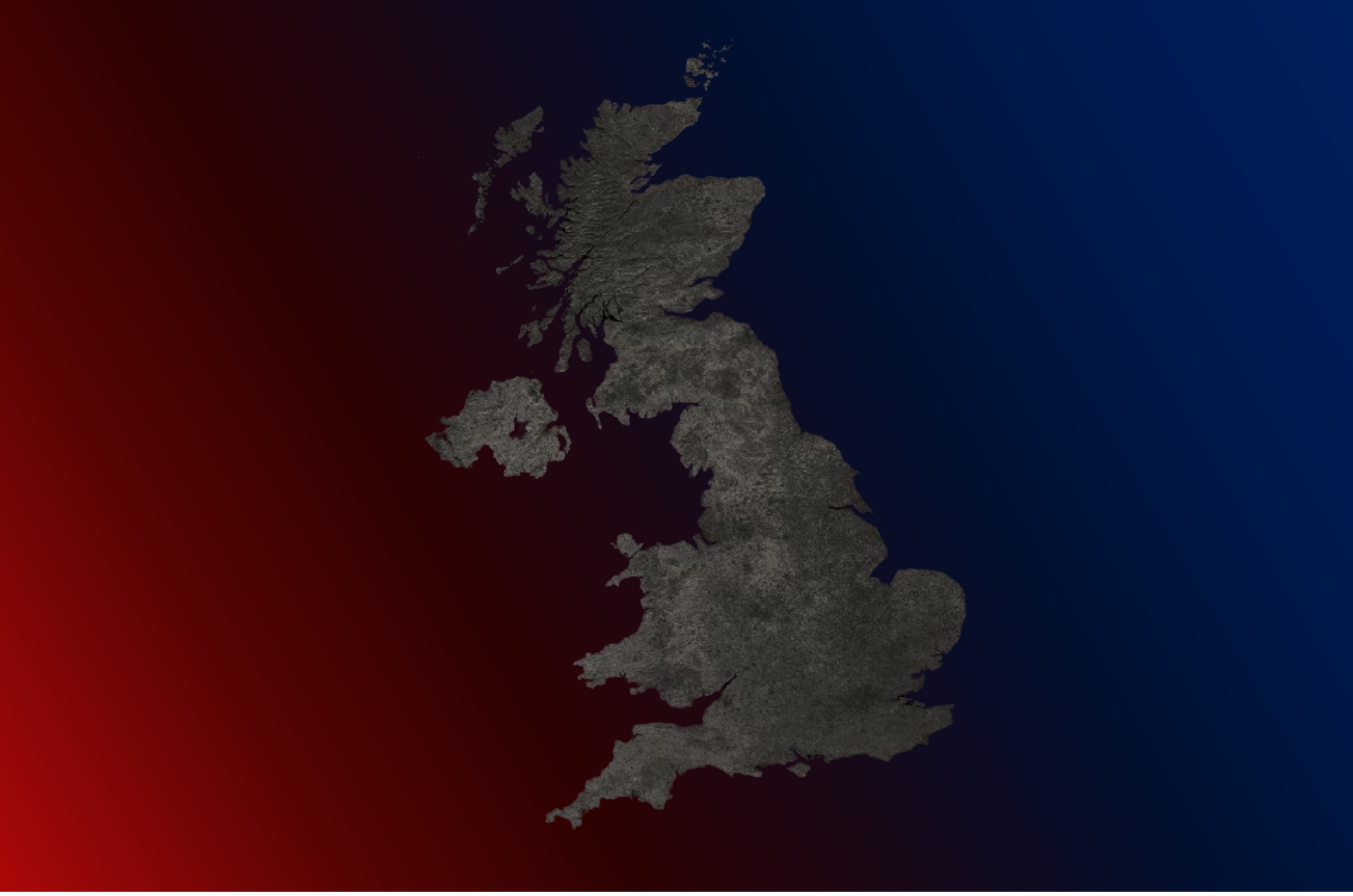

Size & Health of the UK Space Industry 2022

Summary Report for the UK SPACE AGENCY

know.space

March 2023

About us

know.space[1] is a specialist space economics consultancy, based in London and Edinburgh. Founded by leading sector experts, it is motivated by a single mission: to be the source of **authoritative economic knowledge for the space sector**.

know. /nəʊ/v.

to understand clearly and with certainty

www.know.space hello@know.space

Acknowledgements

We would like to thank all the organisations who responded to our survey, and to those who helped promote it. We would also like to acknowledge the support of the UK Space Agency and the Department for Science, Innovation and Technology (formerly the Department for Business, Energy and Industrial Strategy) Space Directorate, and the supporting analysis undertaken by the Office for National Statistics (ONS) Annual Business Survey (ABS) team. Responsibility for the content of this report remains with **know.**space.

Image: 'United Kingdom by Proba-V' (decolourised). ESA/Belspo – by VITO, CC BY-SA 3.0 IGO.

[1] **know.**consulting ltd. (CRN: 12152408; VAT: 333424820), trading as **know.**space

Contents

Key findings

This edition of the '*Size & Health of the UK Space Industry*' examines the **2020/21** financial year – a period when the country was enduring the global COVID-19 pandemic – and finds a remarkably **robust industry**, resiliently weathering disrupted operations to return **growth in income, employment and Gross Value Added (GVA)**.

Furthermore, the growth in the industrial population, continuing high levels of private investment, strong exports, commercial focus and the expanded scope of the UK space industry, particularly in high-growth and emerging markets (such as space surveillance & tracking, space travel and habitation, in-orbit servicing, debris removal) is **encouraging for future growth** – supported by the positive 3-year outlook of survey respondents.

The findings are estimates based on research and analysis of **1,590 UK-based organisations with space-related activities**. The research comprised an industrial survey (achieving a record 303 survey responses), supplemented by secondary research of more than 1,000 organisations (sources: Companies House records, statutory financial accounts, annual reports, company websites, and know.space proprietary databases).

State of the industry

All growth rates are real (inflation-adjusted) growth rates since 2019/20.

- Total **UK space industry income** grew **+5.1%** in real terms to **£17.5 billion** in **2020/21** – the second fastest annual growth in the last seven years.
- The UK space industry growth (+5.1%) **outpaced the growth of the global space industry** (+1.6%)[2], whilst the **wider UK economy declined** by -7.6%.[3]
- The industry numbers **1,590 organisations**, with **29 new incorporations** since last year[4].
- **Segments that experienced growth** were: Space Applications (+7%, +£843m, driving most of the growth); Ancillary Services (+13%, +£72m) and Space Operations (+4%, +£63m). **One segment experienced decline**: Space Manufacturing (-6%, -£134m).
- The **activities that saw the most significant growth** were:
  - *By growth value:* Direct-to-Home (DTH) broadcasting (+8%, +£592m); Supply of user devices and equipment (+31%, +£405m); Proprietary satellite operations (inc. sale/lease) (+30%, +£275m); and Mobile satellite communication services (+10%, +£128m).
  - *By growth rate:* Third-party ground segment operations (+149%, +£59m); Space Surveillance & Tracking (SST) (+135%, +£29m); Legal and financial services (+106%, +£13m); Policymaking, regulation and oversight (+99%, +£37m); Launch and satellite insurance (inc. brokerage) services (+47%, £46m); and In-Orbit Servicing (+33%, +£0.3m).
- The **activities that had notable declines** were: Ground station networks (-58%, -£293m); Location-based signal service providers (-61%, -£210m); Launch services (-53%, -£5.1m); and Launch brokerage services (-77%, -£1.3m).

Importance of the industry

- Direct **employment** grew to an estimated **48,800 jobs** in 2020/21 (from 47,000 in 2019/20), equivalent to **0.15%** of the total UK workforce, supporting a total of over **126,800 jobs** across the supply chain.
- The industry directly contributed **£7.0 billion** of **GVA** to UK economic output in 2020/21 (**0.34%** of UK

[2] The Space Foundation (2022). *Global Space Activity by Category, 2005-2021*. Available (behind paywall) from: https://www.thespacereport.org/resources/global-space-activity-by-category-2005-2021/

[3] ONS (2022). *Gross Domestic Product at market prices: Current price: Seasonally adjusted £m*. Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ybha/ukea

[4] The 1,590 organisations with confirmed space-related activities contribute to the total estimated industry income and employment figures for at least one of the two examined years (2020/21 and 2021/2022e). The total population change year-on-year is 297 organisations, which includes 29 new incorporations, 309 newly captured organisations, and 41 exits. The 309 newly captured organisations include traditionally non-space organisations incorporated before 2021 that have commenced space activities, and organisations that were not identified in previous editions (often because of a lack of public presence or small size). Though numerous, their collective impact on income is small (£208m).

GDP)[5], **up +1.7%** since 2019/20, and a total GVA effect of **£18.3 billion** (including supply chain effects).

- Labour productivity (GVA per employee) for the UK space industry was **£144,000** in 2020/21 (down from £149,000 in 2019/20), but still **2.5 times the UK average labour productivity** (£56,614).
- The UK space industry workforce is **particularly highly-skilled**, with over **3 in 4** (77%) employees holding at least a primary degree – **higher than any sector** in the ONS Census.[6]
- **Exports** remained unchanged in real terms at **£5.9 billion** in 2020/21, accounting for **34%** of total income – up from 32% in 2019/20 and above the UK average (30%). The space export intensity increases to **57%** if Direct-To-Home (DTH) satellite broadcasting is excluded.
- The most important export market for the UK space industry is the **Rest of Europe**, representing **55% of total exports** and **19% of total income** (up from 48% and 15% in 2019/20, respectively).
- With Research & Development (**R&D**) **investment of £788 million** (down 6% since 2019/20, equivalent to 11% of GVA), the space industry is **more than 5 times more R&D intensive than the UK average**.
- The UK space industry has a strong **commercial focus** – 80% of income is commercial, comprised of sales to consumers (including DTH broadcasting) at 50% and sales to other businesses at 30%. That said, there is a strong role for public demand (20%), comprised of: Defence (10.2%), Civil Government (5.4%), European Space Agency (ESA, 2.3%), Space Agencies (2.0%), and European Commission (0.4%).
- Remaining the largest single activity, the share of income accounted for by **DTH broadcasting** grew to **46%** in 2020/21 (from 45% in 2019/20) but is expected to resume its longer-term decline as fibre broadband replaces satellites for signal distribution in the UK.
- The industry is **concentrated** and dominated by a few large organisations, with just **14** organisations accounting for **81%** of total space income, 148 for the next 13% and **1,428** for the remaining **6%**. Only 162 organisations generate space income of more than £5m.
- All **UK regions/nations** are home to headquarters of space organisations, though industrial sites (and employment) are **concentrated** in London, the South East, South West & East of England, and Scotland.
- **Services from satellites** (be they UK or non-UK, and public or commercial, satellites) **support wider industrial activities in the UK** non-financial business economy that contribute at least **£370 billion to UK GDP** (17.7%), broken down by type as follows (not mutually exclusive):
  - **Global Navigation Satellite System** (GNSS) services support **£320 billion** of GDP (15.3%).
  - **Meteorological** satellite services support **£212 billion** of GDP (10.2%).
  - **Communications** satellite services support **£112 billion** of GDP (5.4%).
  - **Earth Observation** satellite services support **£106 billion** of GDP (5.1%).

Outlook for the industry

- **Nearly half of** survey respondents experienced a **negative impact** of **COVID-19** on their workforce and income (46% each), suppliers (45%) and demand (44%). Investments were less affected (only 29% reporting negative impact), and some respondents even reported positive impacts: notably for demand (15%), income (12%) and workforce (10%).
- The ongoing **cost-of-living crisis** has a **negative impact across the board** for survey respondents notably on organisations' own operations (79%), employees (76%), suppliers (65%), customers (62%), and investment (40%).
- According to survey responses on future outlook (next 3 years), **economic uncertainty** was the **most prevalent obstacle** to commercial success (51%), followed by **limitations on EU programme involvement** (49%) and **recruiting staff** (46%).
- That said, survey respondents indicated **optimism with respect to near-term growth**: 3 in 5 expect income to be higher in the coming three years (63%, of which 39% expect much higher). Over half (58%) expect to employ more staff, and around 1 in 2 expect higher investment (50%), increased R&D expenditure (47%). 3 in 10 expected increased exports (32%) and only 10% anticipated a drop.
- UK-headquartered space companies attracted **investment of £635m** in total **over 34 identified investment deals**, with acquisitions accounting for the majority of the total investment value (75%, 15% of deals) but Venture Capital representing most of the investment volume (56%, 23% of value).
- 7 in 10 respondents cited **support and engagement with the UK Space Agency** as a **key enabler** for commercial success (though this may reflect bias in the sample of respondents), followed by **increased spend across UK national space programme** (70%) and **UK funding via ESA programmes** (64%).
- Some survey respondents reported contributing to at least one of the United Nations' **Sustainable Development Goals**, most notably Climate Action (58%), Industry, Innovation & Infrastructure (56%) and Sustainable Cities & Communities (42%), aligning with wider Government agenda (e.g. Net Zero, *Science & Technology Superpower* and Levelling Up the UK).

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[5] ONS (2022). *Gross Domestic Product at market prices: Current price: Seasonally adjusted £m*. Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ybha/ukea

[6] Note that here, as in other instances, *Size & Health* survey-based estimates are compared for context against national and regional 'official statistics' which are produced to rigorous standards defined in the *Code of Practice for Statistics*.

Summary

Introduction

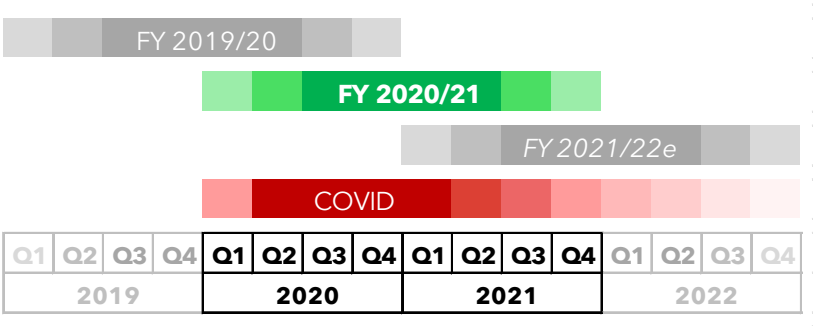
The **UK Space Agency (UKSA)** aims to catalyse investment to maximise the space sector's long-term growth, deliver missions and capabilities to meet national needs and help enhance our understanding of the Universe, and champion space.[7] To guide its work, UKSA needs a means to **monitor the health of the industry** and to **track the effectiveness of its activities and strategy**.

Undertaken since 2010, the *Size & Health of the UK Space Industry* is a long-running study series that quantifies and tracks changes in the UK space industry. It measures if the industry is growing, and highlights the nature and source of the growth, including trends within sub-sectors, sources of income, and future expectations. It is **the principal source of information on the UK space industry**, and a key resource for the Government's evidence-based strategy, policy design and decision-making – but also for the wider industry (e.g. strategy, business cases, investor decks, scientific impact).

UKSA commissioned **know.**space – the specialist space economics consultancy – to conduct the latest edition. In collaboration with UKSA, improvements were made to study design (expanded analytical scope, enhanced trend analysis, innovative data collection, and record survey participation) whilst maintaining comparability with previous editions.

This edition of the '*Size & Health*' covers a **particularly challenging time**. The period of analysis (2020/21) was marked by the **COVID-19 pandemic** (with the first government lockdown starting in late-March 2020 and varying degrees of movement restrictions until mid-July 2021), and survey research was undertaken during the ongoing **cost-of-living crisis** (energy, inflation).

Period of analysis (2020/21) in context



Source: know.space visualisation

This study offers valuable findings, highlighting the resiliency of the industry in the face of successive lockdowns and disrupted operations, as well as offering an insight into survey

[7] UKSA (2022). *UK Space Agency Corporate Plan 2022-25*. Available from: https://www.gov.uk/government/publications/uk-space-agency-corporate-plan-2022-25/uk-space-agency-corporate-plan-2022-25--2#:~:text=UK%20Space%20Agency%20value%20proposition,services%20in%20Europe%20by%202030.

respondents' outlook for the next 3 years. This 2022 report summarises the findings for the **2020/21** financial year (FY).

Given the tumultuous economic circumstances since 2020, the *2021/22 in-year estimate* has been conservatively forecasted using a combination of published accounts (where already filed), survey responses (factoring in respondents' confidence in their estimate) and a three-year historical average.

Scope

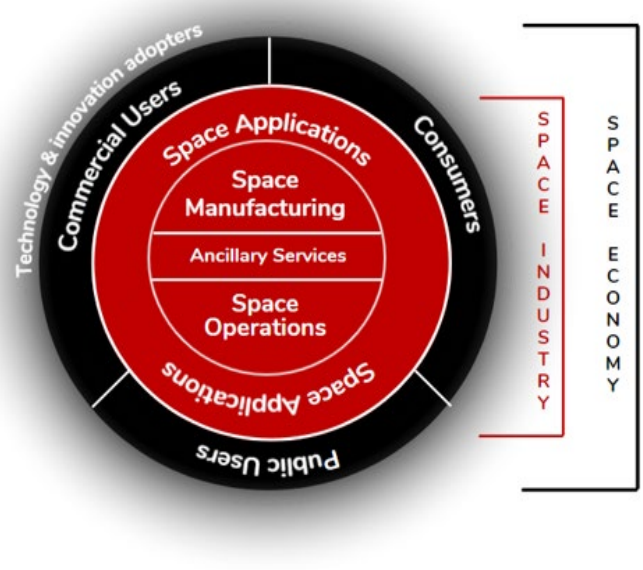
The **'space industry'** is defined to include all organisations that are engaged in any space-related activity, comprising both:

- **Non-commercial organisations** (e.g. universities, research institutes) that secure income to contribute space-specific research and expertise throughout the industry supply chain, often in partnership with commercial organisations. Non-commercial income includes grant funding, core funding, research funding, tuition fees, departmental expenditures, and operating budgets.
- **Commercial organisations** (i.e. businesses, companies, firms) that earn revenue from the manufacture, launch and operation of satellites/spacecraft, and from utilisation of the signals and data supplied by satellites/spacecraft to develop value-added applications. Such organisations may also secure non-commercial income (e.g. grants) to undertake specific R&D.

The term **'income'** covers both commercial revenues and non-commercial funding.

'Space-related activity' is defined to include any of the following:[8]

- **Space Manufacturing**
  Design and/or manufacture of space equipment and subsystems
  including: launch vehicles and subsystems, satellites/payloads/spacecraft and subsystems, scientific instruments, ground segment systems and equipment (control centres and telemetry), suppliers of materials and components, scientific and engineering support, fundamental and applied research.
- **Space Operations**
  Launch and/or operation of satellites and/or spacecraft
  including: launch services, launch brokerage services, proprietary satellite operation (inc. sale/lease of capacity), third-party ground segment operation, ground station networks, in-orbit servicing, debris removal, Space Surveillance & Tracking (SST), space tourism, in-space manufacturing.



[8] This 2022 edition fully adopts the value chain segmentation introduced in the 2016 edition. For reference, Space Manufacturing and Space Operations combined can (roughly) be considered as 'upstream', and Space Applications as 'downstream'. Ancillary Services provide specialised support to all other value chain segments.

- **Space Applications**
  Applications of satellite signals and data[9]
  including: Direct-To-Home (DTH) broadcasting, fixed and mobile satellite communications services (including Very-Small-Aperture Terminals (VSATs)), location-based signal and connectivity service providers, supply of user devices and equipment, processors of satellite data, applications leveraging satellite signals (e.g. GPS devices and location based services) and/or data (e.g. meteorology, geographic information system (GIS) software and geospatial products), other (e.g. Quantum Key Distribution).
- **Ancillary Services**
  Specialised support services
  including: launch and satellite insurance (inc. brokerage) services, financial and legal services, software and IT services, market research and consultancy services, business incubation and development, policymaking, regulation, and oversight.

The outputs of the UK space industry are used to considerable benefit by a large and increasingly wide range of **public, commercial and consumer users**[10]. Commercial users are defined as businesses in an industrial sector other than space that utilise satellite applications *operationally* to improve delivery of their core proposition. The value of commercial use is captured in the value of UK GDP supported by satellite services (p.41).

