



UK SPACE
AGENCY

Executive Summary: The Size & Health of the UK Space Industry

OCTOBER 2014

About London Economics

London Economics (LE) is a leading independent economic consultancy, headquartered in London, United Kingdom, with a dedicated team of professional economists specialised in the application of best practice economic and financial analysis to the space sector. As a firm, our reputation for independent analysis and client-driven, world-class and academically robust economic research has been built up over 25 years with more than 400 projects completed in the last 7 years.

We advise clients in both the public and private sectors on economic and financial analysis, policy development and evaluation, business strategy, and regulatory and competition policy. Our consultants are highly-qualified economists with experience in applying a wide variety of analytical techniques to assist our work, including cost-benefit analysis, multi-criteria analysis, policy simulation, scenario building, statistical analysis and mathematical modelling. We are also experienced in using a wide range of data collection techniques including literature reviews, survey questionnaires, interviews and focus groups.

Drawing on our solid understanding of the economics of space, expertise in economic analysis and best practice industry knowledge, our Aerospace team has extensive experience of providing independent analysis and innovative solutions to advise clients (both public and private) on the economic fundamentals, commercial potential of existing, developing and speculative market opportunities to reduce uncertainty and guide decision-makers in this most challenging of operating environments.

All consultants of our Aerospace team are highly-qualified economists with extensive experience in applying a wide variety of analytical techniques to the space sector, including:

- Insightful and accurate market analysis and demand forecasting;
- Analysis of industrial structure, strategy and competitive forces;
- New technology adoption modelling;
- Estimation of public utility benefits;
- Opportunity prioritisation and targeting to maximise exploitation of investment;
- Sophisticated statistical analysis (econometrics, regression);
- Economic and financial modelling, including: Cost-Benefit Analysis (CBA), cost effectiveness analysis, Value for Money (VfM), impact assessment, policy evaluation, business case development, cash flow and sustainability modelling.

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Acknowledgements

We would like to acknowledge the useful guidance and feedback provided by the UK Space Agency throughout this research. We would also like to thank all of the stakeholders surveyed for their informative questionnaire responses. Responsibility for the contents of this report remains with London Economics.

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Introduction

Since 1992, the UK Space Agency¹ has periodically surveyed organisations in the UK that supply, or make use of, the space sector. The objectives of the survey are to:

- establish the industry's general size and health;
- inform industry and the Government of the day
- promote the UK space sector overseas;
- provide an input into the formulation of UK space policy; and
- track progress towards the policy objectives (e.g. The Space Innovation and Growth Strategy 2014-30).

The series of studies, entitled the Size and Health of the UK Space Industry, provide a historically consistent series of observations on the state of the UK space industry, and thus represent a unique resource for assessing developments in the industry. The UK Space Agency commissioned London Economics to conduct the 2014 version of the study, covering 2011/12 and 2012/13, and this document presents an Executive Summary of the main findings.

