example, the government has identified it will need to improve its approach to government space procurement and become a more intelligent customer of space technology, as awareness of opportunities across departments is limited (paragraphs 1.30 to 1.35).

The UK Space Agency’s role in delivering the Strategy

12 UKSA has been proactive in working to align its activities with the Strategy. In its Corporate Plan 2022–25 (the Corporate Plan), UKSA mapped its work to the Strategy under eight priorities, including areas on innovation, levelling up, discovery and launch. UKSA has also sought to place most of its programmes within these priorities (for example the programme of work with the European Space Agency (ESA) to explore Jupiter is aligned with the Discovery priority, and monitoring fluxes in carbon dioxide is aligned with the Earth Observation priority).⁴ In the Corporate Plan, UKSA also identified the need to make changes to its organisational structure and governance, to both enable it to achieve the Strategy’s objectives and improve organisational culture following poor results on bullying and harassment in the Civil Service People Survey. A transformation programme was launched by UKSA in 2022 and was originally planned to be complete in March 2024, but it is still underway and now is intended to be completed by March 2025. Activities so far have included simplifying the organisational structure and governance and identifying new office locations across the UK to move closer to stakeholders. Since 2021, the percentage of UKSA staff who have reported they had been bullied or harassed, or discriminated against in the last 12 months has decreased; however, it is not possible to determine whether this change is attributable to UKSA’s transformation programme (paragraphs 2.2 to 2.7, and Figures 5 and 6).

⁴ In November 2023 UKSA decided to change the way it refers to ‘projects’ and ‘programmes’ to ‘initiatives’ and ‘priorities’ respectively. For consistency, the terms ‘project’ and ‘programme’ are used throughout this report.

13 UKSA and DSIT's process for allocating UKSA's £1.75 billion budget for 2022 to 2025 had some weaknesses but they are improving the approach for the next spending review period.

In late 2021 to mid-2022, UKSA worked with DSIT to undertake a prioritisation process, drawing upon a range of available information, that informed the 2022 to 2025 spending review preparations, where UKSA received £1.75 billion over three years. UKSA collated information from existing businesses cases and new proposals and developed a series of metrics to support the prioritisation exercise. DSIT and UKSA have acknowledged that, while there was good engagement and a collaborative approach, they also needed to make improvements for the next spending review. They therefore jointly undertook a lessons learned exercise which made recommendations for improvements. This covered a range of issues, for example, some staff reported that they felt that the Strategy was not used to drive change, but its breadth was instead being used as a hook to justify individual programmes. Some staff also felt there needed to be more information relating to programme outcomes, objectives or deliverables. In preparation for the 2025 spending review, DSIT and UKSA have produced a draft prioritisation framework and benefits framework to support decision making, though it will not be possible to evaluate these until spending review preparations are complete (paragraphs 2.8 to 2.10).

14 The UK does not yet receive contracts from ESA proportionate to the value of the funding UKSA provides. UKSA is working with ESA to ensure this is the case by the end of December 2024.

Routing spending through ESA gives UK space companies and academics access to large-scale space programmes which would be challenging to replicate nationally. For example, UKSA, alongside other countries, is investing into ESA's JUICE mission, which aims to orbit Jupiter and three of its largest moons and has a total cost of around €1.6 billion. The UK government's presence on ESA's boards and committees helps to ensure it has influence on ESA's decision-making processes and policies. Of UKSA's overall annual spend, 85% (£553 million) went to ESA in 2022-23, and UKSA has committed to spend around £1.84 billion from 2023 to 2027. ESA aims to allocate its contracts to countries in proportion to their contribution to ESA's budget. This means that the UK should expect to receive contracts proportionally to the value of the UK's investment in ESA, excluding ESA's internal operating costs.^{5,6} In February 2023, a UKSA Executive Committee meeting paper reported that UK companies received an estimated £0.93 for every £1 UKSA contributed to ESA, excluding ESA's internal operating costs, and that the UK had the highest estimated cumulative deficit of any ESA member, equating to around €168.5 million since October 2015. UKSA, with the help of ESA, is working to increase the value of contracts the UK receives. By quarter four 2023, UKSA reported the UK's return increased to £0.96 for every £1 contributed, but this means UK industry and academia are still not benefitting in terms of contract value from the full funding given to ESA by UKSA (paragraphs 2.11 to 2.13 and Figure 7).

5 The value of contracts received is calculated on the basis of the technological value of the contracted activities and is dependent on sufficient bids received from UK companies. Low-amount and low-technical value procurements, non-space procurements and third-party funded activities are not included in this calculation.

6 ESA's internal operating costs include organisational overheads, project team labour and any technical assistance provided by other ESA directorates.