Organisation for Economic Co-operation and Development (OECD) standards

The OECD works to agree and promote international standards for measuring the space industry. In support of this and to facilitate international comparison, this edition breaks down UK space income by the OECD's defined *space sectors (*called *Capabilities* in previous *Size & Health* editions).[11]

OECD also recommends a standard list *space segments* and the *activities* within them. The *Size & Health* already employs a more granular delineation of space segments and activity than the OECD recommended standards. [12] Thus, findings are not additionally grouped by OECD-defined segments or activities.[13]

Methodological approach

This edition maintains methodological consistency with previous editions to **ensure comparability with time series** to identify patterns of growth and emerging trends.

The research was undertaken employing **a combination of primary research** (303 responses to an online survey[14], including 187 complete responses[15] – a record number of responses from the industry) and **secondary research** (desk-based research of more than 1,000 organisations) to deliver comprehensive coverage of the UK space industry. Sources used for the secondary research include: Companies House records and statutory financial reports; Subscription-based databases and information sources;

[9] The definition of the space industry does not include activities leveraging satellite applications for operational purposes (e.g. ride-hailing, food or grocery delivery, usage-based car insurance, etc.), which instead count as part of the wider space economy and are captured in the 'Wider UK GDP supported by satellite services' analysis.
[10] This is reflected in the increased share of UK GDP supported by satellite services (17.7%), despite the impact of COVID.
[11] OECD 'sectors' match what the *Size & Health* study traditionally reports as 'Capabilities'. For the sake of clarity, they are reported as 'Capability / OECD sector' in this year's edition.
[12] The breakdown of OECD-defined 'sectors', 'segments', and 'activities' can be found in OECD (2022). *Handbook on Measuring the Space Economy, 2nd Edition.* Available from: https://www.oecd-ilibrary.org/science-and-technology/oecd-handbook-on-measuring-the-space-economy-2nd-edition_8bfef437-en
[13] Mapping *Size & Health* activities to OECD-defined activities is possible to aid international comparison between specific activities within industries.
[14] The survey was open between October and December 2022, for a duration of 10 weeks.
[15] Responses are considered 'complete' where respondents reached the end of the survey.

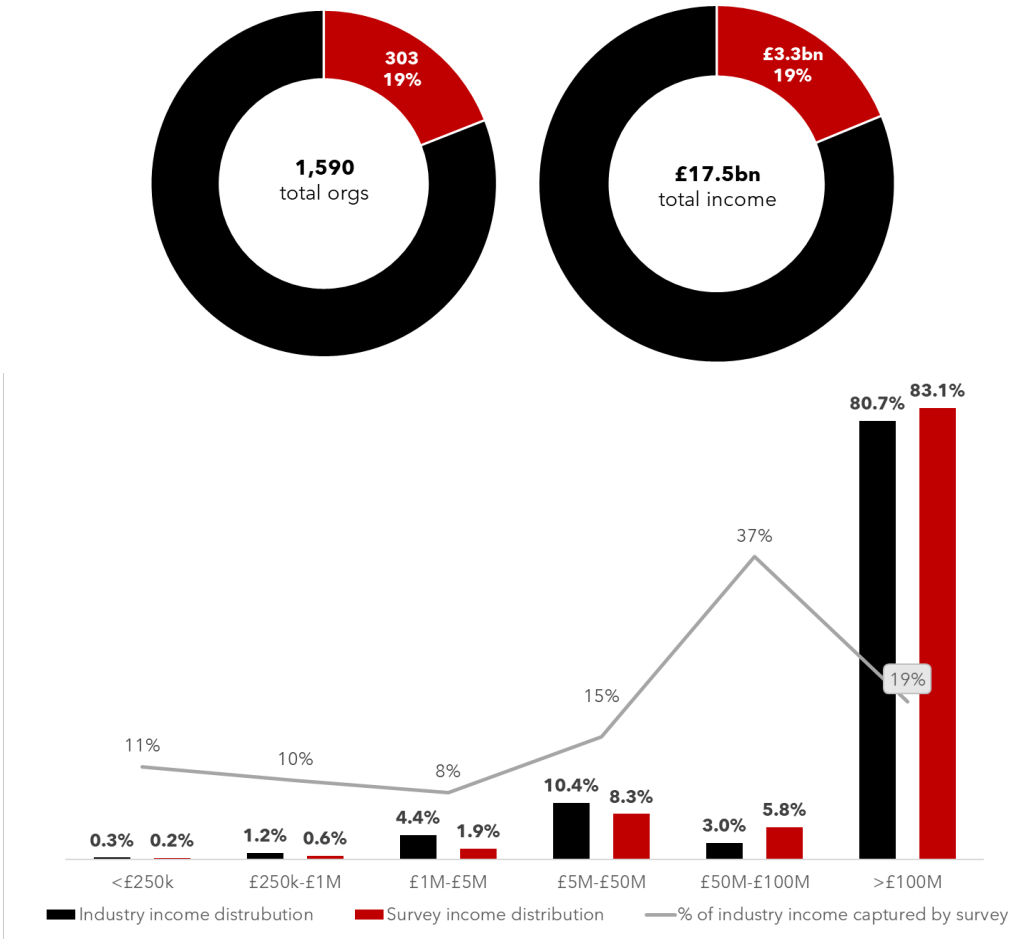
know.space proprietary knowledge and databases[16]; and Office for National Statistics (ONS) Annual Business Survey (ABS) and supporting economy-wide data from the ONS and the Bank of England.

For many metrics (e.g. income and employment, breakdown by segment and capabilities) the total industry estimates are produced by combining survey response data with secondary data (to validate and supplement response data, and to provide data for non-respondents). Unless otherwise stated, this is the approach taken. For other metrics where secondary data is not available (e.g. Research & Development (R&D) spending, input costs, gender split, etc.), survey responses alone are used.

The survey was voluntary and despite best efforts to maximise coverage and participation, the achieved sample of respondents may not be representative of the industry as a whole – indicators of coverage and profile of the survey respondents are provided below. This approach was taken given the infeasibility of undertaking an industry census or using a quota sampling approach.

In this edition, **303** (19%) of a total **1,590** organisations responded to the survey, accounting for **19% of total industry income**.[17] The distribution of organisation size of the achieved survey sample is broadly reflective of the industry population.

Achieved survey sample (in red) relative to industry population



Source: know.space analysis

[16] **know.**space holds and manages a variety of proprietary databases on the UK (and international) space industry, including contacts, characteristics, activities, and a range of quantitative information on performance.
[17] Excluding DTH broadcasting activity, the share of industry income accounted for by survey respondents account is 35%.

Throughout the report we indicate the source and derivation of the numbers, and where the source is exclusively the survey, we note how representative the survey response is.[18] For this 2022 edition:

- The **segmentation** of the studies since 2016 was maintained, with 'Capabilities' of the UK space industry updated to match the OECD's terminology to facilitate international comparison;
- **Expanded identification** of UK space-related organisations was undertaken, based on updated UK space-relevant conference lists. The findings presented in this report are based on **1,590 UK-based space organisations**[19]; and
- **Micro-level secondary research** of **over 1,000 organisations** using a wide range of secondary data sources to determine UK and space relevance was conducted.

Additionally, a number of changes were implemented:

- **Novel metrics** were introduced (e.g. UK contribution to climate variables, scientific contribution);
- Some of the metrics dropped in the 2021 (e.g. wider UK GDP supported) and 2020 ('light touch') editions were **re-introduced**;
- **Additional analyses** of both the composition of the industry and the decomposition of industry growth were added; and
- An **analysis** about the **impact of COVID-19** and **cost-of-living crisis** (energy, inflation) on the UK space industry was included.

Caveats and limitations

Though the research has been conducted by independent analysts with specialist knowledge of the space industry, using best practice and best judgement to calculate robust and fair estimates, the following limitations apply:

- **Measurement error and uncertainty of estimation**: The analysis employs estimation and approximation techniques based on survey and secondary data sources. The true coverage of the analysis and the measurement and estimation errors are unknown, but are believed to be similar to previous years, giving confidence in the historical comparability of the estimates[20].
- **Unidentified omissions**: It is probable that some UK-based organisations with space-related activities have been missed, but any omissions are expected to be small and have a negligible impact on estimates[21].
- **Sample bias**: Every identified organisation in the UK with space-related activities was invited to participate in the survey. The achieved sample reflects the willingness of individual organisations in the invited population to respond, rather than a random sampling process, so is likely to reflect some participation bias (e.g. those with stronger opinions may be more likely to respond). A number of checks have been undertaken to assess representativeness of the sample, and desk-based research was

[18] In terms of total survey responses contributing to the figure, and the share of income accounted for by respondents.
[19] The total population change year-on-year is 297 organisations, which includes 29 new incorporations, 309 newly captured organisations, and 41 exits. The 309 organisations that were newly captured this year include (traditionally) non-space organisations that have entered the industry and smaller space organisations (including startups) identified for the first time.
[20] Survey responses were sense-checked and compared to previous years data to ensure results presented are as reliable as possible. Survey data for larger organisations was also cross-referenced with online sources, notably Companies House data. Due to the methodological approach employed, it is not beneficial to provide uncertainty bands or ranged estimates. Sources for each metric are made clear and the reader is encouraged to show caution in extrapolating survey responses to the whole industry, particularly for smaller sample sizes.
[21] An extensive search was conducted to ensure broad coverage of the UK space industry, building on **know.**space's existing proprietary databases. Multiple sources, including company websites, existing databases, and conference lists, were leveraged to identify UK space organisations. It is probable that some smaller organisations have been omitted, but we are confident that the larger organisations have been captured.

used where possible to validate and fill gaps in survey responses. Response rates and indicators of representativeness are noted where relevant throughout this report.

- **Scope**: This study is intended to calculate key metrics of the UK space industry and identify trends relative to past editions, rather than to investigate the mechanisms or events driving behind observed changes. Explanation of changes is provided where supported by evidence, but we have sought to avoid speculation and, therefore, for certain metrics explanation of changes is left to further research.
- **Financial years**: Each organisation may choose the start and end dates of its financial year, so these vary across organisations. Our estimates of space-related income and employment therefore reflect the different dates organisations choose to report for.
- **Exchange rate fluctuations**: The reference currency for this analysis is GBP, and any input (e.g. company accounts stated in EUR) or comparator values (e.g. international statistics) must be converted to GBP using the prevailing exchange rate (Bank of England, Year Average 2021).

Note: Unless otherwise noted: all figures are in 2020/21 prices, all growth rates are real (inflation-adjusted) and are calculated as compound annual growth rates (CAGR).

Size of the UK space industry

Population

The industrial population (i.e. all UK-based organisations confirmed in our research to have space-related activities in the period of analysis) is **1,590 organisations**.

Income

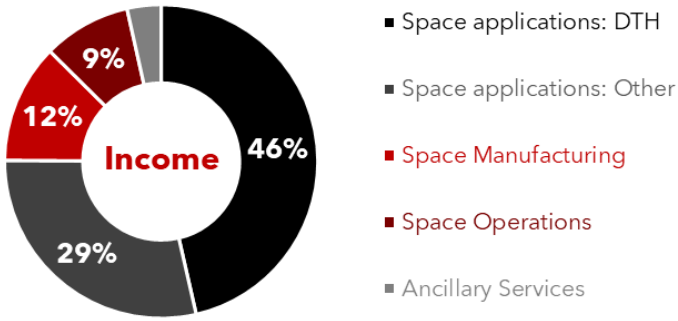
Total UK space industry income grew to **£17.5 billion** in 2020/21 (up from £16.6 billion in 2019/20, inflation adjusted).[22]

By far the largest segment is **Space Applications** with **75%** of total income. Space Applications is dominated by DTH broadcasting, and **DTH broadcasting's share** of total industry income stayed largely the same at **46%** (up from 45% in 2019/20, regaining its 2018/19 level of 46%), after gradually falling since 2010/11. Without DTH broadcasting, the overall space industry income would be £9.4 billion, but with Other (non-DTH broadcasting) applications worth £5.0 billion, Space Applications would remain the largest segment of UK space activity. **Space Manufacturing** (**12.3%**) is the second largest segment, followed by **Space Operations** (**9.1%**), and **Ancillary Services** (**3.5%**).

UK space industry income by segment, 2020/21

Segment	2020/21 (£m)
Space Applications	13,127
- DTH broadcasting	*8,110*
- Other applications	*5,017*
Space Manufacturing	2,150
Space Operations	1,585
Ancillary Services	614
Total	**17,475**

Source: know.space analysis



[22] The 2019/20 year was reported as £16.5 billion (in 2019/20 prices) in the 2021 edition, which is equivalent to £16.6 billion when adjusted for inflation to 2020/21 prices.

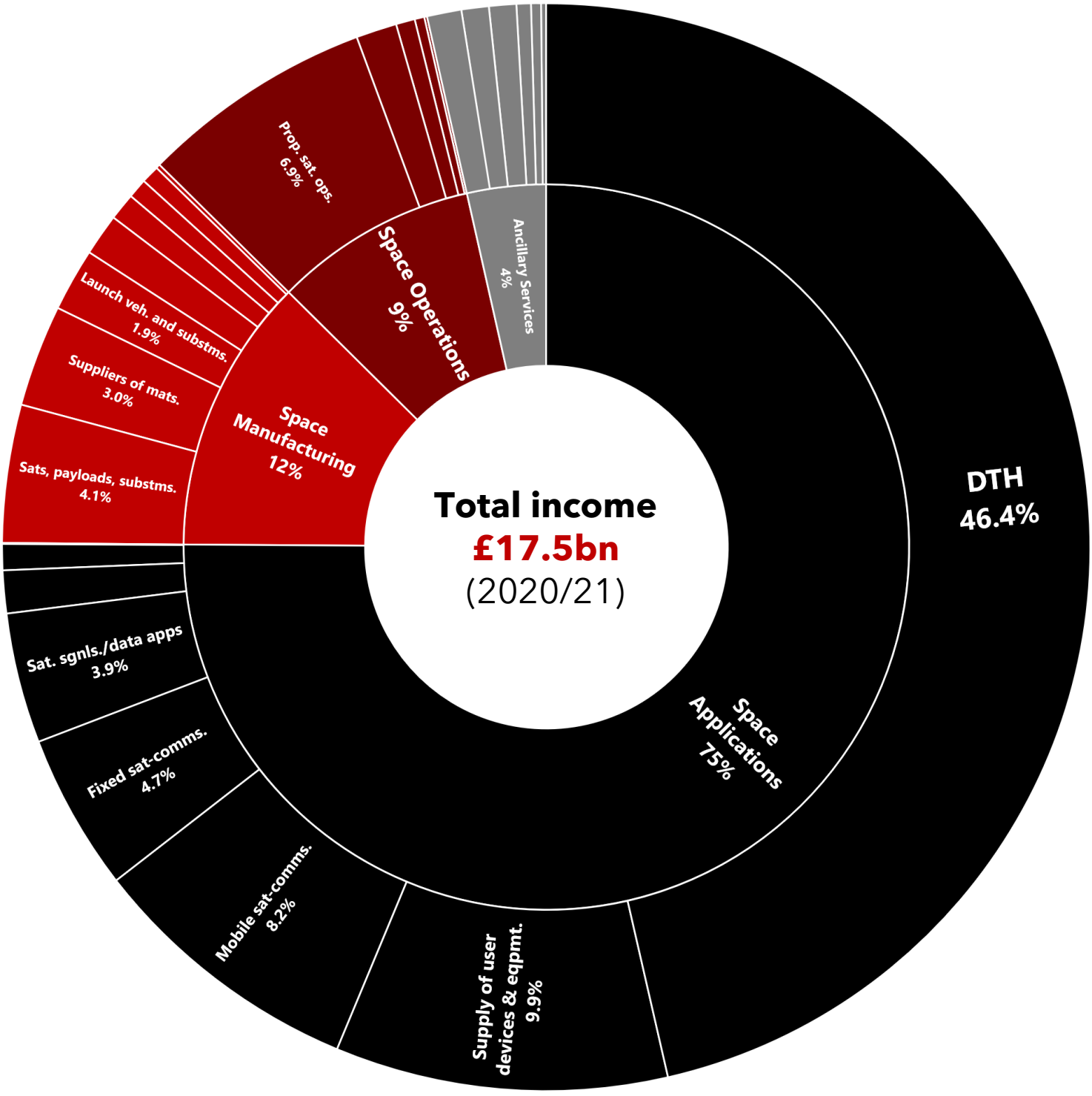
The table and sunburst chart[23] below shows the breakdown of **income by activity**.

UK space industry income by segment and activity, 2020/21

Segment	Activity	2020/21 (£m)
Space Manufacturing (12%)	Launch vehicles and subsystems	327
	Satellites/payloads/spacecraft and subsystems	718
	Scientific instruments	93
	Ground segment systems and equipment	220
	Suppliers of materials and components	526
	Scientific and engineering support	103
	Fundamental and applied research	139
	Space test facilities	24
Space Operations (9%)	Launch services	4.9
	Launch brokerage services	0.4
	Proprietary satellite operation	1,207
	Third-party ground segment operation	98
	Ground station networks	213
	In-Orbit Servicing	1.3
	Debris Removal	1.2
	Space Surveillance & Tracking (SST)	50
	Space Tourism	6.2
	In-space manufacturing	*(d)*
	Spaceports	2
Space Applications (75%)	Direct-To-Home (DTH) broadcasting	8,110
	Fixed satellite communication services	815
	Mobile satellite communication services	1,435
	Location-based signal service providers	137
	Supply of user devices and equipment	1,727
	Processors of satellite data	220
	Applications leveraging satellite signals/data	679
	Other (e.g. Quantum Key Distribution)	4.2
Ancillary Services (4%)	Launch and satellite insurance (inc. brokerage) services	143
	Legal and financial services	26
	Software and IT services	140
	Market research and consultancy services	177
	Business incubation and development	54
	Policymaking, regulation and oversight	74
Total	**All activities**	**17,475**

Source: know.space analysis
Note: *(d)* signifies that this figure has been suppressed to avoid disclosure of individual survey responses.

[23] The purpose is to highlight the higher value (by income) activities and their relative sizes, so lower value activities are not displayed to ensure legibility.



Source: know.space analysis

Another way to break down UK space industry income is by **capability** (equivalent to OECD 'sectors'). This breakdown shows which high-level space capabilities UK organisations support with their space activity. Analysis of UK space industry income by capability / OECD sector highlights a **strong focus on Broadcasting**. Organisations with capabilities in wider Satellite Communication (excluding Broadcasting), Defence/Military and Positioning, Navigation, Timing (PNT) (including GNSS) also account for large shares of income.

UK space industry income by capability (equivalent to OECD 'sectors'), 2020/21

Capability / OECD Sector	**2020/21** (£m)
Broadcasting	8,676
Satellite communication (excl. Broadcasting)	3,138
Defence/Military*	1,824
Positioning, Navigation, Timing (inc. GNSS)	1,737
Space technologies	453
Earth Observation (excl. Meteorology)	445
Generic technologies / components (e.g. AI)	440
Space Transportation (inc. launch)	331
Science	188
Space Exploration	166
Meteorology	79
Total	**17,475**

Source: know.space analysis

* Note: OECD does not define defence/military as a distinct sector but suggests the tracking of different types of procurers of space products and services including defence organisations. Previous editions of the study have included defence/military as a separate capability, and we retain this to show the distinction between civil and military sectors.

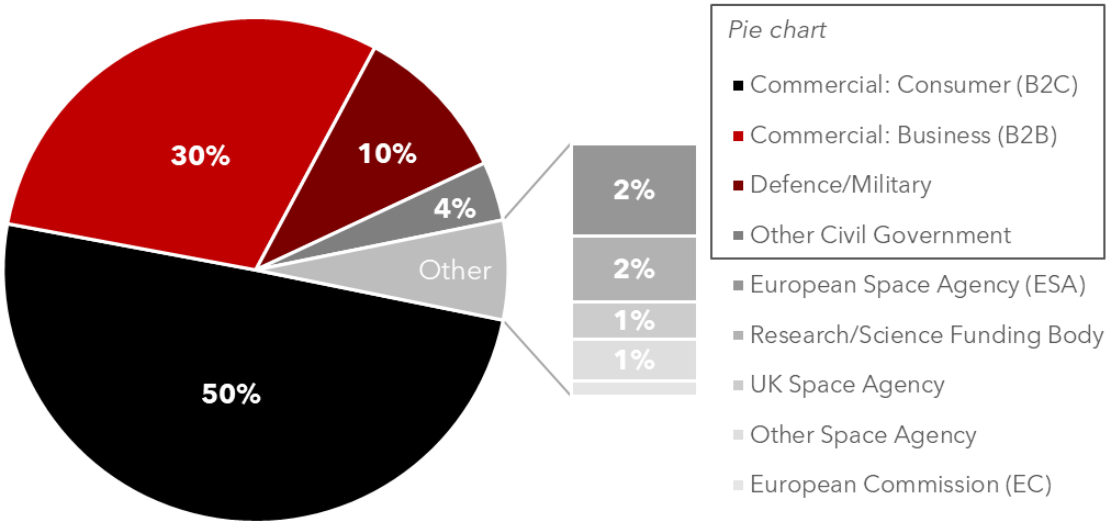
Analysis by customer type reveals the strong **commercial focus** of the UK space industry – **80%** of total income is commercial, comprised of sales to **consumers** (including DTH broadcasting) at **50%** and sales to other **businesses** at **30%.** That said, there is a strong role for **public demand (20%)**: Defence (10.2%), Civil Government including Research/Science (5.4%), European Space Agency (ESA, 2.3%), UK and Other Space Agencies (2.0%), and European Commission (0.4%).