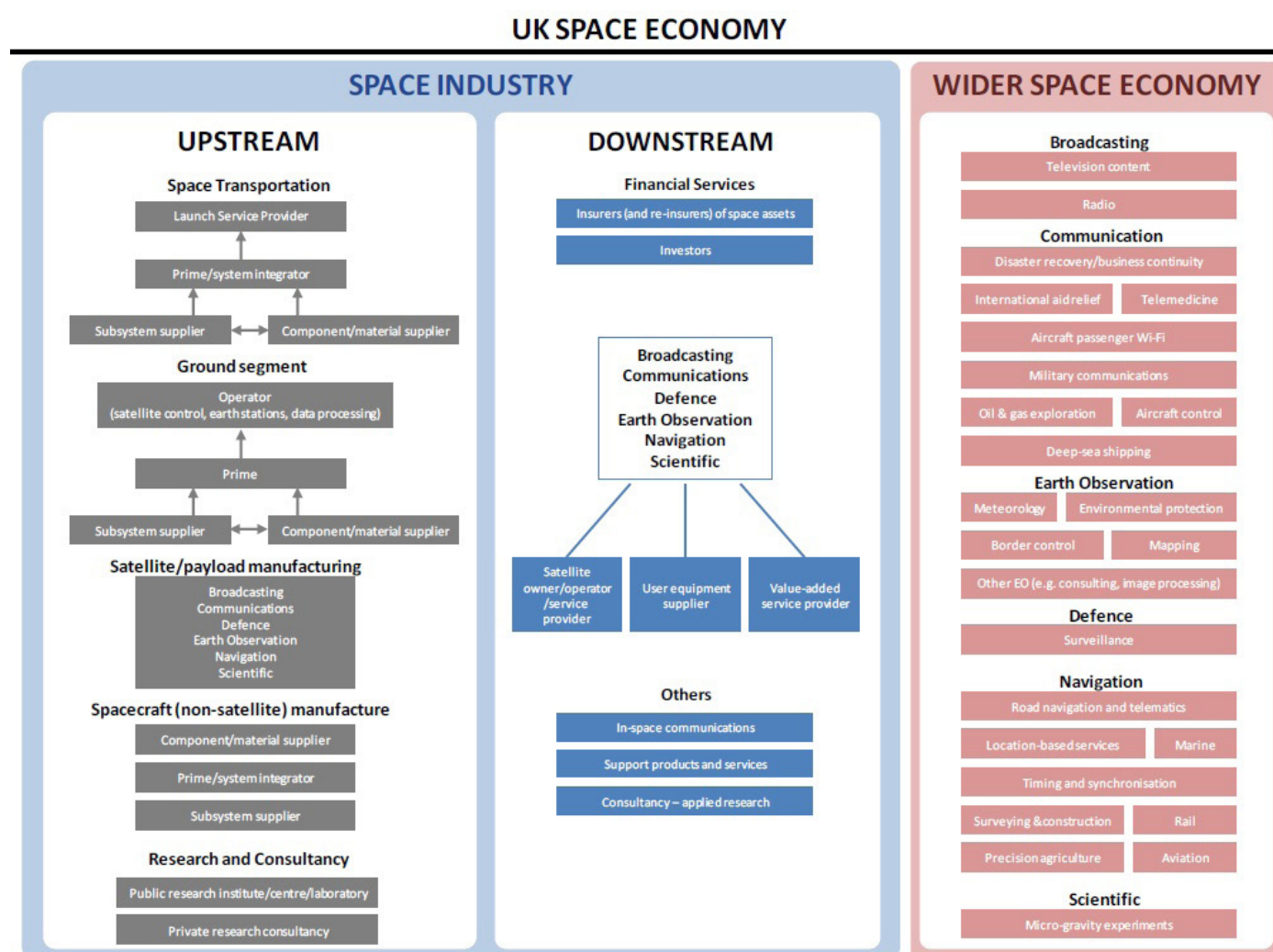
The study has historically focused on the space industry, split into upstream and downstream segments. However, reflecting a growing belief that this definition of the industry is too narrow to capture the sector's future growth, particularly with reference to space-enabled applications, the 2014 analysis reflects three discrete segments of the space economy: upstream space industry (infrastructure and technology), downstream space industry (direct space services) and the wider space economy (space-enabled value-added applications).

The cornerstone of the research is an industrial survey, sent to over a thousand organisations in the UK. Reflecting the expanded space economy definition, the invitee count was increased substantially with a key focus on the industry supply chain (e.g. microelectronics firms) and the wider space economy (e.g. space-enabled value-added service providers). The survey results were supplemented by additional targeted stakeholder consultations, desk-based research of publicly available data sources and a statistical model to estimate inputs for non-responding organisations. The survey questionnaire was based on previous years' surveys and thus ensures a high level of comparability over time – a crucial feature of the study.

With the expanded list of invitees, the definition of the space economy differs from that of the space industry used in previous editions of the study. The quantitative results presented in the report pertain to the space industry to preserve the consistency of the historical data series. 464 invited organisations were deemed to be in the space industry.

The estimates are based on 303 companies, which either - responded to the survey, were estimated from previous responses, use of statutory annual accounts, or as part of the group of organisations that fall below the statutory reporting threshold. The UK space industry ranges from international market leaders with subsidiaries all over the world, to UK subsidiaries of international companies, on to start-ups and small enterprises.