15 UKSA has not made as much progress as it planned on its programmes.

UKSA delivered 74% of its high-level milestones in 2022-23 against its planned deadlines. UKSA told us its performance improved in 2023-24 with an expected 78% of its high-level milestones complete, with some projects continuing to experience delays.⁷ Delays to UKSA-led programmes (excluding ESA projects) resulted in an underspend of around £48 million in 2022-23 against UKSA's original £144 million budget.⁸ UKSA told us it is expecting to meet its financial target of not having a material underspend in 2023-24.⁹ The main reasons for the delays are (paragraphs 2.14 to 2.16):

- **Delays producing business cases for funding approval:** Between April 2022 and December 2023, UKSA prepared around 45 business cases for spend over £500,000. A number of these were not produced within the planned timeframes, but UKSA does not hold data on exactly how many were completed late or on the length of the delay. UKSA and DSIT consider reasons for the delays include a lack of capability and capacity to produce them, and the challenge in providing evidence of benefits for innovative projects which meet HM Treasury's guidelines (paragraphs 2.17 to 2.22);
- **Staff shortages:** As of 31 March 2024, UKSA had 89 vacancies, around 20% of the 444 staff it required. Of the posts that were filled at that time, 21% of UKSA staff were temporary employees, which risks corporate memory being lost, can be more expensive and can limit how effectively an organisation or certain teams are run. It also reported in March 2024 that nine of UKSA's 17 teams identified resources as being a factor constraining successful delivery of priority milestones (paragraphs 2.24 to 2.25 and Figure 8); and
- **Factors outside of UKSA control:** External factors have at times limited progress of UKSA projects, for example, due to geo-political events or the COVID-19 pandemic (paragraph 2.26).

16 UKSA wants to increase its use of alternative commercial interventions, such as procurement, to improve support for industry and attract more private investment, but it has not yet worked out the implications of this shift. UKSA predominantly uses grants to support the sector, but, in line with DSIT's ambitions (see paragraph 11), UKSA considers it needs more public procurement to continue to grow the sector. UKSA has started a project to consider the implications for its processes, capabilities, structures and systems – for example, whether it will need to develop further commercial skills in any of the alternative interventions, and ensure appropriate permissions are in place in order to utilise them. At the time of our fieldwork in early 2024, UKSA was still in the early stages of exploring the options available to support a revised commercial approach (paragraphs 2.27 to 2.30).

7 We were not able to verify the milestone data for 2023-24 as our fieldwork for this report took place before UKSA had completed the end-of-year review of its performance.

8 The impact of around £25 million of this underspend was mitigated by bringing forward ESA payments and the remaining £23 million of underspend was surrendered to DSIT to be repurposed.

9 We were not able to verify the underspend figures for 2023-24 as our fieldwork for this report took place before the financial audit had been completed on UKSA's accounts.

17 DSIT and UKSA have identified that UKSA has more work underway than it can afford to continue, unchanged, beyond March 2025 without a budget uplift, and it may have to make difficult decisions on which of the Strategy’s ambitions to prioritise. In response to its increased budget in the 2022 to 2025 spending review period and to meet the ambitions of the Strategy, UKSA (with contribution and oversight from DSIT) scaled up existing sector funding programmes, launched new ways to invest in science and technology, and signed up to long term international missions. It also chose to increase the UK’s subscriptions to ESA. Before making this subscription, in November 2022 UKSA and DSIT identified UKSA would need to further increase its ESA budget due to higher inflation expectations, foreign exchange volatility, hedging costs and a previous modelling error of £377 million. By September 2023, UKSA estimated that, if it rolled forward beyond March 2025 every ongoing mission and chose to keep making other national investments at current levels, these could cost substantially more than the funding level it receives currently. Not all these activities are contractual obligations and therefore UKSA and DSIT are considering what the options might be for rescheduling, scaling down or discontinuing some activities, depending on the outcome of the next spending review. Such decisions could reduce the total value secured from some of UKSA’s activities undertaken in this spending review period (paragraphs 2.31 to 2.35).

Measuring and evaluating progress against the Strategy

18 UKSA does not currently have a complete view of how it is progressing against its priorities, but it is working to develop one. UKSA does not have an established centralised approach to monitoring and evaluation. It has monitoring arrangements in place at the individual programme level, but this does not enable it to compare programme performance. It has also completed some project and programme evaluations. UKSA’s delivery board monitors progress across its priorities through 22 output-focused metrics, which provide some visibility of progress at the priority level; however, these data have some limitations. UKSA accepts these limitations and, at the time of our fieldwork in early 2024, was taking steps to improve its monitoring and evaluation, including developing a benefits framework and an evaluation strategy, which it intends to publish in Summer 2024. UKSA has also developed a single principal measure for success (the North Star metric), which is intended to measure the total revenue and investment generated within the UK space sector that is attributable to UKSA support. UKSA commissioned a consultancy firm, know.space, to support the collation, collection and reporting of the metric. It found that, while aggregate analysis of the data alone cannot be used to determine attribution or a causal relationship, it is strongly suggestive of a link between UKSA’s funding activity and sector-wide outcomes. For example, some companies that received UKSA funding went on to secure private investment (paragraphs 3.3 to 3.9).