UK space industry income by customer type, 2020/21

Customer type	**2020/21** (£m)
Commercial	13,919
- Consumer (B2C)	*8,695*
- Business (B2B)	*5,224*
Defence/Military	1,784
Other Civil Government	661
European Space Agency (ESA)[24]	405
Research/Science Funding Body	290
Other Space Agency	182
UK Space Agency	166
European Commission (EC)	67
Total	**17,475**

Source: know.space analysis

[24] Note that the UK government invests in ESA, which delivers programmes on behalf of its member states, including the UK. This enables UK participation in ESA programmes, including large-scale missions and technology development.



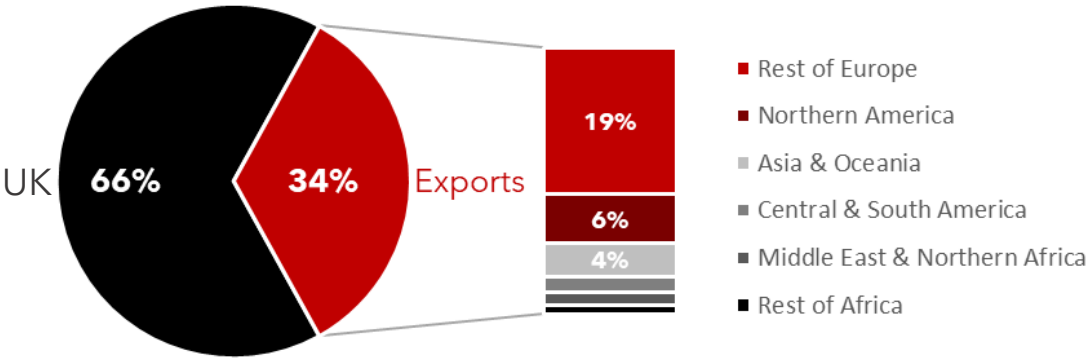
Source: know.space analysis

Exports

In terms of exports[25], the UK space industry **generated almost 34% (£5.9 billion)** of income from abroad (up from 32% in 2019/20)[26]. At **34%**, the UK space industry's export share is **higher** than the export share of the UK economy as a whole (**30%**).[27] The picture improves further if DTH broadcasting – which has a strong domestic market focus – is filtered out. Indeed, the export share of the UK space industry **excluding DTH broadcasting** stands at **57%** in 2020/21.

The most important export market for the UK space industry is the **Rest of Europe**[28], representing **55% of total exports** and **19% of total income** (up from 48% and 15% in 2019/20, respectively). The second and third most important markets are North America and Asia & Oceania (19% and 12% of total exports and 6% and 4% of total income, respectively).

UK space industry income by customer region, 2020/21



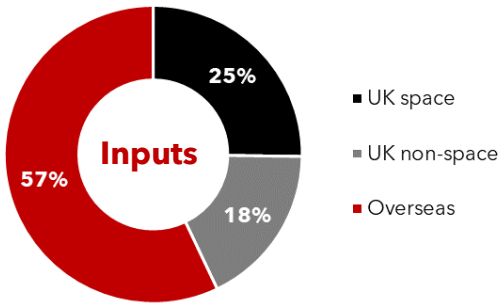
Source: know.space analysis

[25] Although export value and shares are based on many respondents, single large contracts may affect the overall results.
[26] By definition, goods and services sold to ESA are an export as the ownership of goods or intellectual property changes hands from a UK entity to an entity that is based in a foreign country, and which is not majority-controlled by UK interests.
[27] Trade in goods and services. OECD (2022). *OECD Data*. Available from: https://data.oecd.org/trade/trade-in-goods-and-services.htm
[28] Includes ESA, European Commission, and European governments, commercial customers, and consumers.

Imports

We estimate that more than half (**57%**) of the **industry's inputs** are imported from suppliers overseas. Inputs from UK suppliers are split somewhat evenly between space and non-space sectors.

UK space inputs by supplier type, 2020/21



Source: know.space analysis
Note: Based on a combination of survey responses from 2022 and historical responses[29] to increase accuracy.

Gross Value Added (GVA)

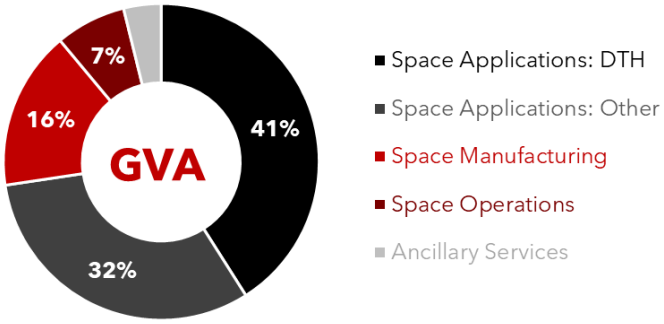
In 2020/21, the UK space industry is estimated to have directly contributed **£7.0 billion** (up from £6.9 billion in 2019/20, inflation-adjusted) of Gross Value Added (GVA)[30] to UK economic output, equivalent to **40%** of space industry income (41% in 2019/20) and **0.34%** of total UK Gross Domestic Product (GDP) (0.31% in 2019/20).[31]

The majority of UK space GVA is generated in the **Space Applications** segment (**73%**). This is less than the segment's contribution to industry income (**75%**). As with income, this segment is led by Direct-To-Home broadcasting (contributing **41%**). When further comparing each segments' contribution to industry GVA relative to their contribution to industry income, we see that Space Manufacturing accounts for a higher share of GVA (**16%**) than income (**12%**). Space Operations accounts for a smaller share of GVA (**7%**) than income (**9%**). Ancillary Services contributes almost the same to both space industry GVA and income (both **4%**).

UK space industry Gross Value Added (GVA), 2020/21

Segment	2020/21 (£m)
Space Applications	5,099
- DTH broadcasting	*2,878*
- Other applications	*2,221*
Space Manufacturing	1,143
Space Operations	508
Ancillary Services	270
Total	**7,019**

Source: know.space analysis



Employment

Total employment (headcount) in the UK space industry was almost **48,800** in 2020/21 (47,000 employees in 2019/20) – equivalent **to 0.15% of the total UK workforce**.[32]

Space Applications also dominated employment, accounting for **67%** of the industry's total, of which DTH broadcasting is **45%** of the total. Space Manufacturing employs a

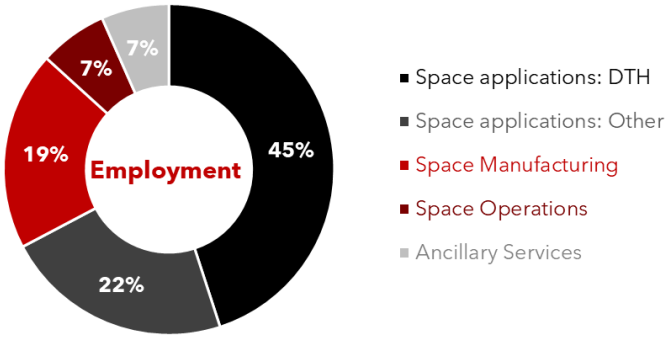
[29] Where an organisation has responded to a survey question in previous years, the most recent response has been used.
[30] See Glossary for definition.
[31] ONS (2022). *Gross Domestic Product at market prices: Current price: Seasonally adjusted £m.* Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ybha/ukea
[32] A01: Summary of labour market statistics: Table 1. ONS (2022). *Summary of Labour Market Statistics.* Available from: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/summaryoflabourmarketstatistics

greater number of staff than Space Operations (**19%** and **7%**, respectively), with Ancillary Services making up a small but important workforce (**7%**).

UK space industry employment by segment, 2020/21

Segment	Employment 2020/21
Space Applications	32,810
- DTH broadcasting	*21,944*
- Other applications	*10,866*
Space Manufacturing	9,490
Space Operations	3,238
Ancillary Services	3,234
Total	**48,772**

Source: know.space analysis



Employment by gender

Based on survey responses, we estimate that more than 3 in 4 (**76%**) of UK space industry employees are male, and less than 1 in 4 (**24%**) are female.

Gender	2020/21
Male	76.2%
Female	23.7%
Other *(inc. non-binary)*	0.1%

Source: know.space analysis
Note: Based on a combination of 2022 and historical (2018-2021) survey responses to increase coverage.

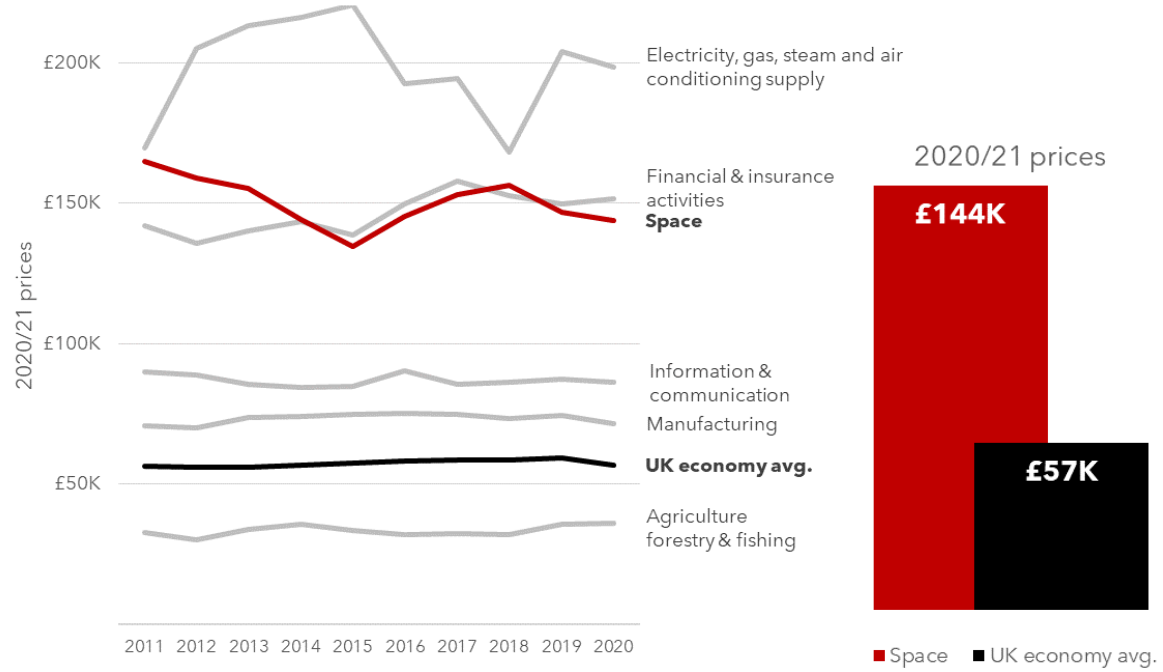
Productivity and Skills

The labour productivity (GVA per employee) for the UK space industry in 2020/21 is estimated at **£144,000** (down from £149,000 in 2019/20, reflecting relative movements in GVA and employment) – **2.5 times the UK's average labour productivity in 2020 (£56,614)**, suggesting the space industry continues to outperform the wider economy in terms of productivity. [33]

ONS data can be used to compare the labour productivity of the UK space industry to that of other industries. The UK space industry's high relative labour productivity signals that **UK space workers are some of the most productive in the UK**. Space industry labour productivity is higher than that of the 'Information & Communication' and 'Manufacturing' industries, and similar to that of the 'Financial & Insurance' industry.

[33] Table 19 - Annual output per job by section-level industry aggregations current price (CP) in GBP. ONS (2022). *Output per job, UK*. Available from: https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/outputperjobuk

Labour productivity of the UK space industry relative to selected industries, 2011–2020



Source: know.space analysis and ONS data[34]

This high level of labour productivity reflects the **particularly skilled workforce** of the UK space industry. Using survey data, we estimate that most employees have undertaken university education, with over **3 in 4 employees (77%) possessing at least a bachelor's degree**. In terms of the 'share of employees holding a higher degree, first degree or HNC/HND and equivalent qualifications', the average estimated qualification level of space industry employees is **higher than any sector** covered by ONS labour force data.[35] This applies for the whole space industry and all four of the value chain segments. However, further research would be needed to test how representative our sample is of the wider industry population.

Research and Development (R&D)

An estimated **£788m** was spent on space-related **R&D** (equivalent to **4.5%** of total industry income) in 2020/21 – a decrease of **6%** since 2019/20 (which had seen an increase of 17% from 2018/19). This R&D investment was funded almost equally from **internal** (49%) and **external**[36] (51%) sources. Investment in R&D can have a long and broad economic effect if it generates new knowledge, technologies, capabilities and derived products and services. This is particularly true in the space industry whereby capabilities developed in the **R&D-intensive manufacturing and operations segments** are commercialised in the applications segment and by commercial users.

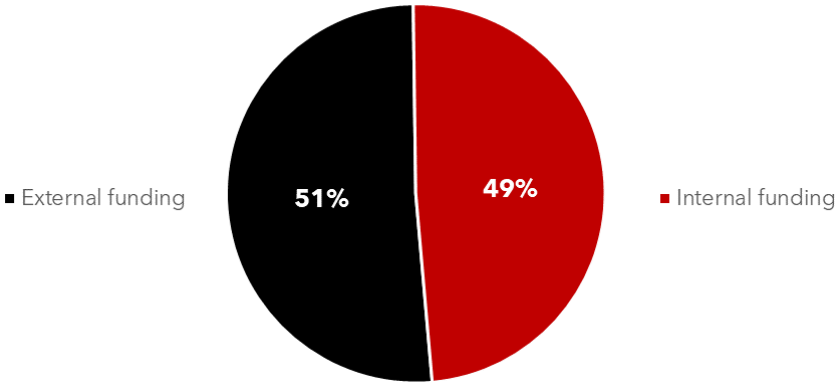
[34] Table 19 - Annual output per job by section-level industry aggregations current price (CP) in GBP. ONS (2022). *Output per job, UK*. Available from: https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/outputperjobuk

[35] ONS (2016). *Two digit Industry Qualifications broken by region for January to December 2016*. Available from: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/adhocs/007684twodigitindustryqualificationsbrokenbyregionforjanuarytodecember2016.
Note that here, as in other instances, *Size & Health* survey-based estimates are compared for context against national and regional 'official statistics' which are produced to rigorous standards defined in the *Code of Practice for Statistics*.

[36] Refers to funding originating from outside the organisation, such as public funds or private finance.

With the equivalent of **11%** of direct industry GVA invested in R&D, the UK space industry's R&D as share of GVA is **more than 5 times the UK business average**.[37] About 1.8% of the total UK R&D spending by businesses is space-related.[38]

UK space industry R&D expenditure by source, 2020/21



Source: know.space analysis
Note: Based on a combination of 2022 and historical (2018-2021) survey responses to increase coverage.

Industry composition

The UK space industry covers the **full spectrum of organisation size** (in terms of space-related income and not total organisation income), from start-ups with low space-related income to multinational conglomerates turning over tens of millions in space-related income. However, the space industry is **concentrated** and dominated by a few large organisations, with just **14** organisations accounting for **81%** of total space-related income, **148** for the next **13%** and **1,428** for the remaining **6%** – a similar pattern to 2019/20. **Only 162 organisations generate space income in excess of £5m.**

Size composition of the UK space industry by space income band, 2020/21

Space income band	**Number** of organisations	**Space income** 2020/21 prices (£m)	**Aggregate share** of total space income
Less than £5M	1,428	1,034	5.9%
£5M-£50M	140	1,815	10.4%
£50M-£100M	8	517	3.0%
>£100M	14	14,110	80.7%
Total	**1,590**	**17,475**	

Source: know.space analysis

International comparison

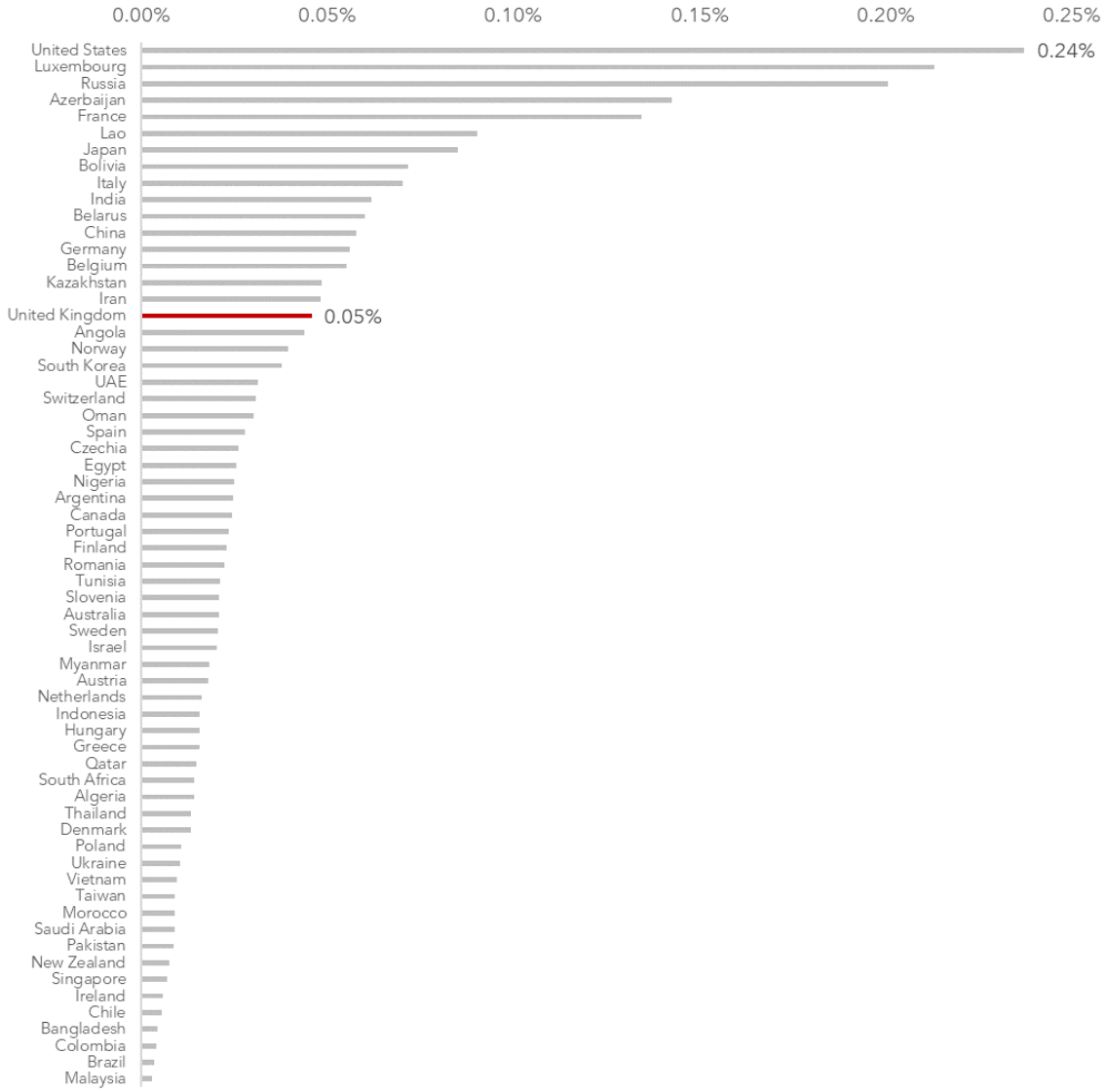
It is important to contextualise the UK's activities in space by examining what other countries are doing. Though this is a challenging task due to the **limited availability of consistent global data** and **differing definitions** of the 'space industry', we can explore

[37] Table 8: Expenditure on R&D performed in UK businesses. ONS (2022). *Gross domestic expenditure on research and development, UK: 2020*. Available from: https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/businessenterpriseresearchanddevelopmentukdesignatedasofficialstatistics
[38] Table 8: Expenditure on R&D performed in UK businesses. ONS (2022). *Gross domestic expenditure on research and development, UK: 2020*. Available from: https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/businessenterpriseresearchanddevelopmentukdesignatedasofficialstatistics

UK performance in different areas, such as government spending for space, the provision of climate monitoring data sources, and science outputs.