Figure 0.1: Definition of the UK space economy



Source: London Economics

Size of the industry

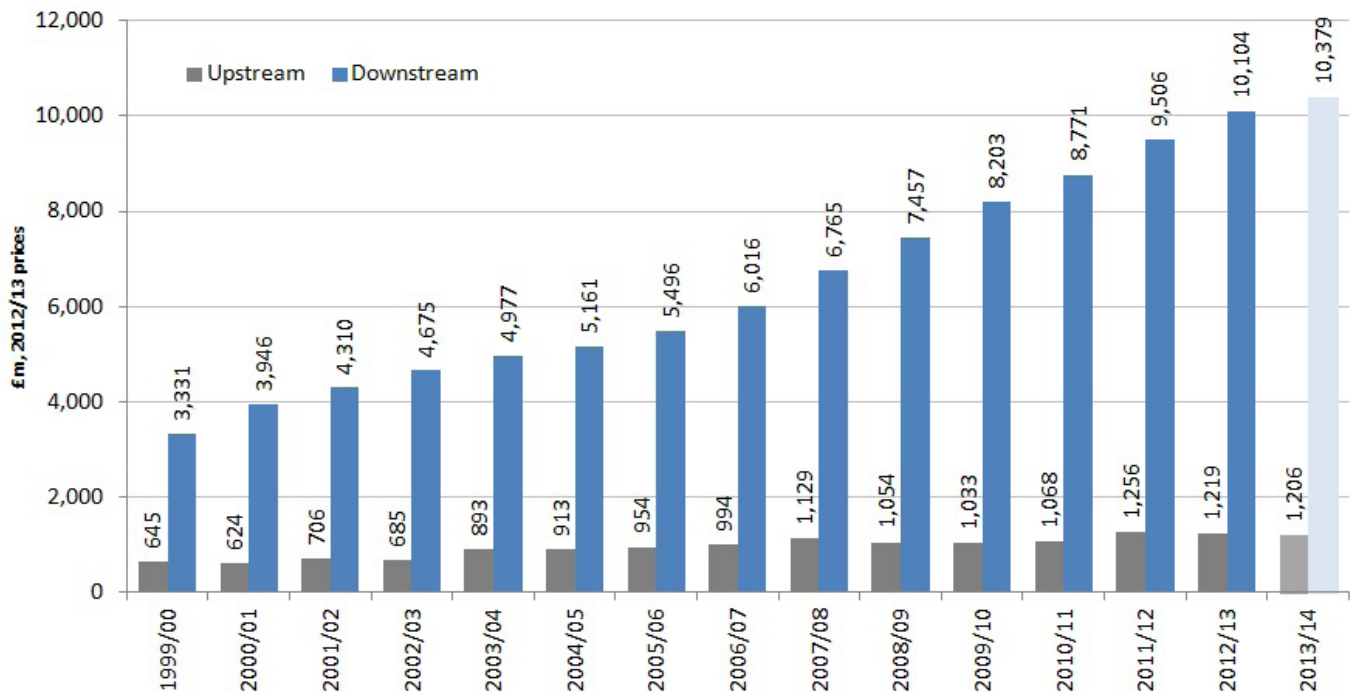
Space industry turnover in 2012/13 was found to have increased by 15% in real terms² in the two years since 2010/11 (an annual average of 7.3%³), to £11.3 billion. Consolidated revenue grew slightly slower than overall space industry revenue, indicating that the space organisations are sourcing more and more inputs from other organisations within the industry. Though still well above the growth rate of the wider economy, space industry growth has slowed slightly, as compared to the 7.5% growth observed annually between 2008/09 and 2010/11.

The downstream sector has enjoyed stable growth over the survey period, with turnover increasing by 15% in real terms since 2010/11. The upstream sector had a very strong year in 2011/12, before contracting slightly in 2012/13. Total upstream turnover growth over the period amounts to 14%. The downstream sector dominates – at £10.1 billion in 2012/13 it accounts for 89% of total industry.

² That is, over and above the inflation rate in the economy.

³ Computed as the compound annual growth rate (CAGR).

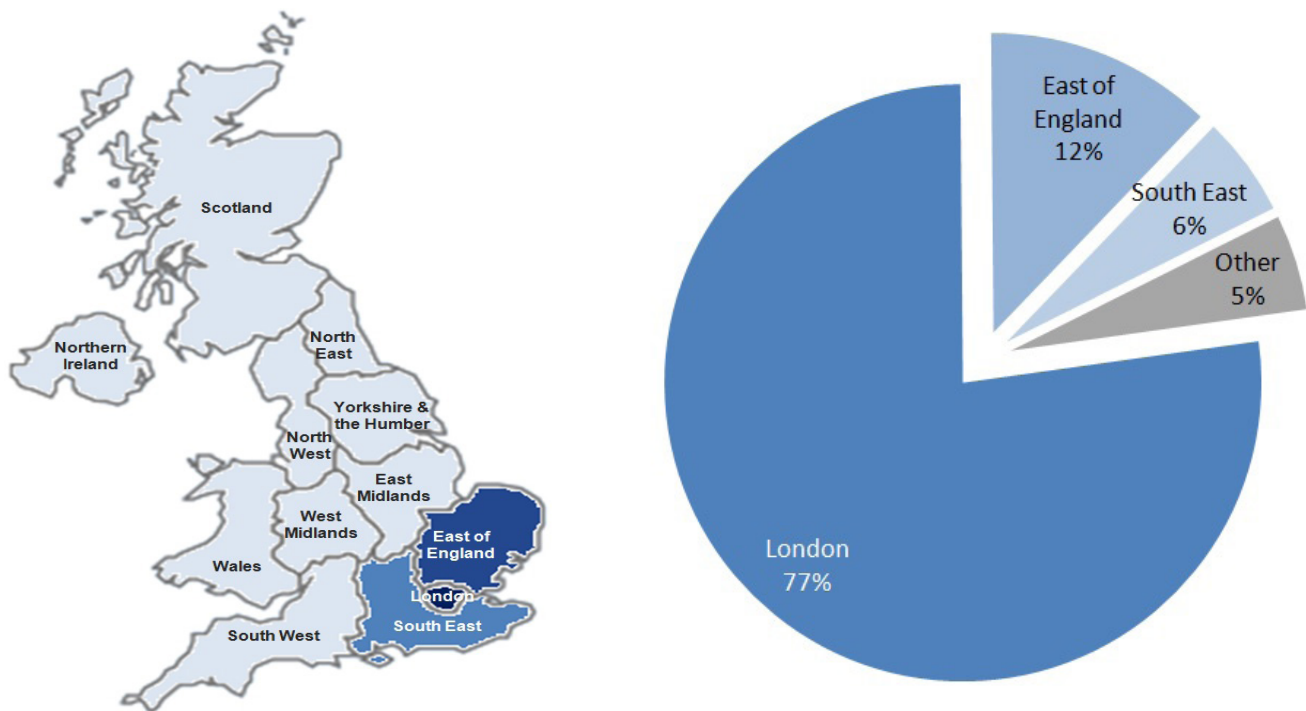
Figure 0.2: UK downstream and upstream space industry turnover 1999/2000 - 2013/2014