19 At the Strategy level, DSIT is improving its view of progress but does not yet have a systematic framework for monitoring and evaluating progress across the whole Strategy. DSIT has oversight of UKSA's progress through its corporate reporting and has identified an initial set of progress indicators for the Strategy. The National Space Board also receives updates on some of the activities undertaken by public bodies with delivery responsibilities; however, it is not systematically monitoring progress against each of the Strategy's commitments. DSIT has faced challenges monitoring progress against the Strategy as it did not set out specific aims or outcomes. It also does not have a framework for evaluation, DSIT told us that strong monitoring data need to be in place before this can occur. DSIT is currently revisiting its objectives to be more defined and therefore measurable, with the intention of creating a standardised focus with which to monitor and evaluate progress towards the Strategy's goals. It is currently behind schedule but expects to complete this work in July 2024. Until this work is complete and a systematic process for monitoring progress is established, the government will not know whether it is making sufficient progress against the objectives set out in the Strategy (paragraphs 3.10 to 3.12).

Conclusion on value for money

20 Space plays a critical role in modern everyday life in the UK. It is vital for scientific discovery and is a fast-developing UK commercial sector which has grown to around £17.5 billion in 2020-21. The government did well to draw its many different interests and activities in this very diverse sector into a single vision in its 2021 national Strategy, which set high ambitions and helped galvanise the sector's interest. DSIT recognised that the original Strategy was broad and that it did not know how much it would cost to deliver. However, it did not produce the implementation plan that it had originally planned to, and three years later DSIT and UKSA are still in the early stages of identifying and developing the plans and capabilities needed to deliver the Strategy's ambitions.

21 The government substantially increased the scale of UKSA's funding and changed its delivery responsibilities in 2021, but DSIT did not provide clarity on the aims, outcomes or priorities for what UKSA was supposed to deliver and by when, or ensure that UKSA had the capability or capacity to deliver it. UKSA was proactive in working to align its activities with the Strategy and identifying a need to make changes to its organisational structure and governance but did not have sufficient planning, monitoring or evaluation arrangements or capabilities in place. As a result, its funding allocation processes had some weaknesses, some of its projects are behind schedule, and it does not have a complete view of whether it is on course to deliver the government's ambitions.

22 UKSA has recognised many of these weaknesses and has been putting in place arrangements to remedy them, including a revised approach to allocating funding, and improved monitoring and evaluation processes. UKSA has recently seen notable improvements in its Civil Service People Survey results. Similarly, it expects to report improved performance against its planned milestones and to meet its financial target of not having a material underspend for 2023-24. However, UKSA recognises that it has more to do. The sector is developing at a fast pace, and in planning for the future the government will need to balance the need to provide certainty with the need to be flexible and responsive to new opportunities. If UKSA is able to address these issues and DSIT provides the required clarity on the aims and outcomes of the Strategy, then they will be much better placed to secure value for money from the government's multi-billion pound investments in the sector and achieve the government's ambitions for the UK in space.

Recommendations

23 To ensure effective and transparent cross-government working arrangements, DSIT with other government bodies should:

- a** By December 2024, map out the roles and responsibilities of public bodies with a role in the space sector, and publish this to provide clarity for industry and academia to enable them to easily navigate the government's system.
- b** By December 2024, explore and implement the appropriate arrangements for cross-government working for the space sector. This should include clearly defining accountabilities for delivery and setting out the mechanisms for gathering information on the needs of different public bodies and understanding and coordinating cross-government spend on space-related activities.

24 To help build and provide confidence to the UK space sector:

- c** By June 2025, DSIT should, in preparation for and following the outcome of the spending review, assess whether there will be sufficient funding to achieve its ambitions and identified capabilities. Should there not be sufficient funding, DSIT should update its plans, setting out what would be deprioritised together with its longer-term funding ambitions.

25 To improve management and oversight of future financial commitments:

- d** By December 2024, DSIT and UKSA should undertake a joint review to understand how factors contributing to future commitments can be incorporated into financial management processes.
- e** DSIT and UKSA should evaluate the new prioritisation exercise and benefits framework designed to support spending review preparations, and identify whether this has enabled greater evidence-based decision making; and whether further improvements need to be made.

26 To measure the progress and benefits of government funding in the space sector:

- f** By December 2024, DSIT should define and establish output and outcome metrics to monitor cross-government progress against the Strategy.
- g** By December 2024, UKSA should review and confirm whether it is using the most appropriate metrics, including the North Star metric, to measure its progress.