The UK government spends **0.05%** of its GDP on space, which is 5 times lower than the United States (US, 0.24%), 4 times lower than Russia (0.20%) and almost 3 times lower than France (0.13%). It is, however, similar to Italy (0.07%), Germany, Belgium, and China (all 0.06%), and higher than Spain (0.03%) and Canada (0.02%). For the biggest European spenders, the largest expenditure is subscription to ESA programmes, which distributes the funding to the space industry through the geographical return mechanism).[39]

Government spending on space as a share of GDP, 2021



Source: know.space analysis and Euroconsult[40]

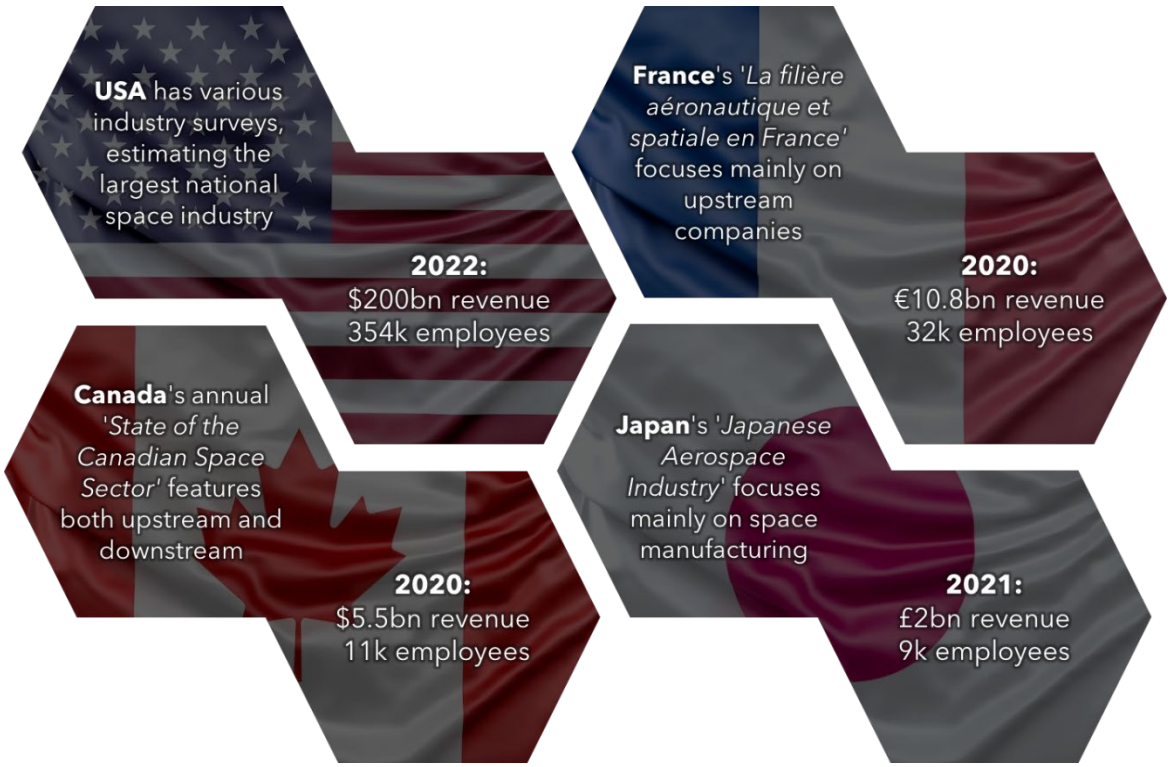
However, it should also be caveated by the fact that **different countries have different definitions of space** (notably around the extent of the inclusion of defence activities).

[39] Please see the following link for more information on ESA's geographical return mechanism: https://www.esa.int/About_Us/Business_with_ESA/How_to_do/Industrial_policy_and_geographical_distribution

[40] World Government Expenditures for Space Programmes (2021). Euroconsult (2022). *Government space budgets driven by space exploration and militarization hit record $92 billion investment in 2021 despite COVID-19, with $1 trillion forecast over the decade.* Available from: https://www.euroconsult-ec.com/press-release/government-space-budgets-driven-by-space-exploration-and-militarization-hit-record-92-billion-investment-in-2021-despite-COVID-19-with-1-trillion-forecast-over-the-decade/

Currently, several other countries conduct some form of reporting on the size and growth of their space industries, but **true international comparisons are not yet feasible**: a lack of standardisation in definitions in scope can lead to misleading comparisons of 'total' industry sizes. Some countries only measure their upstream manufacturing base (normally because they survey both their aerospace and space industries together, like France and Japan), or they may include space-*adjacent* employment, like the US.

Sample of international space industry surveys



Source: know.space analysis of national sources[41]

The *Size & Health* defines the space industry as comprising of organisations involved in activity in one of the four segments: space manufacturing, space operations, space applications, and ancillary services.[42] The *Size & Health* is therefore an attempt to measure the full range of national space activities – and not only the upstream segment, but across the whole value chain. Though recommended in the OECD guidance,[43] the **UK's comprehensive definition of the value chain for measurement is still relatively unique** internationally: currently, the Canadian '*State of the Canadian Space Sector*' is the most similar study (and therefore most comparable to the UK findings) as it also encompasses upstream, downstream, and ancillary services activities.

[41] France: Insee (2021). *La filière aéronautique et spatiale en France en 2020*. Available from: https://www.insee.fr/fr/statistiques/5896539. Canada: Canadian Space Agency (2021). *2020 State of the Canadian Space Sector Report - Facts and Figures 2019*. Available from: https://www.asc-csa.gc.ca/eng/publications/2020-state-canadian-space-sector-facts-figures-2019.asp. Italy: Italian Trade Agency (2022). *'There is a lot of SPACE in Italy' campaign*. Available from: https://itahouston.com/italianspace/. US: The White House (2022). *Remarks by Vice President Harris on Supporting the Commercial Space Sector*. Available from: https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/08/12/remarks-by-vice-president-harris-on-supporting-the-commercial-space-sector/. Japan: The Society of Japanese Aerospace Companies (2021). *Japanese Aerospace Industry 2021-2022*. Available from: https://www.sjac.or.jp/english/pdf/publication/habataku2021-22E.pdf

[42] Organisations that operate in multiple industries and not just the space industry have a factor applied to their total income and employment to get space-related activity. This share is often provided directly by survey respondents.

[43] OECD (2022). *Handbook on Measuring the Space Economy, 2nd Edition*. Available from: https://www.oecd-ilibrary.org/science-and-technology/oecd-handbook-on-measuring-the-space-economy-2nd-edition_8bfef437-en

Nonetheless, it is possible to look at other international industry reports to get a **sense of scale of international space industries**. Above, we show a sample of countries that survey (at least part of) their space industry. The US reports its space economy to generate $200bn a year, roughly 10 times the UK's total income, while employing over 7 times as many people (354,000). France and Italy each employ at least 32,000 and 64,000 (upstream only) respectively. France reported €10.8bn in upstream revenue in 2020, while Italy reported €13bn in total revenue in 2021. For reference, the UK space industry generated £17.5bn in income and employed almost 48,800 employees in the headline year (2020/21) across upstream, downstream, and ancillary services activities.

Health of the UK space industry

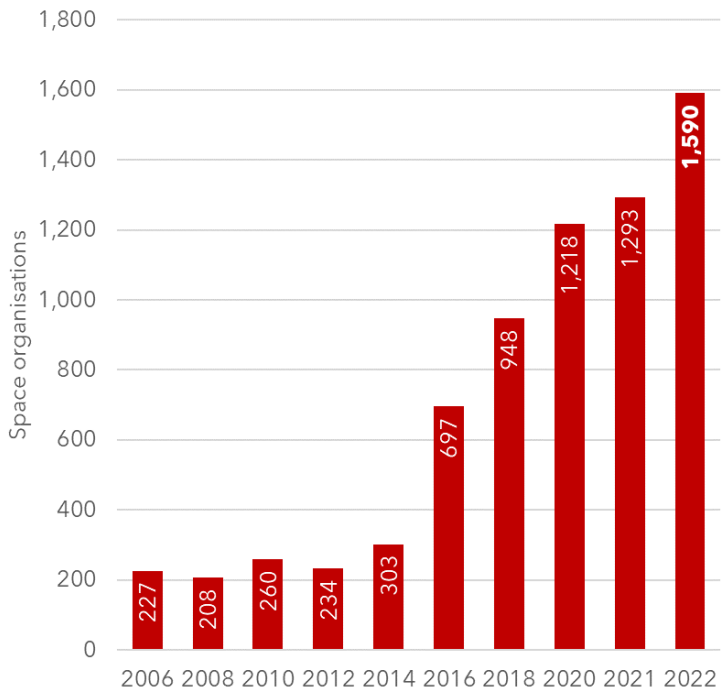
Population growth

The industrial population included in the *Size & Health* has grown on average 21% every year since the 2012 edition of this study. This year, it grew to **1,590 organisations with confirmed space-related activities**.

The total population change year-on-year is **297 organisations**, which includes 29 new incorporations, 309 newly captured organisations, and 41 exits.

The 29 **new incorporations** in 2021 and 2022 continues a steady trend of new incorporations, with 47 new space incorporations per year on average between 2000 and 2020.[44]

Number of space-related organisations in the UK



Source: know.space analysis

The 309 **newly captured organisations** include traditionally non-space organisations incorporated before 2021 that have commenced space activities, and organisations that were not identified in previous editions (often because of a lack of public presence or small size). Though numerous, their collective impact on income is small (£208m).

Due to the complexity of establishing which of the 309 newly captured organisations are 'truly' new entrants to the industry and which were active but missed in previous years, we draw a distinction between **organic growth** – the growth of previously captured organisations and new incorporations – and growth accounted for by new captures.[45]

[44] New incorporations without a public presence will not have been captured yet, so this number is likely to grow in future editions as these organisations are identified. The 2021 edition of the study listed 27 incorporations for 2020, whereas this number has now grown to 38. The number of identified 2022 incorporations in this edition is 5.
[45] The growth associated with new incorporations can be included in 'organic growth', but for clarity we report them separately here.

Changes in industrial population and contribution to growth, 2019/20 – 2020/21

Organisation status	Number of organisations	Income growth 2020/21 prices (£m)	Contribution to income growth
Attrition (exits)	-41	-	-
Previously captured	1,293	608	72%
New incorporations	29	27	3%
New captures	309	208	25%
Total	**1,590**	**843**	-

Source: know.space analysis

Three quarters of the industry's income growth year-over-year (y-o-y) is accounted for by previously included organisations (72%) and new incorporations (3%), and can thus be considered **organic growth**. A quarter of income growth (25%) is accounted for by new captures, which includes 'truly' new space income from new entrants to the industry but also previously unidentified income. All growth calculations elsewhere in the report refer to the total growth. This breakdown of growth demonstrates the **dynamism of the industry** – with new entrants such as start-ups, spin-outs, and (traditionally) non-space organisations all offsetting the industry's attrition.

Income growth

UK space industry income grew 5.1% in real terms between 2019/20 and 2020/21, the second highest annual growth rate since 2013/14. This rate is higher than recent years (2.2% annually between 2015/16 and 2019/20) and towards the average long-term growth trend of 6.4% growth annually since the turn of the millennium. The real growth rate (2019/20 – 2020/21) falls to **2.8% if DTH broadcasting growth is excluded**.

The UK space industry growth **outpaced the growth of the global space industry in the same period** (1.6%[46]) as well as the **general UK economy,** which contracted by -7.6% from 2019/20 to 2020/21.[47] This is not the first time the UK space industry has outperformed the UK economy: from 2009/10 to 2019/20, the UK economy has seen an average annual real growth of 1.7%, compared to the UK space industry's annual real growth of 4.8% in the same period (3.5 times faster than the economy as a whole).

Given the tumultuous economic circumstances of the 2020/21-2021/22 period, the **2021/22 numbers have been conservatively forecasted** using a combination of account (where already filed with Companies House), survey responses (factoring in the respondent's confidence in their forecast), and a three-year historical average.

Survey respondents highlighted many factors that influenced the **increase** in income since 2019/20. The **development of launch activities** (e.g. vehicles, launches, insurance, spaceports) was cited by a number of surveyed organisations[48]. Other respondents also explained that their income increase was due to **funding awards** (e.g. from UK and European Union (EU) organisations, ESA, investors), **products and services becoming**

[46] As measured by *The Space Report*, which adopts a different segmentation, but is a long-running and commonly referenced measure of the global space industry. The Space Foundation (2022). *Global Space Activity by Category, 2005-2021*. Available from: https://www.thespacereport.org/resources/global-space-activity-by-category-2005-2021/

[47] ONS (2022). *Gross Domestic Product at market prices: Current price: Seasonally adjusted £m.* Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ybha/ukea

[48] These were the most cited amongst answers to a freeform survey question, though are some discrepancies with estimated activity growth rates from 2019/20 to 2020/21. This may be due to the sub-sample of respondents and/or differences in time period: survey respondents answered in autumn 2022, which for many organisations was more than a year later than the end of their 2020/21 financial year and, notably, outside of the COVID-19 pandemic period.

market-ready, **growing end-user markets**, a **growing space industry**, and **COVID-19 support**. A few respondents reported factors that **hindered** income growth, such as effects of the **UK's exit from the EU** and the **COVID-19 pandemic**. Importantly, it should be noted that these influencing factors reflect the opinions of some survey respondents and are thus specific to their organisations. Therefore, they may not be reflective of all UK space-related organisations and should be treated with caution.

A longer-term perspective reveals the success story of the UK space industry: industry income has **more than tripled** (x3.4) in real terms since the turn of the millennium (a CAGR of **6.4%** since 2000/01), and **increased by 68% in real terms since 2009/10**.

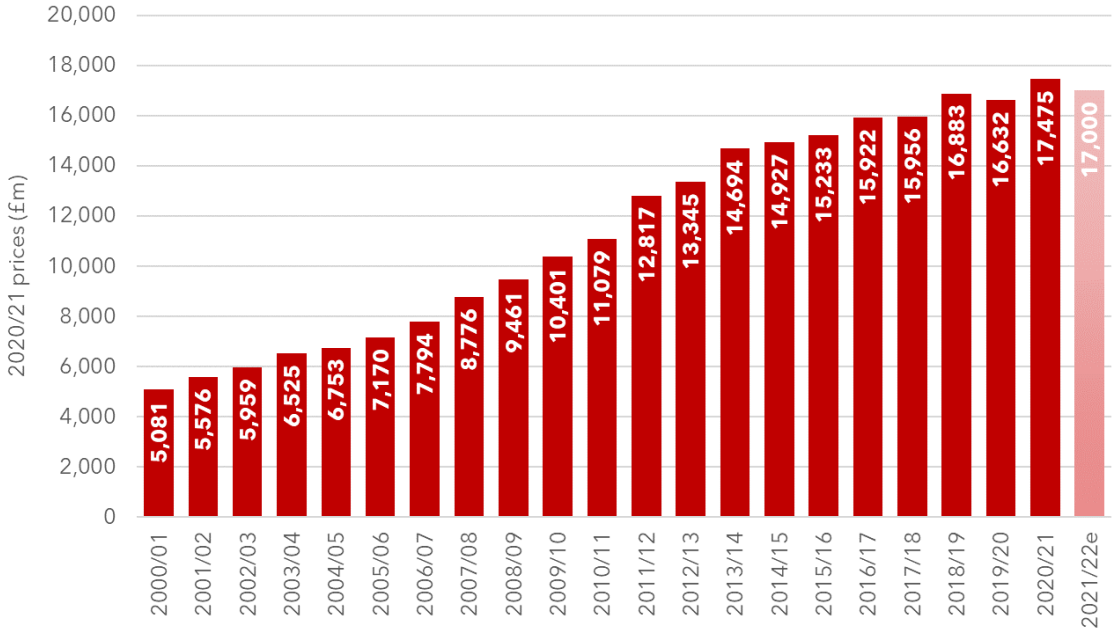
UK space industry income, 2009/10 – 2021/22e

Year	Current prices £m	2020/21 prices £m	Real growth (y-o-y%)
2000/01	-	5,081	-
2009/10	8,334	10,401	9.9%
2010/11	9,188	11,079	6.5%
2011/12	11,087	12,817	15.7%
2012/13	11,848	13,346	4.1%
2013/14	13,347	14,694	10.1%
2014/15	13,702	14,927	1.6%
2015/16	13,998	15,233	2.0%
2016/17	14,792	15,922	4.5%
2017/18	15,242	15,956	0.2%
2018/19	16,492	16,883	5.8%
2019/20	16,528	16,632	-1.5%
2020/21	**17,475**	**17,475**	**5.1%**
2021/22e	*17,700*	*17,000*	*-2.7%*

Source: know.space analysis

Note: 2021/22 is an in-year estimate. Reflecting the considerable prevailing uncertainty, 2021/22 numbers have been conservatively forecasted using a combination of survey responses (factoring in their confidence in their estimate) and a three-year historical average (as used in previous editions).

Long-term UK space industry income, 2000/01 – 2021/22e



Source: know.space analysis

The aggregate-level growth rate conceals variation in performance by activities:

- ↑ The **segments** that experienced **growth** were:
  - **Space Applications** (+7%, +£843m);
  - **Space Operations** (+4%, +£63m); and
  - **Ancillary Services** (+13%, +£72m).

UK space industry income growth by activity, 2019/20 – 2020/21

Segment | Activity		2019/20	2020/21	Growth (y-o-y%)
		2020/21 prices, £m		
Space Manufacturing	Launch vehicles and subsystems	295	327	11%
	Satellites/payloads/spacecraft and subsystems	778	718	-8%
	Scientific instruments	124	93	-25%
	Ground segment systems and equipment	270	220	-19%
	Suppliers of materials and components	492	526	7%
	Scientific and engineering support	166	103	-38%
	Fundamental and applied research	136	139	2%
	Space test facilities	22	24	8%
	Segment total	**2,284**	**2,150**	**-6%**
Space Operations	Launch services	10	4.9	-53%
	Launch brokerage services	1.7	0.4	-77%
	Proprietary satellite operation (inc. sale/lease)	932	1,207	30%
	Third-party ground segment operation	39	98	149%
	Ground station networks	506	213	-58%
	In-Orbit Servicing	1.0	1.3	33%
	Debris Removal	1.1	1.2	14%
	Space Surveillance & Tracking (SST)	22	50	135%
	Space Tourism	6.4	6.2	-4%
	In-space manufacturing	*(d)*	*(d)*	*(d)*
	Spaceports	2.0	1.9	-7%
	Segment total	**1,522**	**1,585**	**4%**
Space Applications	Direct-To-Home (DTH) broadcasting	7,518	8,110	8%
	Fixed satellite communication services	838	815	-3%
	Mobile satellite communication services	1,307	1,435	10%
	Location-based signal service providers	347	137	-61%
	Supply of user devices and equipment	1,322	1,727	31%
	Processors of satellite data	343	220	-36%
	Applications leveraging satellite signals/data	605	679	12%
	Other	3.9	4.2	7%
	Non-DTH broadcasting Space Applications segment subtotal	*4,766*	*5,017*	5%
	Segment total	**12,284**	**13,127**	**7%**
Ancillary Services	Launch and satellite insurance (inc. brokerage) services	98	143	47%
	Legal and financial services	12	26	106%
	Software and IT services	186	140	-25%
	Market research and consultancy services	162	177	10%
	Business incubation and development	47	54	15%
	Policymaking, regulation and oversight	37	74	99%
	Segment total	**542**	**614**	**13%**
Total UK space industry income		**16,632**	**17,475**	**5.1%**

Source: know.space analysis
Note: *(d)* signifies that this figure has been suppressed to avoid disclosure of individual survey responses.