Note: 2013/14 forecast based on survey responses and analysis of annual accounts.
 Source: London Economics analysis

The London, East of England, and the South East regions dominate space turnover, accounting for 95% of total turnover. The dominance is slightly greater in downstream turnover, where the three regions make up 95% of the total. Upstream exhibits a little more geographic dispersion, with London, East of England and South East accounting for 88% of turnover.

Figure 0.3: Regional distribution of space industry turnover 2012/13



Note: Based on location of UK headquarters.
 Source: London Economics analysis

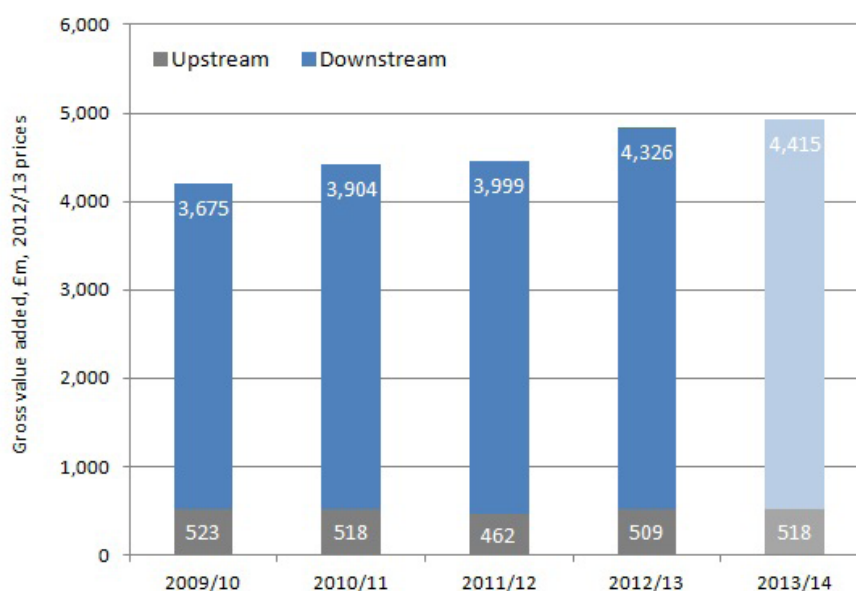
Economic impact of the UK space industry – Value-Added

A key economic impact of any industry or company is its Gross Value-Added (GVA), which is its contribution to the national GDP. GVA is defined as turnover less the cost of intermediate goods excluding labour costs, and is equivalent to salaries and taxes paid, and profits earned.

Direct GVA of the space industry amounted to £4.8 billion in 2012/13, from a turnover of £11.3 billion. The UK space industry therefore contributes to UK GDP to a similar extent as passenger rail transport and motion picture production. The downstream sector contributes 89% of direct GVA, and has had a steady increase over the last two survey periods. The upstream sector on the other hand has exhibited more fluctuation, with growing input costs among key large firms, resulting in a real decrease of upstream GVA since 2010/11.

Comparing GVA results between this survey period and the previous survey period – strong growth in turnover, but a weaker increase in GVA (GVA of £4.4 billion from a turnover of £9.8 billion, at 2012/13 prices) – suggests that the UK space industry has experienced additional demand for its output, and has satisfied the demand by purchasing an increased share of intermediate inputs.

Figure 0.4: UK space industry gross value added 2009/10 - 2013/14



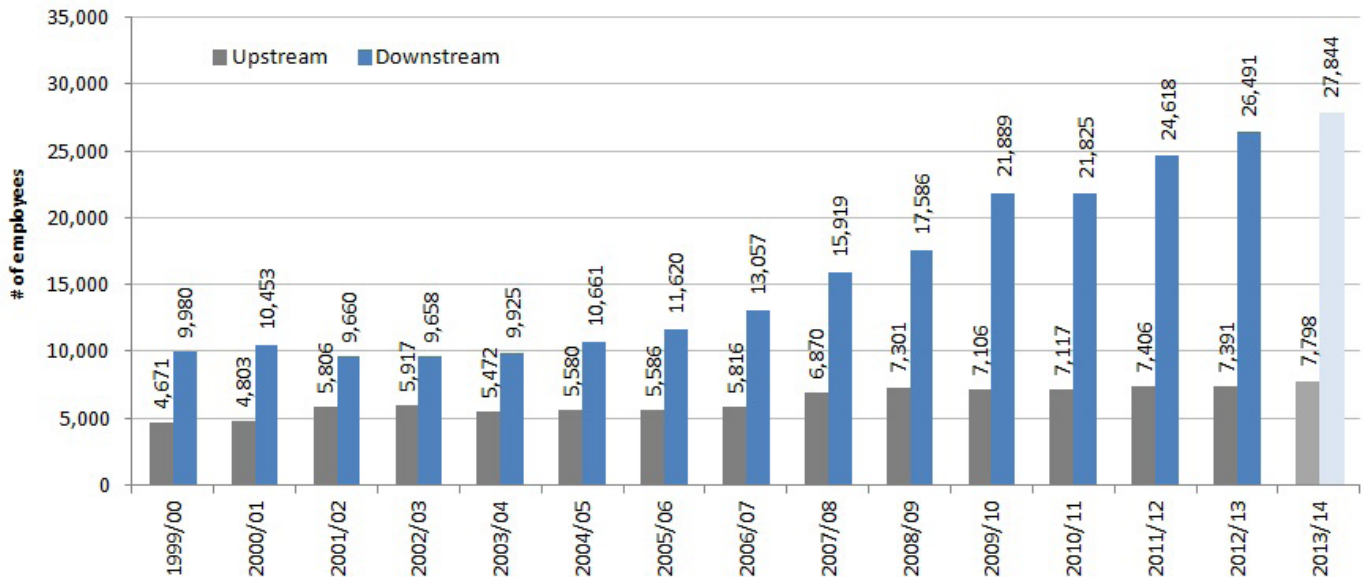
Note: 2013/14 forecast based on survey responses and analysis of annual accounts.

Source: London Economics analysis

Economic impact of the UK space industry – Employment

Employment in the UK space industry has increased to 34,300 employees (an increase of 18.7% since 2010/11), helped by significant hiring by the largest employer (BSkyB) and the rest of the downstream sector (up by 21%). The upstream sector grew at a slower rate (4% over the period).

Figure 0.5: UK downstream and upstream space industry employment 1999/2000-2013/14