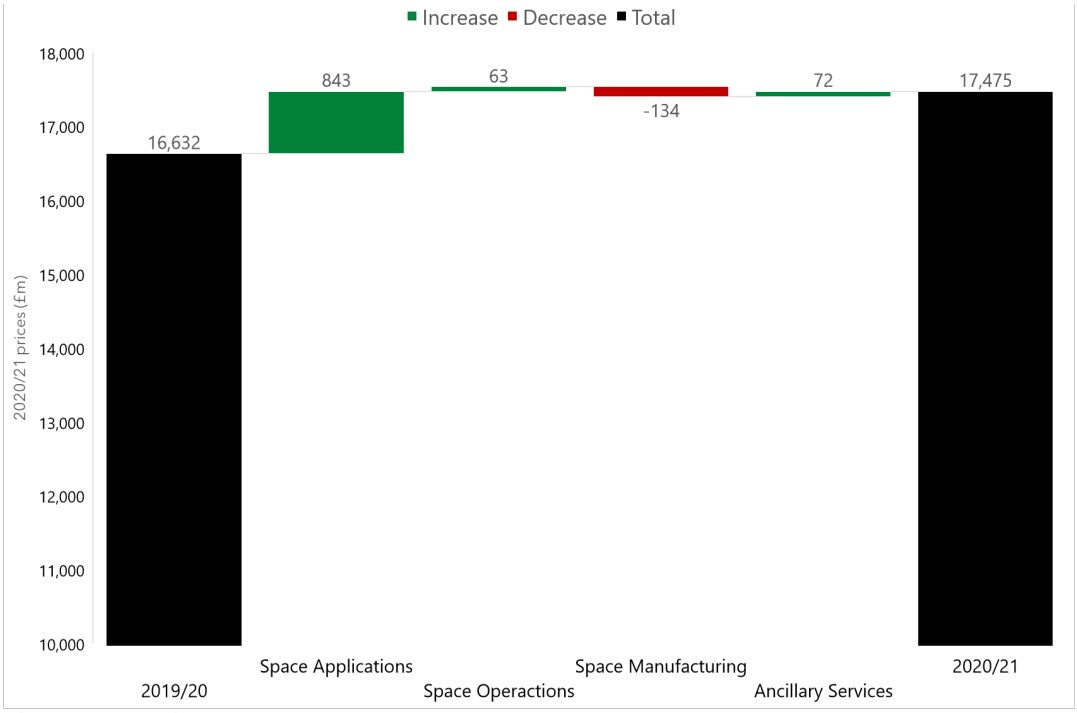
- The **activities** that saw the **most significant growth** were:
  - **Third-party ground segment operations** (+149%, +£59m);
  - **Space Surveillance & Tracking (SST)** (+135%, +£29m);
  - **Legal and financial services** (+106%, +£13m);
  - **Policymaking, regulation and oversight** (+99%, +£37m);
  - **Launch and satellite insurance (inc. brokerage) services** (+47%, £46m);
  - **In-Orbit Servicing** (+33%, +£0.3m);
  - **Supply of user devices and equipment** (+31%, +£405m); and
  - **Proprietary satellite operations (inc. sale/lease)** (+30%, +£275m).

- Despite having grown in the past year (8%), DTH broadcasting's share of the total industry income (46%) remains much lower than in 2010/11 (69%), having gradually declined this past decade. DTH broadcasting nevertheless remains the largest single activity by some distance.
- The one **segment** that experienced **decline** was **Space Manufacturing** (-6%, -£134m), possibly due to the need for in-person activities, which were challenging in 2020/21 due to government COVID-19 restrictions (e.g. lockdowns).
- The **activities** that had **notable declines** were:
  - **Launch brokerage services** (-77%, -£1.3m);
  - **Location-based signal service providers** (-61%, -£210m);
  - **Ground station networks** (-58%, -£293m); and
  - **Launch services** (-53%, £5.1m).

Decomposition of income growth

The decompositions below highlight how Space Manufacturing's declining income in 2020/21 (-£134m) was compensated by an increase in Space Application's income (£843m), which accounts for most of the industry growth between 2019/20 and 2020/21.

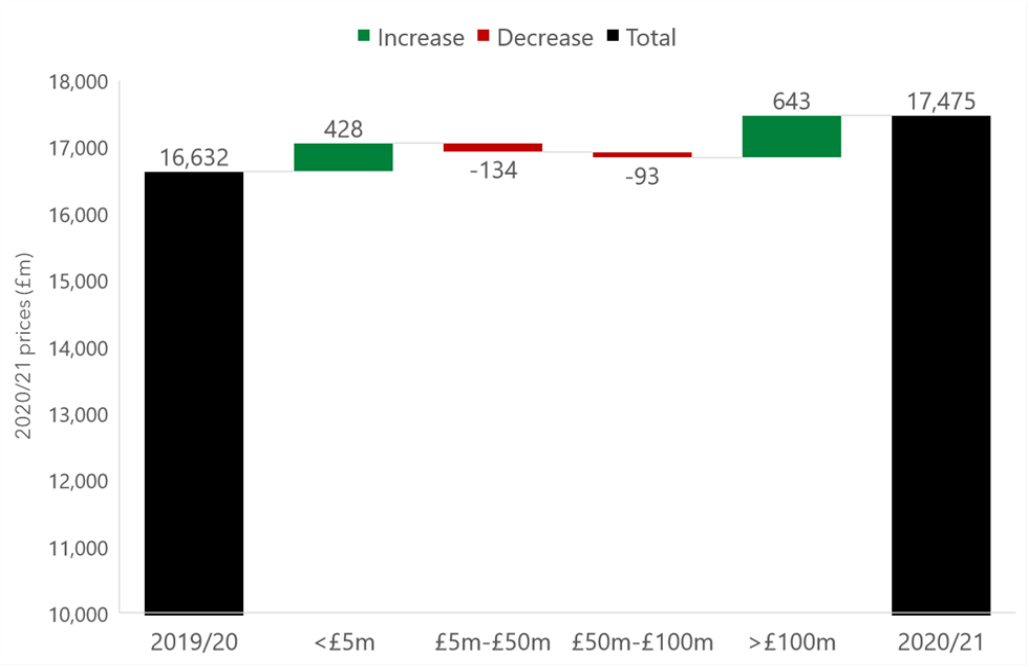
Decomposition of income growth by segment, 2019/20 – 2020/21



Source: know.space analysis

The income of **small and large organisations** (<£5m and the >£100m bands) **grew** since 2019/20. These organisations drove the increased income of the UK space industry (£428m for organisations in the <£5m band and £643m for those in the >100m band). This compensated the decreasing income of organisations in the £5m-£50m and £50m-£100m bands (-£134m and -£93m respectively).

Decomposition of income growth by income band, 2019/20 – 2020/21



Source: know.space analysis

Employment growth

UK space industry employment, 2009/10 – 2021/22e

Year	Employees	Growth (y-o-y%)
2000/01	15,256	-
2009/10	28,995	16.50%
2010/11	28,942	-0.2%
2011/12	32,024	10.6%
2012/13	33,882	5.8%
2013/14	37,391	10.4%
2014/15	38,522	3.0%
2015/16	41,690	8.2%
2016/17	41,929	0.6%
2017/18	44,052	5.1%
2018/19	44,040	0.0%
2019/20	46,995	6.7%
2020/21	**48,772**	**3.8%**
2021/22e	*49,100*	*0.7%*

Source: know.space analysis
Note: 2021/22 is an in-year estimate.

Direct employment in the UK space industry was approximately **48,800 jobs** in 2020/21 following strong growth of **3.8%** since 2019/20 – **outpacing the total** employed UK workforce which saw a decline in the same period of -1.4%[49].

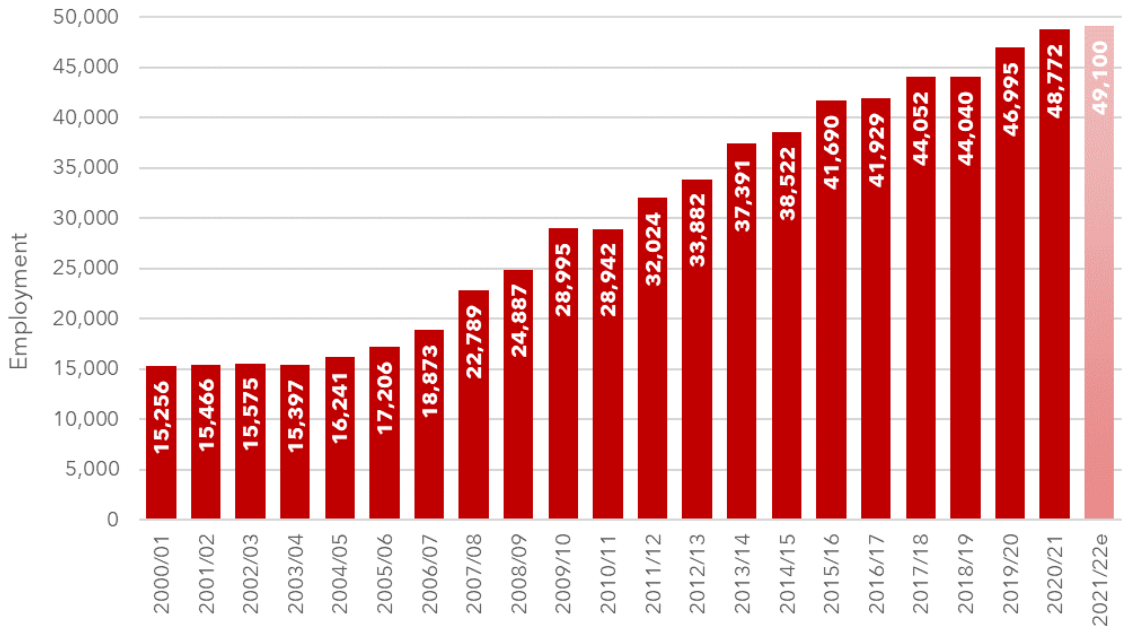
Survey respondents highlighted various factors that influenced the **increase** in employment since 2019/20. A general **growth in business** and **increased revenue from new contracts and grants** were credited by some organisations for headcount increases. A few respondents reported **challenges resulting from the UK's EU exit**, indicating that they faced difficulties remaining attractive and competitive to current and prospective

[49] A01: Summary of labour market statistics: Table 1. ONS (2022). *Summary of Labour Market Statistics.* Available from: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/summaryoflabourmarketstatistics

employees, higher costs to hire talent from the EU, and a loss of income opportunities (e.g. lower exports). Respondents also noted the uncertainty and risk of losing access to Copernicus and other large EU programmes. These influencing factors reflect the opinions of survey respondents and relate to individual organisations rather than representing the wider population.[50]

Employment in the UK space industry has **grown strongly** (CAGR 6.0%) **since 2000/01**.

Long-term UK space industry employment, 2000/01 – 2021/22e



Source: know.space analysis

Gross Value Added (GVA) growth

Space GVA **increased** by 1.7% between 2019/20 and 2020/21 to **£7.0 billion**[51]. The estimate for 2021/22 space GVA is £6.9 billion (2020/21 prices).

[50] Of those reporting issues related to EU exit, no clear common characteristics could be drawn out, but respondents include both commercial and academic organisations, as well as organisations not directly receiving EU funding.
[51] GVA is a function of income and input share (see Glossary). Given income has risen over the period, this fall in GVA is the result of a rising input share.

UK space industry Gross Value Added, 2009/10 – 2021/22e

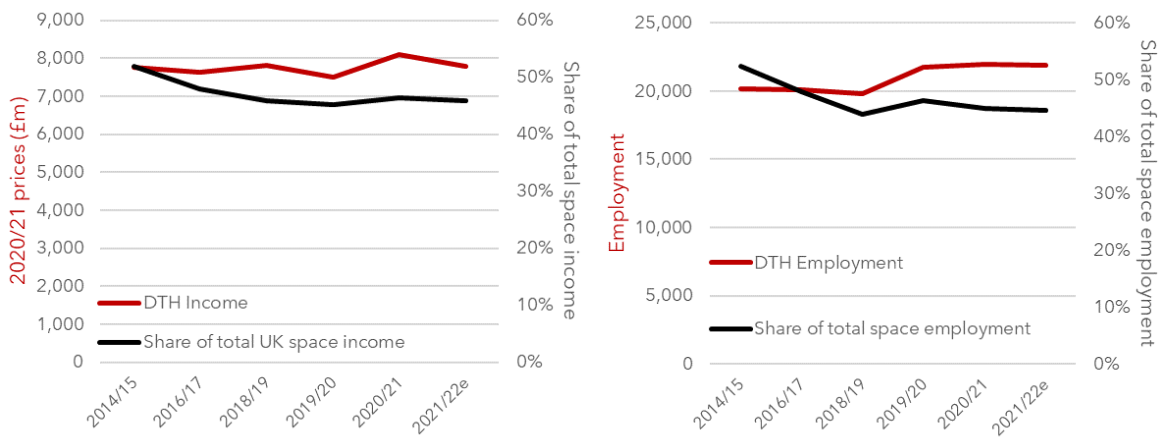
Year	Current prices £m	2020/21 prices £m	Real growth (y-o-y%)
2009/10	3,789	4,729	0.5%
2010/11	4,130	4,980	5.3%
2011/12	4,597	5,314	6.7%
2012/13	5,044	5,682	6.9%
2013/14	5,020	5,527	-2.7%
2014/15	5,132	5,591	1.2%
2015/16	5,257	5,721	2.3%
2016/17	5,663	6,096	6.6%
2017/18	6,438	6,739	10.6%
2018/19	6,727	6,887	2.2%
2019/20	6,856	6,899	0.2%
2020/21	**7,019**	**7,019**	**1.7%**
2021/22e	*7,100*	*6,900*	*-2.4%*

Source: know.space analysis
Note: 2021/22 is an in-year estimate. Reflecting the considerable prevailing uncertainty, 2021/22 numbers have been conservatively forecasted using a combination of survey responses (factoring in their confidence in their estimate) and a three-year historical average (as used in previous editions).

Box: Focus on Direct-To-Home broadcasting

DTH broadcasting satellite services (more commonly known as 'satellite TV') have been, and still are, the **leading source of income and employment** in the UK space industry. DTH broadcasting represented **46%** of total UK space income (**£8.1bn**) in 2020/21. This share has dropped in the past decade (from 69% in 2010/11), though the decrease has slowed since 2016/17.

Evolution of DTH broadcasting income and employment share, 2014/15 – 2021/22e



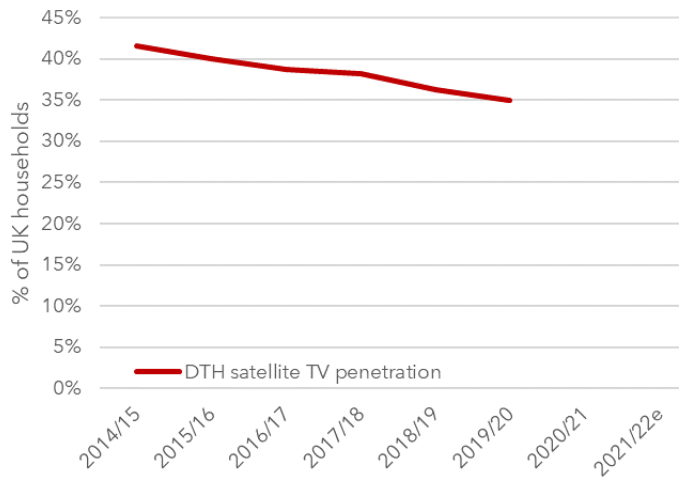
Source: know.space analysis

DTH broadcasting employment has been growing slowly since 2014/15, plateauing since 2019/20 (almost **22,000 employees** in 2020/21). DTH broadcasting's share of total space employment has also been gradually decreasing, and this decrease has also slowed since 2019/20 (**45%** in 2020/21).

The observed gradual decrease in DTH broadcasting's dominance of UK space income and employment may be explained by the decrease in penetration of DTH broadcasting

satellite TV in the UK (from 42% in 2014/15 to 35% in 2019/20)[52]. Ofcom notes fundamental shifts in viewing habits and industry structures, notably due to the rise of Over-the-Top (OTT, online content delivery) and the emergence of global video providers (e.g. Netflix, YouTube, Amazon)[53].

DTH broadcasting satellite TV penetration since 2014/15



DTH broadcasting's decreasing dominance in the UK space industry's income and employment is expected to continue, notably due to OTT TV services. Sky, the leading single UK space employer (nearly 21,700 employees, 45% of total employment) and income source (£8.1bn, 47% of total income) has released *Sky Glass* in late 2021 (meaning effects would not have been captured in this study's period of analysis), which removes the need for a satellite dish by providing video services over broadband connection.

Investment into the UK space industry

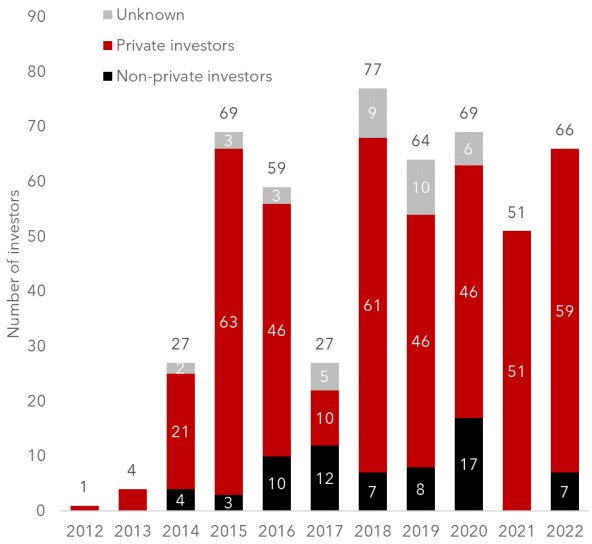
External investment

This analysis highlights the types, volume, magnitude, and sources of investments into the UK space industry. Research of investments[54] into **UK-headquartered space companies**[55] between 2012 and 2022[56] using Crunchbase found that:

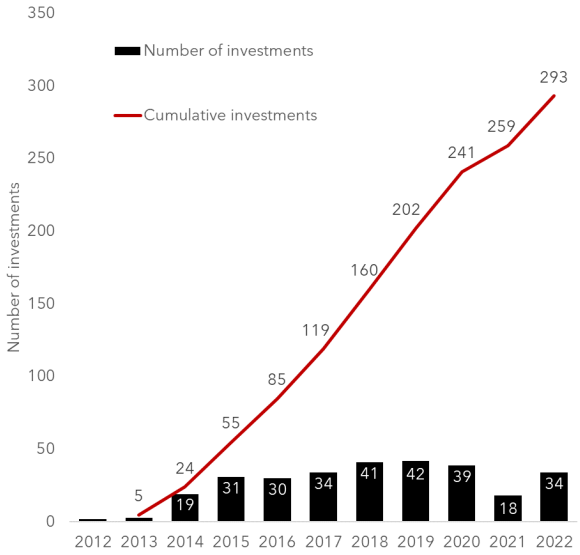
- **More than £635m was invested** in total in 2022, in **34 identified investment deals**[57] (bringing cumulative investment **since 2012** to **£11.7bn** in **293 deals**).
- **Private investors** were the source of most investment (**89%**, 59 investors), with non-private investors representing 11% (7 investors) of total investment.
- **Acquisitions** accounted for the vast majority (**75%**) of total investment value for 2022, despite only representing 15% of total deals (5/34 deals).
- **Venture Capital** investments represented **over half (56%, 19/34) of deals**, but only 23% of the £635m invested in 2022. However, when filtering out mega-deals over £100m, **Venture Capital dominates total investment value.**
- Both the population of investors and number of investments per year have remained at a similar level over the last 10 years, albeit with some **considerable fluctuations** amongst the population of investors.

[52] Figure 1.2: Platform take-up, households (millions). Ofcom (2019). *Media Nations: UK 2019*. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0019/160714/media-nations-2019-uk-report.pdf
[53] Ofcom (2019). *Media Nations: UK 2019*. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0019/160714/media-nations-2019-uk-report.pdf
[54] Investment types covered by Crunchbase are: Funding Round, Equity Crowdfunding, Product Crowdfunding, Angel, Pre-Seed, Seed, Series A, Series B, Series C, Series Unknown, Convertible Note, Grant, Non-Equity Assistance, Post-IPO Equity, Debt Financing, Post-IPO Debt, IPO, and acquisition.
[55] Of the total 1,590 space organisations, approximately 1,041 appear on Crunchbase, of which 707 list a UK headquarters.
[56] Investments are dated according to year of announcement, rather than completion.
[57] Many deals have an 'undisclosed' deal value and so have been treated conservatively as £0. The figures (both 2022 and previous years) should be considered lower bound estimates.