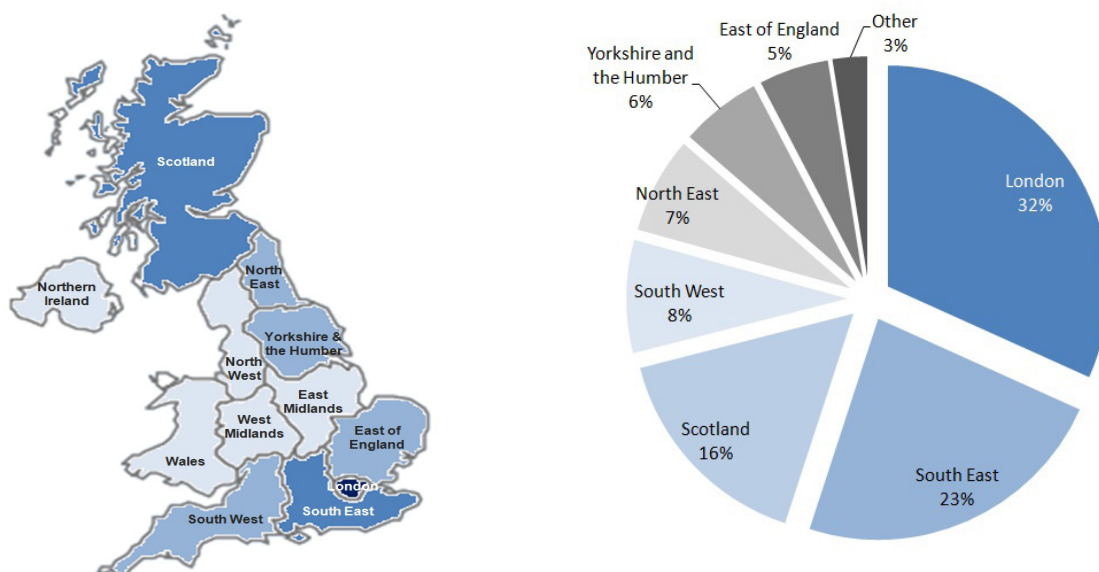


Note: The figure excludes employment levels supported by firms for which a corresponding estimate of turnover was not available, standing at approximately 400 employees. 2013/14 forecast based on survey responses and analysis of annual accounts.

Source: London Economics analysis

The 2014 questionnaire was the first to ask respondents to indicate the split of UK employment by region. As with turnover, London and the South East dominate the majority of space employment, but unlike turnover, Scotland comes third with 16% of UK space employment in 2012/13. The difference between turnover and employment can be explained by companies tending to have headquarters in or near London, and production sites or customer support in other regions.

Figure 0.6: Regional distribution of space employment, 2012/13



Note: Based on regional distribution of employees across the UK as indicated by survey respondents.

Source: London Economics analysis

Economic impact of the UK space industry – Multiplier impact

In the analysis of Gross Value-Added, it is reasonable to include contribution beyond the direct contribution of the industry itself. Activity in the space industry requires inputs from the supply chain. For example manufacture of satellites requires intermediate inputs such as electronic subsystems, which might not be produced in the absence of space industry demand. The associated GVA of the supply chain is known as the Indirect GVA contribution of the space industry. Further to the indirect effect, employees in the space industry and supply chain spend their salaries in yet other sectors of the economy. Capturing these effects in the calculation is known as estimating the induced effects of the industry.

In total, the UK space industry contributes £10.8 billion to UK GDP through direct (£4.8bn), indirect (£3.0bn) and induced (£3.0bn) effects, equivalent to a Type II GVA multiplier of 2.2.

Figure 0.7: The total economic impact of the UK space industry, value added 2012/13



Source: London Economics analysis

The UK space industry also supports employment in addition to the jobs supported by firms in the industry. Intermediate inputs need people to produce them, and retail and service industries need people to do the work. It is found that the UK space industry supports 72,000 jobs through indirect and induced effects in addition to the 34,300 jobs supported by direct employment. This result is equivalent to a Type II employment multiplier of 3.1, yielding an estimated total UK-based employment supported of 106,300 jobs in 2012/13.

Figure 0.8: The total economic impact of the UK space industry, 2012/13



Source: London Economics analysis

Sub-sectors

The breakdown of employment by upstream business sector appears similar to the split of turnover by these categories, with satellite / payload manufacturing contributing the largest share of 36% of employment supported by the sector. However, key differences arise for the ground segment and space transportation subsectors. Whereas the ground segment market accounts for 17% of upstream industry turnover, the respective share of employment amounts to 31%. In the other direction, though the space transportation subsector accrues 24% of upstream turnover, only 5% of upstream jobs are supported by space transportation (such a ratio is consistent with launch service provision and brokerage).

Figure 0.9: Upstream sector turnover by sub-sector, 2012/13

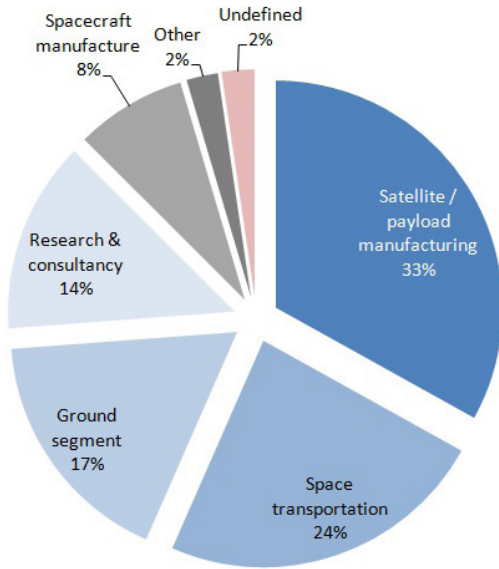
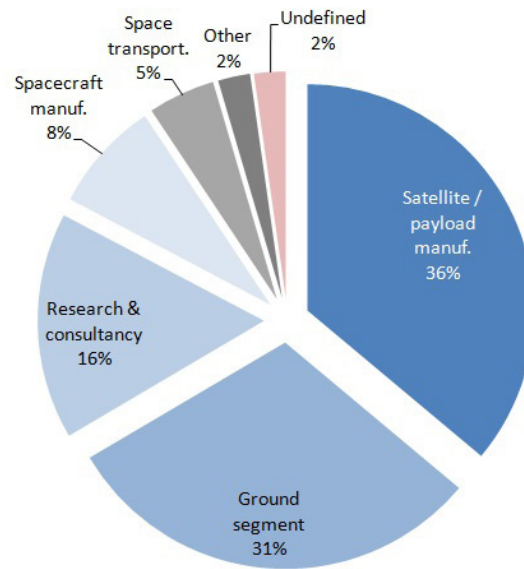


Figure 0.10: Upstream sector employment by sub-sector, 2012/13



Source: London Economics analysis

Downstream employment similarly aligns with the distribution of turnover across downstream subsectors, and continues to be dominated by broadcasting, even more so in 2012/13 than in 2010/11, with broadcasting’s share increasing from 65% to 74% over the period. The growth in downstream employment is linked with BSkyB’s staff expansion, adding 1,200 customer-facing staff to its workforce in 2012 alone⁴. The second and third largest employment shares are supported by the satellite communications (8%) and defence subsectors (6%).

Figure 0.11: Downstream sector turnover by business category, 2012/13

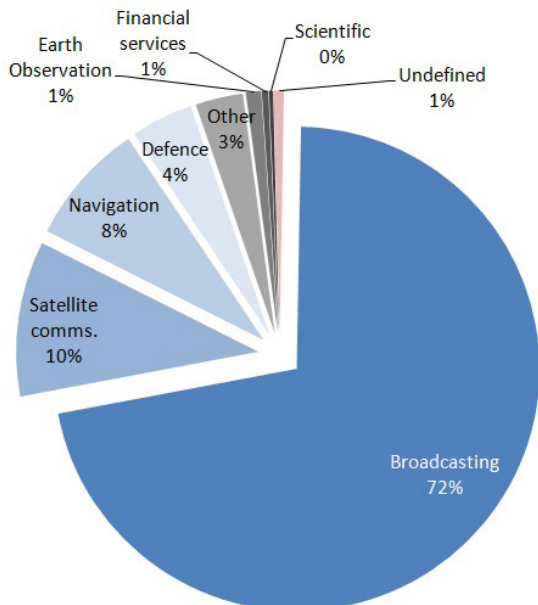
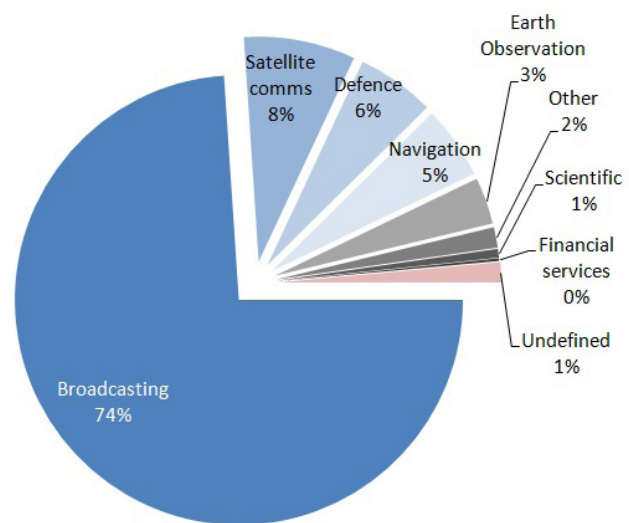


Figure 0.12: Downstream sector employment by business category, 2012/13



Note: Satellite communications include communications other than broadcasting, such as telecommunications and Internet.
Source: London Economics analysis

⁴ British Sky Broadcasting Group Plc (2012) Annual Review 2012, available at: http://annualreview2012.sky.com/_assets/downloads/pdfs/Sky_Annual_Review_2012.pdf

Customers

In 2012/13, business-to-consumer (B2C) sales accounted for 62% of total sales from the space industry, with sales to businesses (B2B) representing 24% of sales. These proportions have remained almost constant since 2010/11, and total turnover generated from B2C and B2B customers has increased from £8.3 billion in 2010/11 to £9.8 billion in 2012/13, which equates to a real compound annual growth rate of 8.7%. Commercial sales to consumers and businesses are concentrated in the broadcasting application and to lesser extent in the satellite communications application.