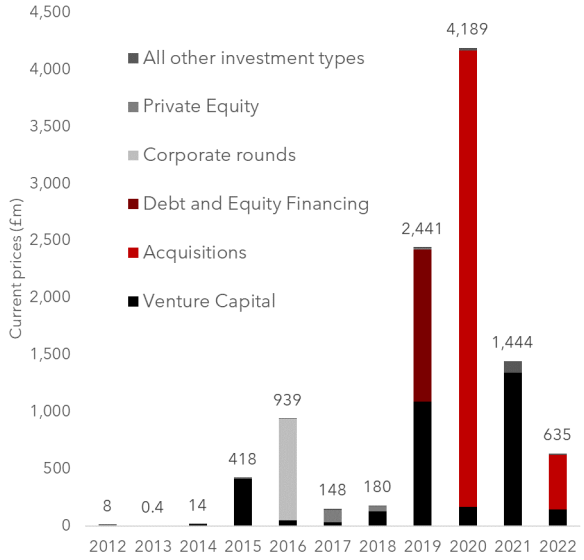
Population of investors, 2012-2022[58]



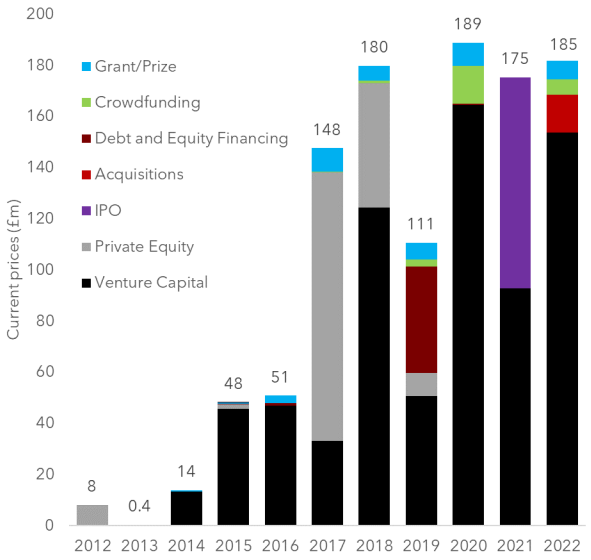
Number of investments, 2012-2022[59]



Total invested (all deals), 2012-2022



Total invested (deals <£100m only), 2012-2022



Source: know.space analysis of Crunchbase data

Not included in the 2022 total investment figure (£635m), two other merger and acquisition (M&A) mega-deals are anticipated for 2023:

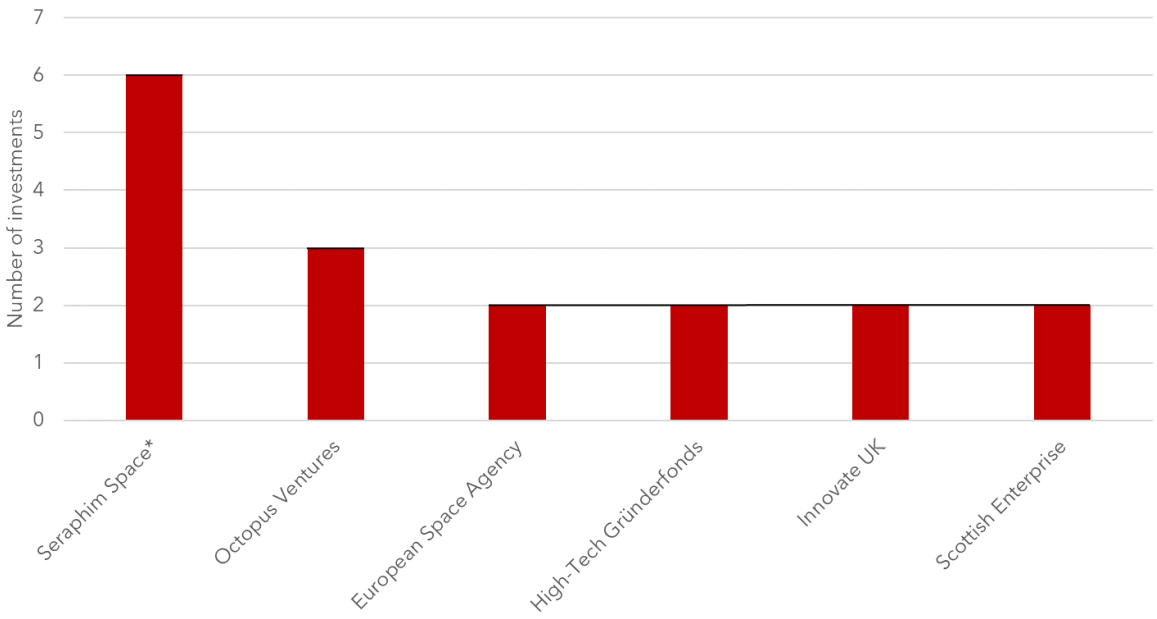
Viasat inmarsat
$7.3 bn
closing 2023 s/t CMA

EUTELSAT OneWeb
£2.8 bn
closing 2023 s/t SHA

[58] Note that whilst investments must be into UK-headquartered companies to be included, investors are worldwide.
[59] 2021 investment numbers are taken from the *Size & Health* 2021 edition, which used a different source and methodology to the 2020 and 2022 editions. As a result, caution should be exercised when making comparisons between 2021 and other years.

The top investors list for 2022 presents a mix of public and private investors. The top investor in 2022 is the global SpaceTech investor, Seraphim Space, with 6 investments. Octopus Ventures are second, with 3 space investments. Other investors have been particularly active over the last 10 years, particularly Par Equity, Innovate UK and Scottish Enterprise (including its Scottish Investment Bank activity).

*Top investors by number of investments**, 2022*



Source: know.space analysis of Crunchbase data
* Note: Includes investments through Seraphim Space Fund LP and Seraphim Space Enterprise LP (Seraphim Space Accelerator), but excludes Seraphim investments in SpaceTech companies that qualify 'commercial users' in our definition of the industry.
** Note: Many investment deals include multiple investors. This list counts an investment if an investor is listed as part of the deal, regardless of the level of involvement.

Obstacles to securing external investment

In an open-ended question, many surveyed organisations explained that they did not seek external investment (i.e., due to their type or development stage), though those that did emphasised **numerous obstacles to attracting investment from external private investors** (listed from most to least cited):

- Lack of internal resources (e.g., dedicated staff, time, investment knowledge and experience, marketing material);
- Insufficient Technology Readiness Level (TRL) maturity;
- Unwillingness to share/lose control;
- Risk-averse internal strategy and processes;
- Lack of visibility;
- Macro funding environment and economic outlook;
- Lack of clarity/availability of public funding; and
- Lack of interest from investors.

Internal investment

New this year, survey respondents were questioned on their internal investments (e.g. from reserves, owners, group, headquarters (HQ)). They reported a total of **£65m internal investment** for 2020/21, and expected that figure to increase to £78m in 2021/22. Importantly, these figures only represent the input of 98 survey respondents covering 11% of total industry income (21% of non-DTH broadcasting income). No attempt at extrapolation to the wider industry was made.

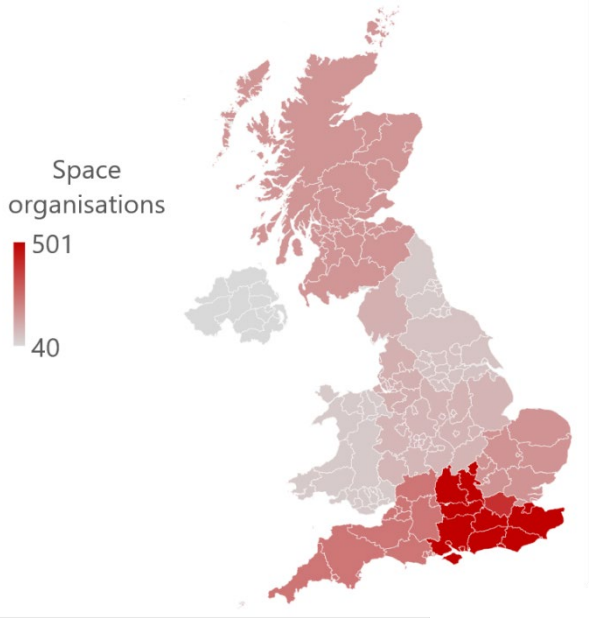
Regional distribution of the UK space industry

Population by region

Based on survey response data on employment by industrial site (i.e. an office or facility involved in space-related activities) supplemented by desk-based research for non-respondents (e.g. company reports and websites), it is possible to analyse the **regional composition** of the UK space industry **workforce** across the **twelve 'International Territorial Level 1' (ITL 1)[60] regions of the** UK – the nine regions of England and the three country-level regions of Scotland, Wales and Northern Ireland – and the British Crown Dependencies.

UK space organisation population by region, 2020/21

Region	Space sites
South East	501
London	398
South West	250
East of England	187
Scotland	183
North West	124
East Midlands	116
West Midlands	113
Yorkshire and the Humber	87
Wales	72
North East	71
Northern Ireland	40
Crown Dependencies	3
Other / Undefined	57
Total	**2,202***



Source: know.space analysis
* Note: The total of regional sites exceeds the UK organisation total as some organisations have presence in multiple regions.

As in 2019/20, space-related activity **sites** are **concentrated in the South** of England – comprised of **South East** (501 sites), **London** (398 sites), and **South West** (250 sites) – **East** of England (187 sites) and **Scotland** (183 sites). **Wales** is home to 72 space-related organisation sites, and **Northern Ireland** has 40 sites. All ITL 1 regions have a count of space-related organisation sites in the double-digits, whilst there were 3 such sites in the British Crown Dependencies.

[60] In previous editions, Eurostat's Nomenclature of Territorial Units for Statistics (NUTS) regions of the UK were used. Since the UK's exit from the EU, ONS has set out to develop a domestic classification framework separate from NUTS called International Territorial Level (ITL). As of this edition, ITLs continue to mirror NUTS classifications and thus have no impact on the backwards compatibility of the regional analysis.

Income by region

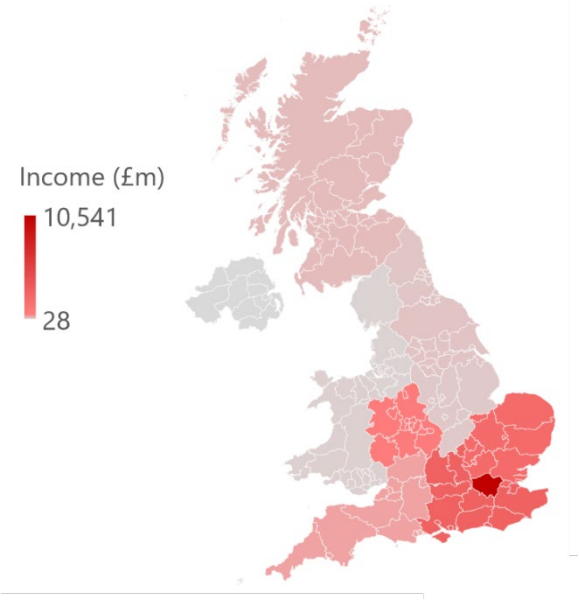
The geography of income is defined with respect to the location of the **organisation's HQ.** Though each of the 13 regions/nations is home to many headquartered organisations, the distribution of total income varies greatly across regions/nations.

London accounted for the **majority** (£10.5bn, 60%) of total UK space industry income in 2020/21, followed by the **South East** (£2.9bn, 16%), **East of England** (£2.2bn, 12%) and **West Midlands** (£0.8bn, 5%). Together, the 4 regions account for **94%** of total UK space income.

Several regions/nations displayed significant income growth since 2018/19[61], notably the **North East** (47%), **North West** (41%), **South West** (34%), **East Midlands** (33%) and **Scotland** (30%). The **West Midlands** returned to a space income comparable to that of 2018/19 (£849m in 2020/21), after a large decrease in 2019/20. **London** continued to see steady growth (8%), while the South East's income decreased by 2.1%.

UK space industry income by region (of organisation HQ), 2020/21

Region	Space HQs	Income (2020/21, £m)
London	339	10,541
South East	376	2,856
East of England	136	2,161
West Midlands	162	849
South West	114	313
Scotland	76	180
Yorkshire and the Humber	80	138
North East	48	129
East Midlands	80	111
Wales	49	79
North West	25	63
Northern Ireland	43	28
Crown Dependencies	3	0
Other / Undefined	59	28
Total	**1,590**	**17,475**



Source: know.space analysis
Note: Income distribution reflects the **location of the HQ** rather than the distribution of value creation.

Employment by region

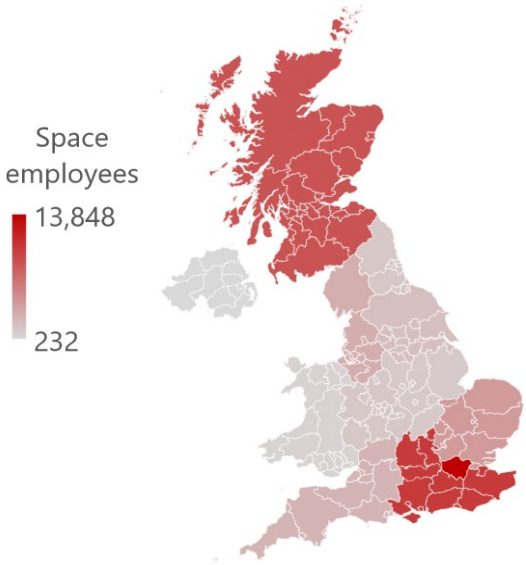
When examining where employees are based (i.e., organisation sites, not necessarily organisation HQ), **space employment** is more evenly **distributed across regions/nations** than income, reflecting that **large UK space organisations** (especially those headquartered in London and the East and South East) **have locations in multiple regions/nations**.

London (**28%,** up from 27% in 2019/20) and the **South East** (**21%**, unchanged) employ the most staff and account for **half** of all employees combined. **Scotland** and the **East of England** follow, with shares of **18%** (unchanged) and **8%** (up from 7%), respectively.

[61] Methodological differences in the regional analysis limits the reliability of one-year regional growth rates, so two-year real growth rates are shown here instead.

UK space industry employment by region, 2020/21

Region	Space organisations	Employees 2020/21
London	398	13,848
South East	501	10,170
Scotland	183	8,568
East of England	187	4,111
North West	124	2,862
South West	250	2,473
Yorkshire and the Humber	87	1,811
North East	71	1,310
West Midlands	113	1,292
East Midlands	116	1,185
Wales	72	603
Northern Ireland	40	232
Crown Dependencies	3	3
Undefined	57	305
Total	**2,202***	**48,772**



Source: know.space analysis
* Note: Total of regional sites exceeds the UK organisation total as some organisations have presence in multiple regions.

Supply chain effects

To capture the full economic impact of the UK space industry, it is necessary to consider not only its direct impact, but also indirect (secondary demand to UK suppliers) and induced impacts (derived demand from employee expenditure) across the economy[62].

This is achieved by estimating and applying a series of economic **multipliers** using Input-Output analysis and analytical tables published by the ONS. ONS analytical tables provide data on which sectors supply inputs to other sectors, which allows us to trace interdependencies and estimate how activity in one sector will impact on other sectors in the economy (reflected in economic multipliers). The space-related GVA share of more than 200 different sectors (5-digit SIC codes) are then used to estimate multipliers specific to the make-up of the UK space industry.

In this section, we present the *Type II* multipliers for GVA and employment, which measure the direct, indirect, and induced effects.

Gross Value Added (GVA)

The *Type II* GVA multiplier is estimated at **2.63**, implying that **each £1 of space industry GVA generates £1.63 worth of GVA in the supply chain and supporting sectors[63]**.

The **total contribution of the UK space industry** including indirect and induced effects is therefore estimated at **£18.3 billion** in 2020/21. This implies that the industry's direct GVA of **£7.0 billion** generates an additional GDP contribution of **£11.2 billion** in the UK economy through indirect and induced impacts.

[62] See Glossary for technical definitions.
[63] The Type I GVA multiplier is estimated at 1.69.

Employment

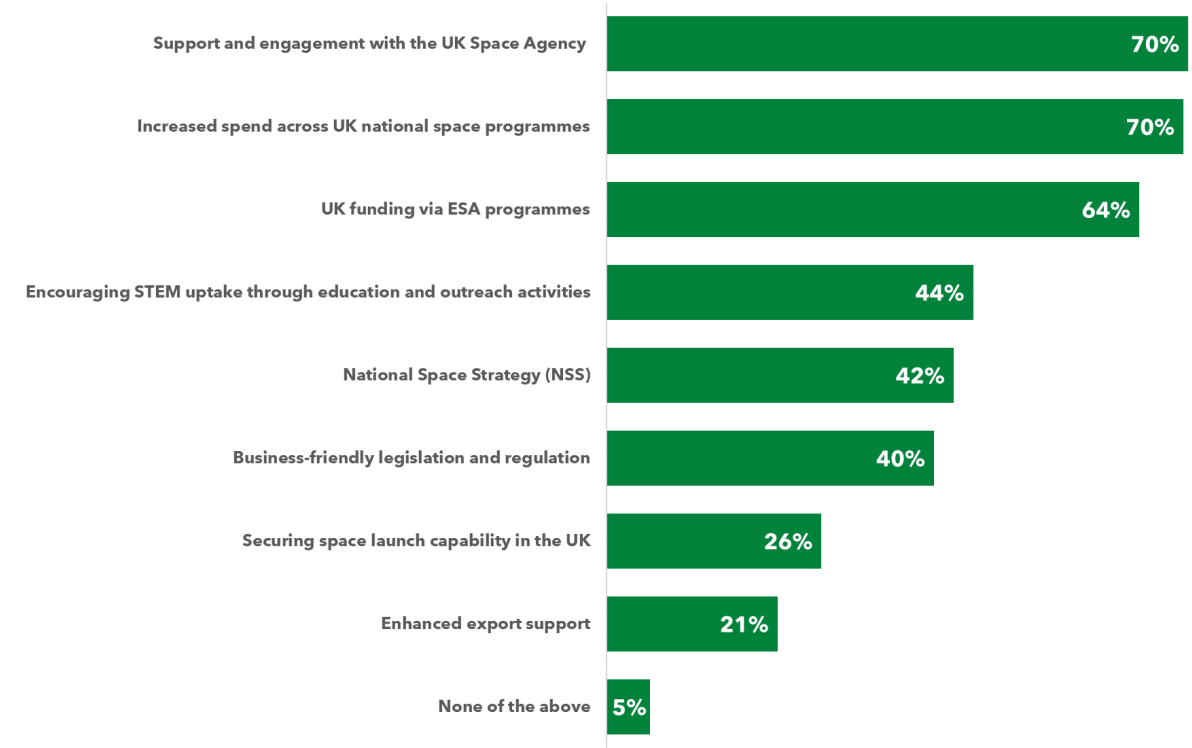
The *Type II* employment multiplier is estimated at **2.64**, suggesting that **the activity of 100 employees in the space industry supports 164 additional employees among suppliers and in other economic sectors** (such as retail and services)[64]. Using this multiplier, we estimate that the **total UK-based employment supported** by the activities of the UK space industry in 2020/21 is over **126,800 employees**. Direct employment in the space industry (approximately **48,800**) thus supports over **78,000** additional UK jobs through indirect and induced effects.

Future growth potential

As part of this edition's survey, organisations were asked to provide their views on enablers and barriers to growth, the impact of crises (COVID and cost-of-living), and their three-year outlook. Because a response to these questions was **not mandatory for a response**, there may be particularly prevalent sampling biases (e.g. organisations choosing not to report unfavourable outlooks). Findings are therefore not reported as indicative of the wider industry and care should be taken when extrapolating these findings. Nonetheless, survey respondents to these questions represent (on average across the questions) a significant 19% of total industry income (36% of total non-DTH broadcasting income).

Enablers of growth

Factors enabling success according to survey respondents, 2020/21



Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 169 responses to this survey question, covering 19% of the total industry income (36% of non-DTH broadcasting income).

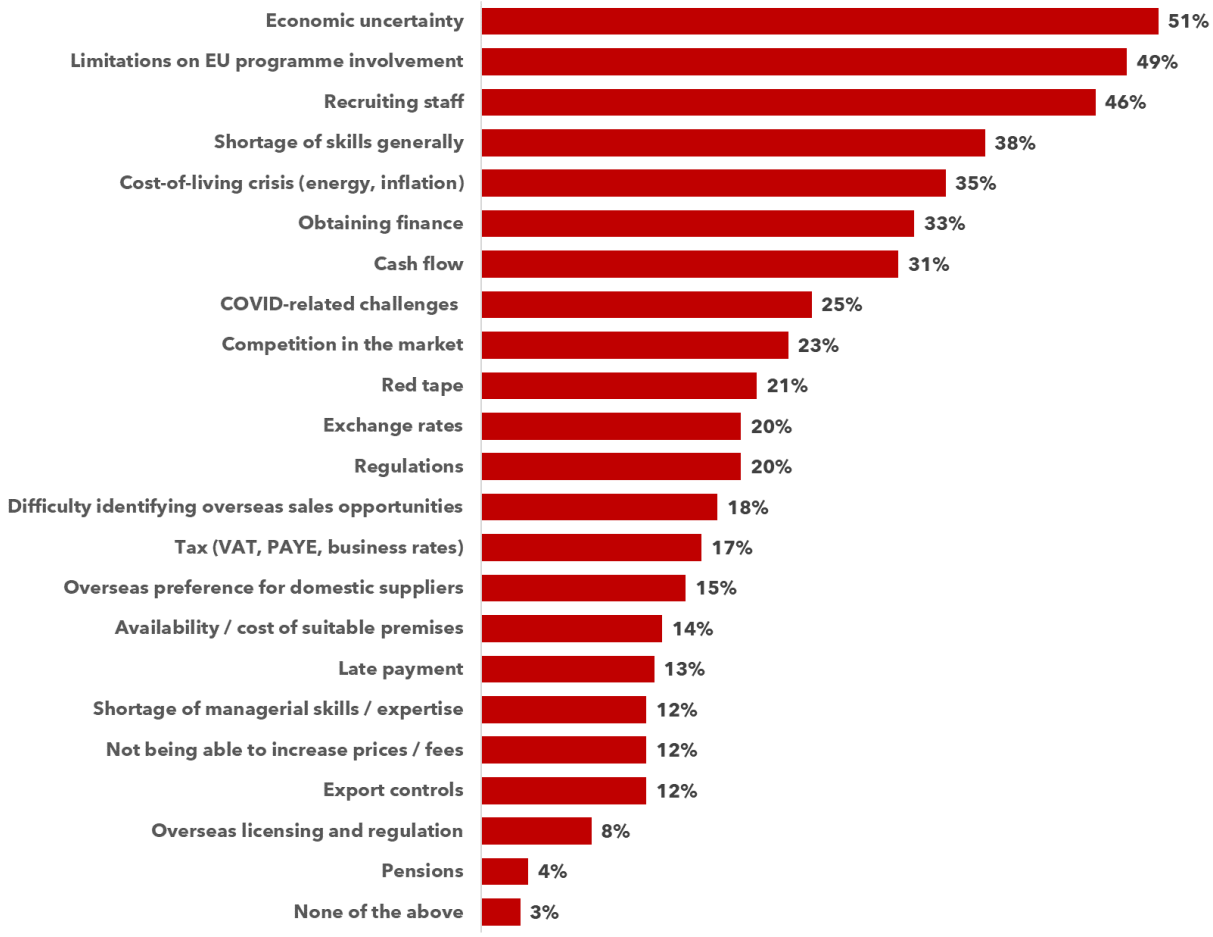
[64] The Type I employment multiplier is estimated at 1.81.

119 of 169 survey respondents (70%) cited **support and engagement with UKSA** as a key enabler for ongoing commercial success[65], followed by the **increased spend across UK national space programme** (118 respondents, 70%), **UK funding via ESA programmes** (109 respondents, 64%), **efforts to encourage Science, technology, engineering, and mathematics (STEM) uptake through education and outreach activities** (75 respondents, 44%), and the **National Space Strategy** (71 respondents, 42%).

Barriers to growth

Economic uncertainty was the **most prevalent obstacle** to ongoing commercial success, cited by 86 of 169 respondents (51%), followed closely by **limitations on EU programme involvement** (82 respondents, 49%) and **recruiting staff** (78 respondents, 46%). A wide range of other barriers were also indicated by respondents, as highlighted in the below graph.

Barriers to growth according to survey respondents, 2020/21



Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 169 responses to this survey question, covering 19% of the total industry income (36% of non-DTH broadcasting income).

[65] Note that the survey was entirely voluntary and conducted on behalf of UKSA. As such, it is possible that respondents were biased towards having a more favourable opinion of the Agency.

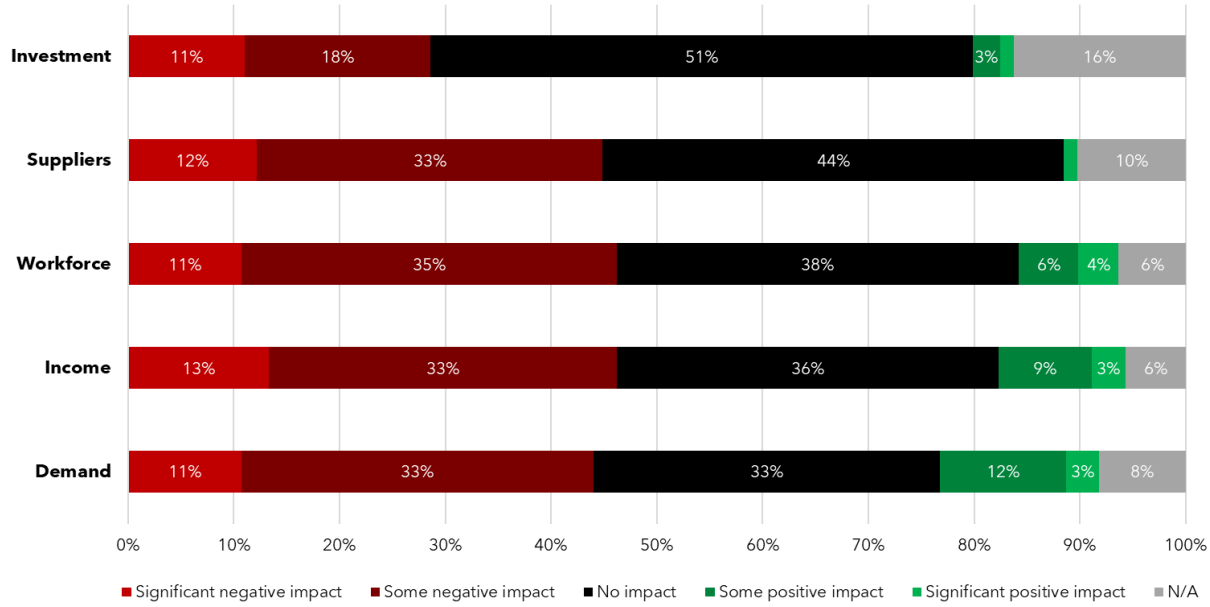
Impact of COVID-19

As highlighted throughout the analysis, at a macro level the COVID-19 pandemic seems to have had an **impact on survey respondents' performance**, with 42 of 163 respondents (25%) reporting COVID-related challenges as obstacles to success.

When enquiring in more detail about the impact of the pandemic, the 163 respondents to this question (representing 18% of industry income) seem to have had different experiences, with a third to half of the respondents (depending on the enquired impacted category) reporting no impact. Over 2 in 5 organisations highlighted at least some negative impact for their suppliers (45%), workforce (46%), income (46%) and demand (44%). Meanwhile, investment seems less affected, with only 29% reporting any negative impact. COVID-19 even led to positive impacts in certain categories, notably for demand (15%), income (12%) and workforce (10%).

The pandemic's varying effects on UK space organisations may reflect the nature of respondents' activities, notably whether they were able to adapt to government restrictions and whether they were affected by supply chain issues (among many other influencing factors). It should also be noted that the start of the pandemic was nearly 3 years ago, and thus respondents' perspectives may be biased (e.g. peak-end rule)[66].

Impact of COVID-19 on survey respondents, 2020/21



Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 163 responses to this survey question, covering 18% of total industry income (35% of non-DTH broadcasting income).

[66] The peak-end rule is a cognitive bias that shapes how individuals remember past events. People tend to judge an experience based on how they felt during intense positive or negative moments ('peaks') and the final moments ('end').

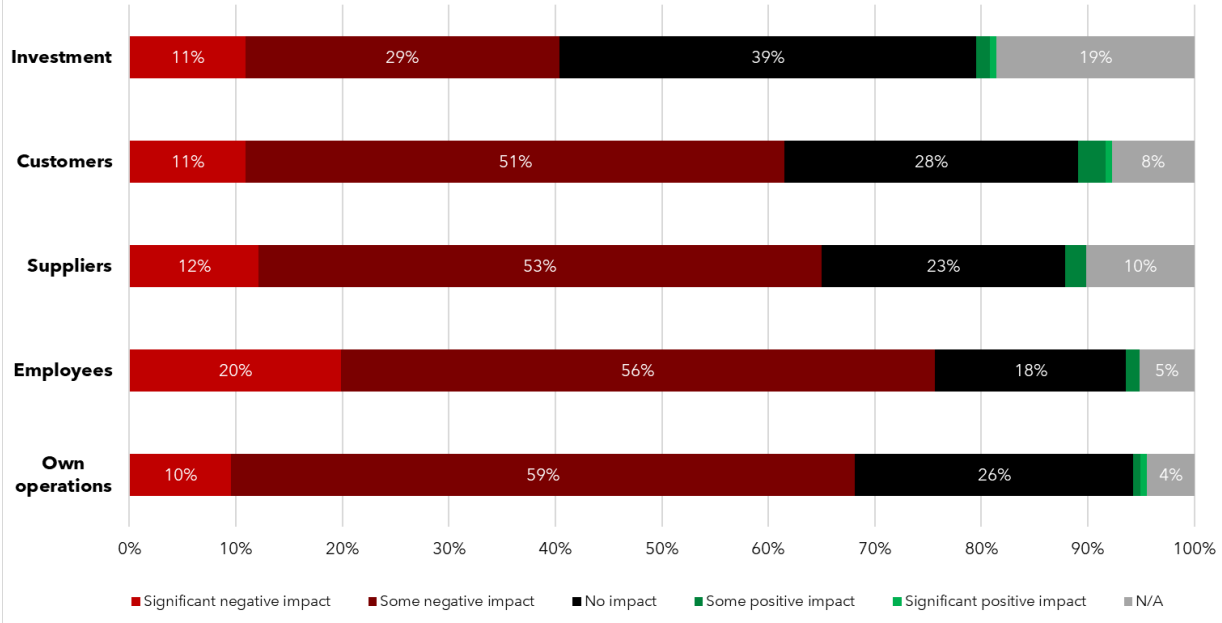
Impact of cost-of-living crisis

The ongoing cost-of-living crisis (energy, inflation) experienced in the UK since 2021/2022 is having a **notable negative impact** on UK organisations in our sample. 59 of 162 survey respondents (35%) qualified it as an obstacle to success and **negative impacts were reported across the board** – own operations (79%), employees (76%), suppliers (65%), customers (62%), and investment (40%).

The detrimental impact is particularly pronounced for survey respondents' own operations and employees (59% and 56% reporting a 'significant negative impact', respectively). Out of all 5 enquired categories, investment seems to be the least impacted by the cost-of-living crisis (41% reporting no or positive impact).

These findings should be nuanced by the fact that the cost-of-living crisis is ongoing, and thus organisations' opinion on its impact may change in the future.

Impact of cost-of-living crisis (energy, inflation) on survey respondents, 2020/21



Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 162 responses to this survey question, covering 18% of industry income (35% of non-DTH broadcasting income). N/A: Respondent indicated not applicable.

Future sentiment: 3-year outlook

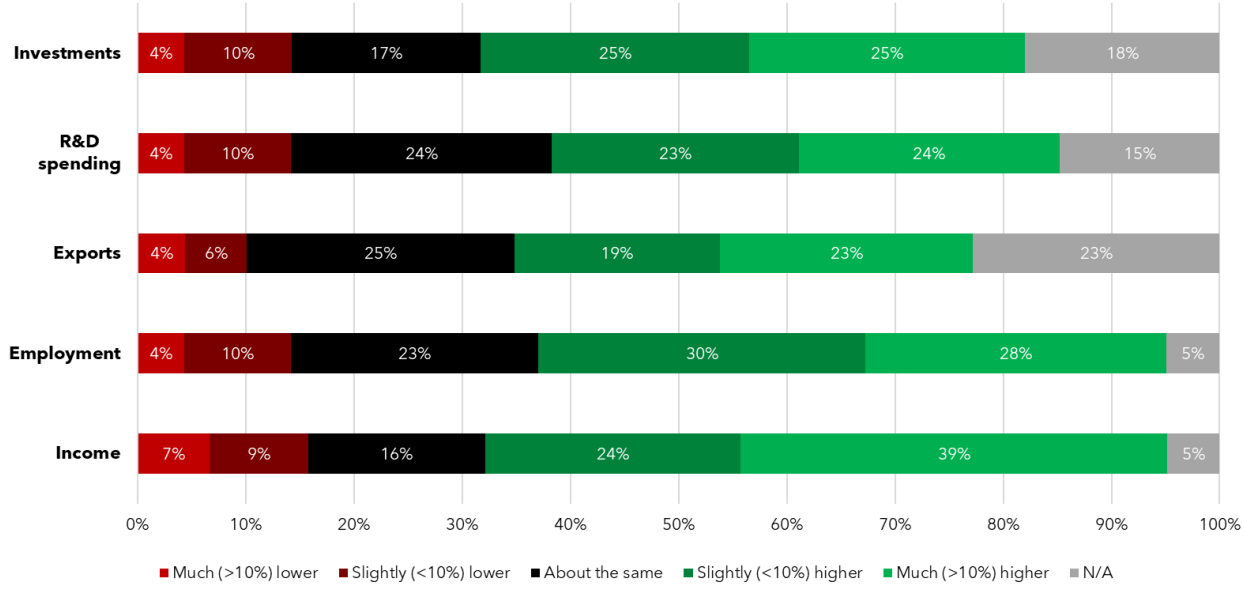
From a sample of 166 survey respondents, **optimism** was indicated with respect to **near-term growth**.

- **3 in 5** (63%) expect **income to be higher** in the coming three years, of which **2 in 5** (39%) expect income to be much higher (79% and 58% respectively in 2019/20).
- **Over half** (58%) of respondents expecting to **employ more staff** (74% in 2019/20).
- **Around half** of respondents expect **higher investment** (50%) and **increased R&D expenditure** (47%) (58% and 56% respectively in 2019/20).
- **2 in 5** (42%) respondents foresee **increased exports** (53% in 2019/20).

The picture is **not all positive**, however, as almost **1 in 5** (16%) respondents expect

income to be lower, and 14% expect reduced investments, R&D spending, and employment. Additionally, optimism seems to be more tempered than in 2019/20.

3-year outlook according to survey respondents, 2020/21



Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 166 responses to this survey question, covering 19% of industry income (36% of non-DTH broadcasting income). N/A: Respondent indicated not applicable.

Wider impact of space activities

UK GDP supported by satellite services

The impact of space extends far beyond the space industry to a wide range of public, commercial and consumer users. Beyond the activities of the space industry itself, an assessment was made of which (**non-space**) **UK industries employ satellite services** in their commercial operations to derive an estimate of the **proportion of UK GDP that is supported by satellite services.**

The estimates are **not a valuation of the economic value contributed by satellite services**, and the estimates are **not specific to UK-owned/operated satellites**. Rather, the estimates indicate the **total value of output of those industries that are supported by satellite services from UK and non-UK satellites**.

***Caveat**: The analysis does not cover the full UK economy. Instead, it reflects the coverage of the ONS's Annual Business Survey (ABS) and is limited to the **UK Non-Financial Business Economy** which accounts for approximately two thirds of the UK economy in terms of GVA. In other words, it excludes: financial and insurance, public administration and defence, public provision of education, public provision of health and all medical and dental practice activities. Furthermore, the ABS is a sample-based snapshot (cross sectional) rather than a time-series data source and changes in the sample can affect the approximated GVA results.*

On the basis of the latest granular industry data (*Annual Business Survey 2020*, released in June 2022) it is estimated[67] that satellite services (be they from UK or non-UK, and public or commercial, satellites) support wider industrial activities across the UK (non-financial business) economy that contributed at least **£370 billion to UK GDP** in 2020, equivalent

[67] With the support of the Office for National Statistics (ONS).

to 17.7% of UK GDP[68] (up from £360 billion and 16.9% when last calculated with reference to 2018). For context, it should be noted that **UK GDP experienced an unprecedented fall during this period**, contracting by 19.8% between April and June 2020,[69] owing to public health measures (e.g. social distancing, travel restrictions, closure of non-essential shops) undertaken to protect the country from the onset of the **COVID-19 pandemic**.

Delving deeper reveals the **importance of satellite services**, but highlights the particularly high adoption of GNSS (Global Navigation Satellite Systems, or more commonly: 'satnav'), which enables a wide range of Positioning, Navigation and Timing (PNT) applications:[70]

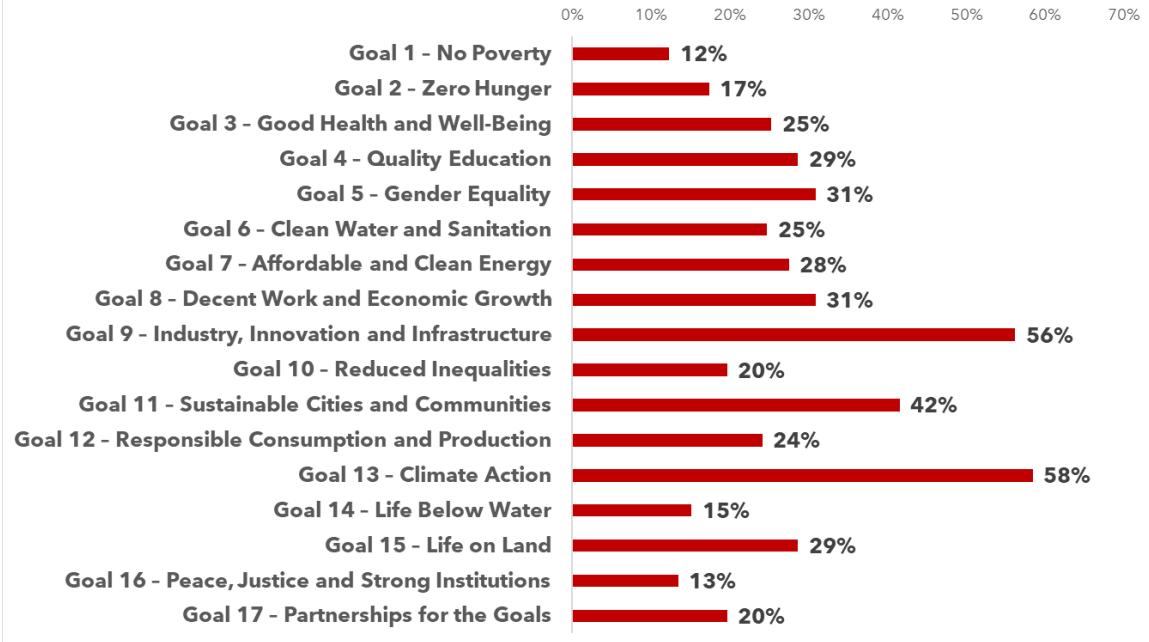
- **GNSS** satellite services support an estimated **£320 billion** of UK GDP (15.3%).
- **Meteorological** satellites support an estimated **£212 billion** of UK GDP (10.2%).
- **Communications** satellites support an estimated **£112 billion** of UK GDP (5.4%).
- **Earth Observation** satellites support an estimated **£106 billion** of UK GDP (5.1%).

Contribution to Sustainable Development Goals

Many of the 178 respondents to this question survey reported contributing to at least one of the UN's Sustainable Development Goals (SDGs). Their space-related activities were perceived as notably benefiting:

- **Goal 13**: Climate Action (104 respondents, 58%)
- **Goal 9**: Industry, Innovation and Infrastructure (100 respondents, 56%)
- **Goal 11**: Sustainable Cities and Communities (74 respondents, 42%)

Share of survey respondents contributing toward each UN SDG goal, 2020/21



Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 178 responses to this survey question, covering 20% of industry income (37% of non-DTH broadcasting income).

[68] ONS (2022). *Gross Domestic Product at market prices: Current price: Seasonally adjusted £m*. Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ybha/ukea.
[69] ONS (2022) *GDP and events in history: how the COVID-19 pandemic shocked the UK economy*. Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/gdpandeventsinhistoryhowthecovid19pandemicshockedtheukeconomy/2022-05-24
[70] Many industries use multiple types of satellite service, so the sum across satellite types exceeds the total value supported.

These SDGs align with national priorities such as *Net Zero Strategy: Build Back Greener*, *UK as a Science and Technology Superpower Agenda* and the *Levelling Up the United Kingdom Agenda*.[71]

While the contribution of the UK space industry to the achievement of the SDGs is out of scope for this study, it is clear that **UK space-related activities are playing a role in reaching international and national sustainable development targets**.

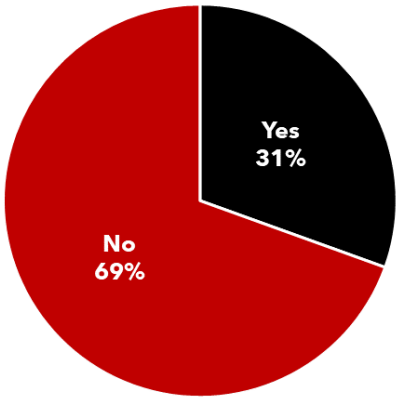
Industry carbon emissions

In line with the UK government's *Net Zero Strategy*[72] (i.e. achieving net zero by 2050), organisations across the country are in the process of setting up their own initiatives to help achieve this national target and monitor their progress.

As part of this edition's survey, organisations were asked to provide an estimation of their carbon emissions. Given this question was **not mandatory**, there may be sampling bias (e.g. organisations choosing not to report unfavourable emissions). Findings are therefore not reported as indicative of the wider industry and care should be taken when extrapolating emissions numbers. Nonetheless, survey respondents to this question represent a significant 20% of total industry income (37% of total non-DTH broadcasting income).

54 of 177 survey respondents (**31%**) reported estimating their carbon emissions in 2020/21, and **32** of those 54 shared their emissions levels in the survey.

Percentage of survey respondents that estimate carbon emissions, 2020/21



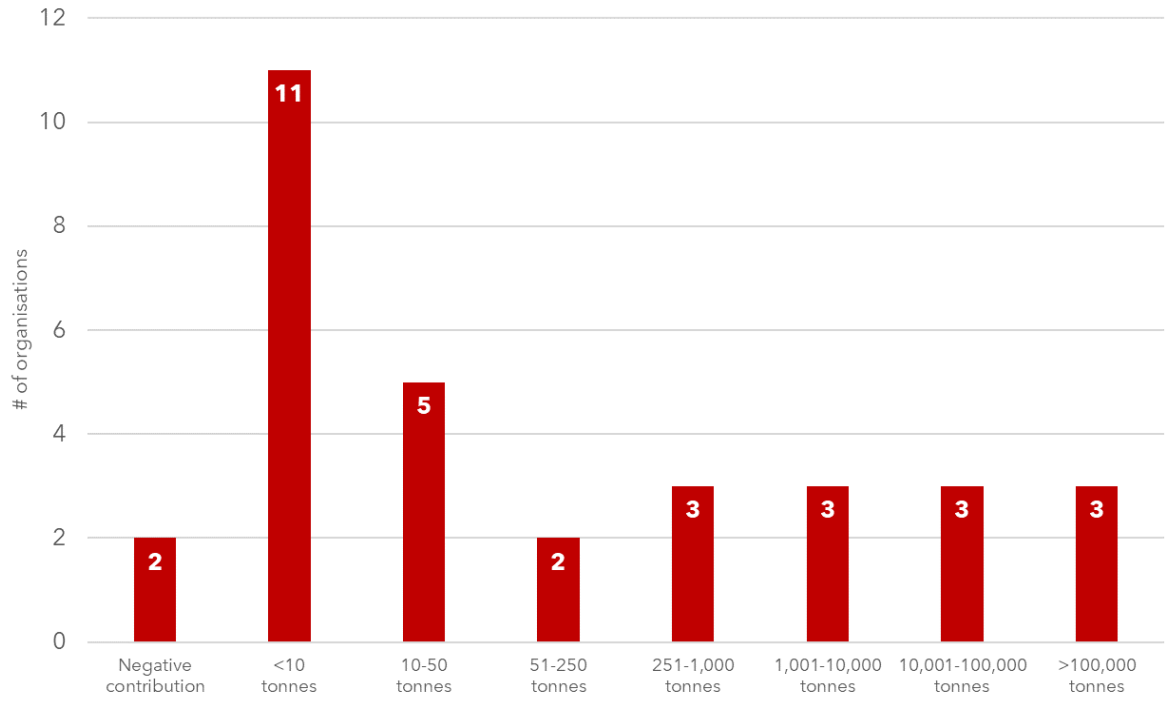
Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 177 responses to this survey question, covering 20% of the total industry income (37% of non-DTH broadcasting income).

Among the 32 respondents who shared their emissions, the **median** carbon emission was 31 tonnes of carbon dioxide equivalent (CO_2e). The **mean** reported emissions, however, jumps to over 116,000 tonnes of CO_2e, reflecting the wider economy trend that the largest organisations account for most emissions. The distribution of organisations based on their reported emissions is shown in the histogram below, which shows **two of 32 organisations already reporting a negative carbon footprint**.[73]

These figures are provided as a baseline and future annual reporting of the UK space industry's carbon emissions will help identify growth patterns in emissions for the industry and assess how well the industry is contributing to the UK's *Net Zero* emission ambition.

[71] HM Government (2021). *The UK as a science and technology superpower*. Available from: https://www.gov.uk/government/publications/the-uk-as-a-science-and-technology-superpower; HM Government (2022). *Levelling Up the United Kingdom*. Available from: https://www.gov.uk/government/publications/levelling-up-the-united-kingdom
[72] HM Government (2021). *Net Zero Strategy: Build Back Greener*. Available from: https://www.gov.uk/government/publications/net-zero-strategy
[73] Survey respondents that reported being carbon-negative did not elaborate on how they are offsetting or arriving at negative emissions.

Distribution of organisations based on their reported emissions, 2020/21



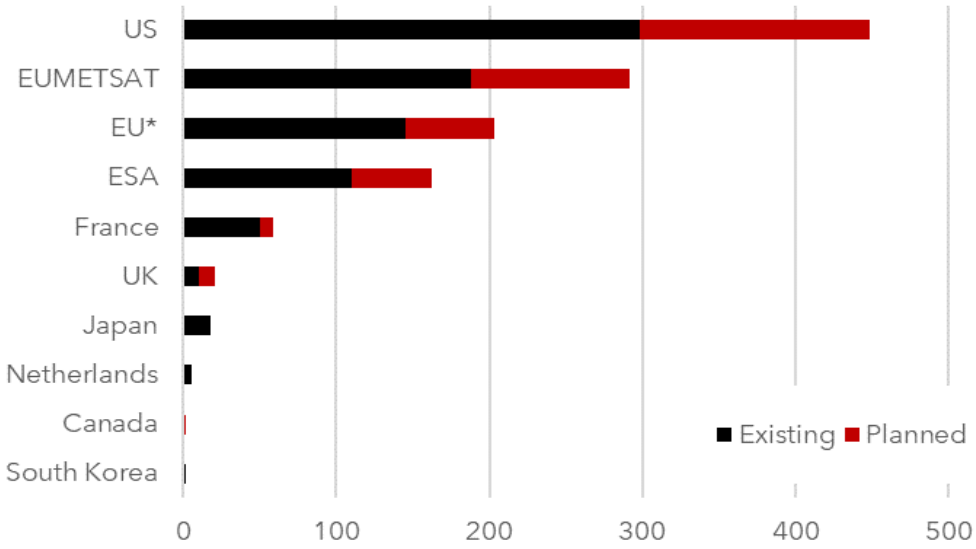
Source: know.space analysis
Note: Based on a non-representative, voluntary response sample consisting of 177 responses to this survey question, covering 20% of the total industry income (37% of non-DTH broadcasting income). 32 organisations reported their emission levels. 'Negative contribution' means that organisations have a net negative carbon emission contribution.

Climate Change monitoring

The UK currently plays, and will continue to play, an **increasingly key role** in providing the necessary data to monitor climate change and its effects. The country is planning to **double** its provision/ownership of climate monitoring data sources, reflecting the Government's emphasis on addressing climate change, as outlined in the *National Space Strategy* and *Net Zero Strategy*. This is in addition to ESA's data sources, which the UK contributes to through its significant participation in EO and climate programmes (£315m at the 2022 Ministerial, a 45% increase since the 2019 Ministerial).[74] As highlighted above, UK space organisations are also in the process of setting up initiatives to achieve the Government's Net Zero target and monitor their own progress.

[74] ESA Member States commit funding to ESA programmes at Ministerial, which are held every 3 years. For more information, please see: https://vision.esa.int/cm22/; HM Government (2022). UK secures £1.84 billion investment for ESA programmes with support for Earth Observation sector. Available at: https://www.gov.uk/government/news/uk-secures-184-billion-investment-for-esa-programmes-with-support-for-earth-observation-sector

Provision/ownership of climate monitoring data sources, 2022

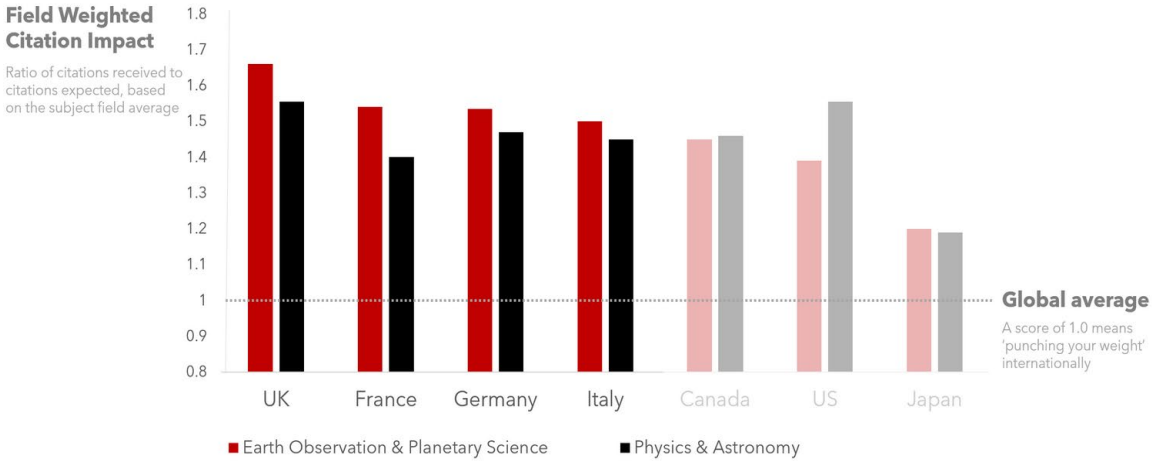


Source: know.space analysis of CEOS data[75]
* Note: Copernicus Climate Change Service (C3S) accounts for 189 of the EU's 203 existing and planned data sources.

Contribution to scientific knowledge

The UK's scientific community produces **particularly impactful research in space-related fields**. Its impact is higher than the global average for both EO & Planetary Science and Physics & Astronomy, outperforming countries like France, Germany, Italy, Canada, Japan (in both fields) and the US (in EO & Planetary Science).

Citation impact of UK science compared to international peers, 2018



Source: know.space[76]

[75] ECV Inventory v4.10. CEOS (2022). *ECV Inventory*. Available from: https://climatemonitoring.info/ecvinventory/
[76] know.space (2021). *UK Space Science: a summary of the research community and its benefits*. Figure 8: UK Space Science-related fields and FWCI. Available from: https://span.ac.uk/wp-content/uploads/2021/04/SPAN-UK-space-science-nature-benefits-FINAL-REPORT-060421.pdf

Conclusion

This 2022 edition of the '*Size & Health of the UK Space Industry*' examined the **2020/21** financial year – a period when the country was enduring the global COVID-19 pandemic – and found a remarkably **robust industry**, resiliently weathering successive lockdowns and disrupted operations to return **growth in income, employment and Gross Value Added (GVA)**. UK space industry income grew 5.1% in real terms – the second fastest annual growth in the last seven years, though there was variation in performance across activities.

Beyond contributing to the ***National Space Strategy***'s objectives, the UK space industry is also feeding into wider Government strategies, notably achieving ***Net Zero*** *Strategy: Build Back Greener* and becoming a ***Science Superpower***, with a majority of survey respondents contributing to the *Climate* and *Innovation* **Sustainable Development Goals**. It is also playing a key role in the ***Levelling Up*** *the United Kingdom* agenda: England's North East, North West, South West, East Midlands and Scotland displayed the highest growth rates for space-related income; whilst North West and East England had the highest growth rates in employment.

Furthermore, the **growth in the industrial population**, continuing **high levels of private investment**, strong **exports**, **commercial focus** and the **expanded scope** of the UK space industry, particularly in high-growth and emerging markets (such as space surveillance & tracking, space travel and habitation, in-orbit servicing, active debris removal) is **encouraging for future growth** – supported by the **positive 3-year outlook** of survey respondents.

Glossary

Typology

Capability / OECD sector	Capabilities are different from 'activities' and 'segments' and refer to what space capability is being support by an organisation. Capabilities include: • Defence/Military; • Earth Observation (excl. Meteorology); • Meteorology; • Positioning, Navigation, Timing (inc. GNSS); • Satellite Communications (excl. broadcasting); • Broadcasting; • Science; • Space Exploration (inc. ISS, rovers, and probes); • Space Transportation (inc. launch); • Space technologies (used in multiple systems, e.g. solar); • Generic technologies/components that enable space capabilities (e.g. AI). OECD 'sectors' match what the *Size & Health of the UK Space Industry* study traditionally reports as 'Capabilities'. For the sake of clarity, they are reported as 'Capability / OECD sector' in this report.
Segment	Supply chain segments, including Space Manufacturing, Space Operations, Space Applications and Ancillary Services. For reference, Space Manufacturing and Space Operations combined can (roughly) be considered as 'upstream', and Space Applications as 'downstream'. Ancillary Services provide specialised support to all other value chain segments.
Space Applications	1 of 4 segments, refers to applications of satellite signals and data.
Space Manufacturing	1 of 4 segments, refers to the design and/or manufacture of space equipment and subsystems.
Space Operations	1 of 4 segments, refers to launch and/or operation of satellites and/or spacecraft.
Ancillary Services	1 of 4 segments, refers to specialised support services.
Space-related activity	Refers to the wide-ranging activities related to the delivery of a space product or service, across the supply chain (full list p.8).

Investment[77]

Acquisitions	An acquisition occurs when one company purchases and gains control over another company.
Corporate round	A corporate round occurs when a company, rather than a venture capital firm, makes an investment in another company. These are often, though not necessarily, done for the purpose of forming a strategic partnership.
Crowdfunding	Funding by raising money from numerous sources. *Equity crowdfunding* platforms allow individual users to invest in

[77] Definition sourced from Crunchbase (2023). *Glossary of Funding Types*. Available from: https://support.crunchbase.com/hc/en-us/articles/115010458467-Glossary-of-Funding-Types

	companies in exchange for equity. Typically on these platforms the investors invest small amounts of money, though syndicates are formed to allow an individual to take a lead on evaluating an investment and pooling funding from a group of individual investors. In a *product crowdfunding* round, a company will provide its product, which is often still in development, in exchange for capital. This kind of round is also typically completed on a funding platform.
Debt and equity financing	In a debt round, an investor lends money to a company, and the company promises to repay the debt with added interest.
Grant/Prize	A grant is when a company, investor, or government agency provides capital to a company without taking an equity stake in the company.
Initial Public Offering (IPO)	An Initial Public Offering is the first public sale of stock (shares) by a privately owned company.
Private Equity	A private equity round is led by a private equity firm or a hedge fund and is a late-stage round. It is a less risky investment because the company is more firmly established, and the rounds are typically upwards of $50M.
Venture capital	Venture funding refers to an investment that comes from a venture capital firm and describes Series A, Series B, and later rounds.

Other key terms

Compound Annual Growth Rate (CAGR)	$CAGR = \left(\frac{Final\ value}{Initial\ value}\right)^{\frac{1}{Number\ of\ years}} - 1$ The mean annual growth rate over a period of time.
Constant prices	Values have been adjusted to the price level of the stated base year (i.e. adjusted to remove the effect of inflation) so that comparison can be made between years to identify change in real terms.
Current prices	Values are expressed in nominal terms in the price level of each year, and are not adjusted for inflation. Any comparison between years will be in nominal terms and include the effect of inflation.
Direct effects	The most immediate or 'first round' spending effects. This covers income generated within the space sector and those employed directly by the sector.
Direct-to-Home (DTH) broadcasting	The distribution of television broadcasting services to a subscriber's home, via satellite.
Downstream	Activities based on space technology or making use of a space-derived systems.
Field Weighted Citation Impact (FWCI)	Refers to the ratio of citations received to citations expected, based on the subject field average.
Financial Year (FY)	Accounting reference period used for financial reporting – each organisation may choose the dates of their own financial year, so it may align to the calendar year, the tax year, or any other dates in the year. Also known as a fiscal year or budgetary year. The UK government financial year (also the tax year) commences on April 6th and ends on April 5th the following year.
Gross Domestic Product (GDP)	Gross domestic product, or GDP, is a measure of the combined economic activity of all the people, businesses, and government of a country.
Gross Value Added (GVA)	Approximated as: $GVA = Income \times (1 - Input\ share)$ Gross value added is a measure of the value of goods and services produced in an area, industry, or sector of an economy. It represents an industry's direct contribution to GDP (Gross Domestic Product).
Headquarters (HQ)	Location of the UK head office of an organisation.

Indirect effects	Organisations in the supply chain of space organisations benefit from increased sales in the space industry, as the demand for intermediate inputs increases.
Induced effects	Different sectors benefit from additional household income and consequent spending from those employed in the space industry and its supply chain.
Industrial site	An office or facility involved in space-related activities (which can be different to an organisation's headquarters).
Input share	Percentage of income spent on inputs, i.e. the cost of sales.
Investment	This covers capital deployed to further R&D, capital expenditures (such as equipment), investment in people and tools to develop intellectual property. *Internal investment* refers to investments originating within an organisation (e.g. reserves, owners, group, headquarters). *External investment* refers to investment originating from a third-party to the recipient organisation.
ITL	International Territorial Level, refers to ONS' new domestic classification framework, developed after the UK's exit from the European Union. This moves away from the use of Eurostat's NUTS. As of the *Size & Health 2022* edition, ITLs continue to mirror NUTS classifications and thus have no impact on the backwards compatibility of the regional analysis.
Labour productivity	GVA per employee.
Mean	$$Mean = \frac{Sum\ of\ data\ values}{Number\ of\ data\ values}$$ A type of average. Unless otherwise specified, the use of the term 'average' refers to the mean.
Median	A type of average. The middle value in an ordered list.
Nominal terms	Values are not adjusted for inflation.
NUTS	Nomenclature of Territorial Units for Statistics. In previous editions, Eurostat's Nomenclature of Territorial Units for Statistics (NUTS) regions of the UK were used. Since the UK's exit from the European Union, ONS has set out to develop a domestic classification framework separate from NUTS (see 'ITL').
Real terms	An inflation-adjusted number.
R&D	Research and development, including own/internal and external sources of funding. *Space-related R&D* refers to R&D directly supporting space activities.
Sampling bias	A difference exists between the characteristics of the sample taken (e.g. those responding to our survey) and the population (e.g. the space industry as a whole).
Space organisation	Organisations identified as being engaged in space-related activities.
Space-related employee	Employees involved in space-related activities, based in the UK.
Technology Readiness Level (TRL)	A measurement system used to assess the relative maturity of different technologies.
Type II multiplier (GVA, employment)	Estimates the magnitude of indirect and induced effects, relative to direct effects (see above for definitions). For example, a type II multiplier of 3 would imply that the sum of indirect and induced effects is double the magnitude of direct effects.
Upstream	Activities including research, space manufacturing and ground systems.

… now you **know.**