Figure 0.13: Market share by customer type, 2012/13

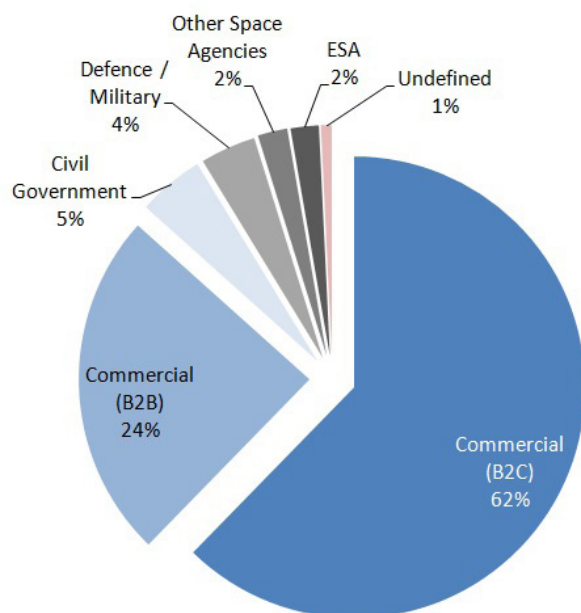
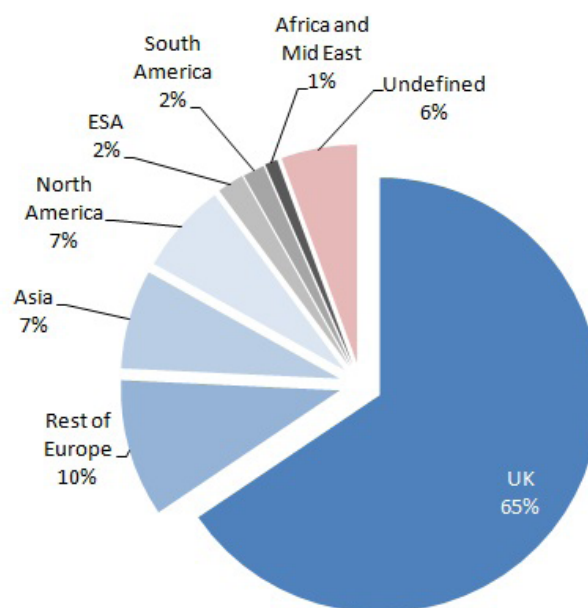


Figure 0.14: Market share by customer location, 2012/13



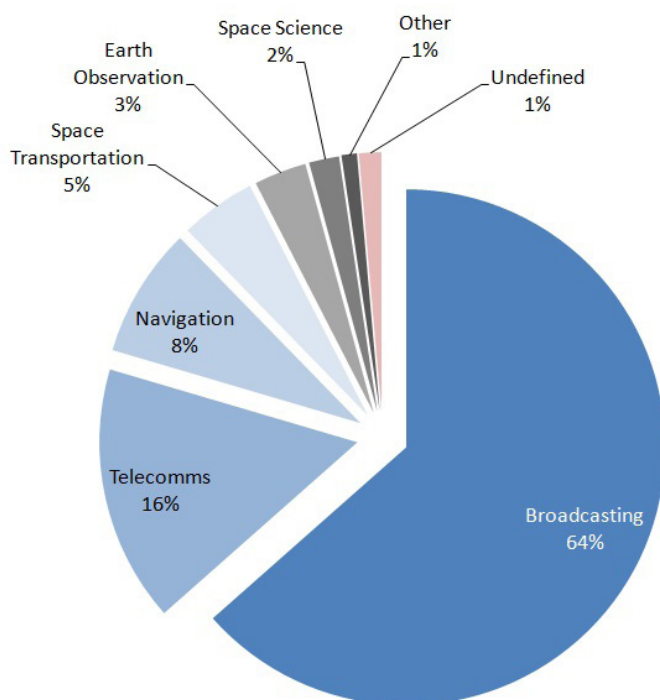
Source: London Economics analysis

The UK remains the key market for the UK space industry, with 65% of turnover coming from domestic customers, but this share is falling. The composition of customer location is changing, with the corresponding share in 2010/11 being 78%. The value of UK sales has grown in real terms, so the decreased share is actually being driven by growth in export sales. Turnover generated from Asian customers has doubled since 2010/11, sales in Europe outside the UK have grown by 50% and sales to the Americas grew by 11%. Only sales to Africa and the Middle East have experienced a minor decrease (less than 1% since 2010/11).

Applications

The largest application in terms of revenue remains broadcasting, as has been the case for the last 5 issues of the study. Telecommunications has decreased in real value terms, but remains the second largest application. Navigation has increased by a factor of three since 2010/11 and now generates 8% of total turnover, while space transportation has increased even faster and represents around 5% of turnover, thus exceeding the turnover generated in Earth Observation. With a UK Spaceport planned for 2018, this growth is encouraging.

Figure 0.15: UK Space turnover by application, 2012/13

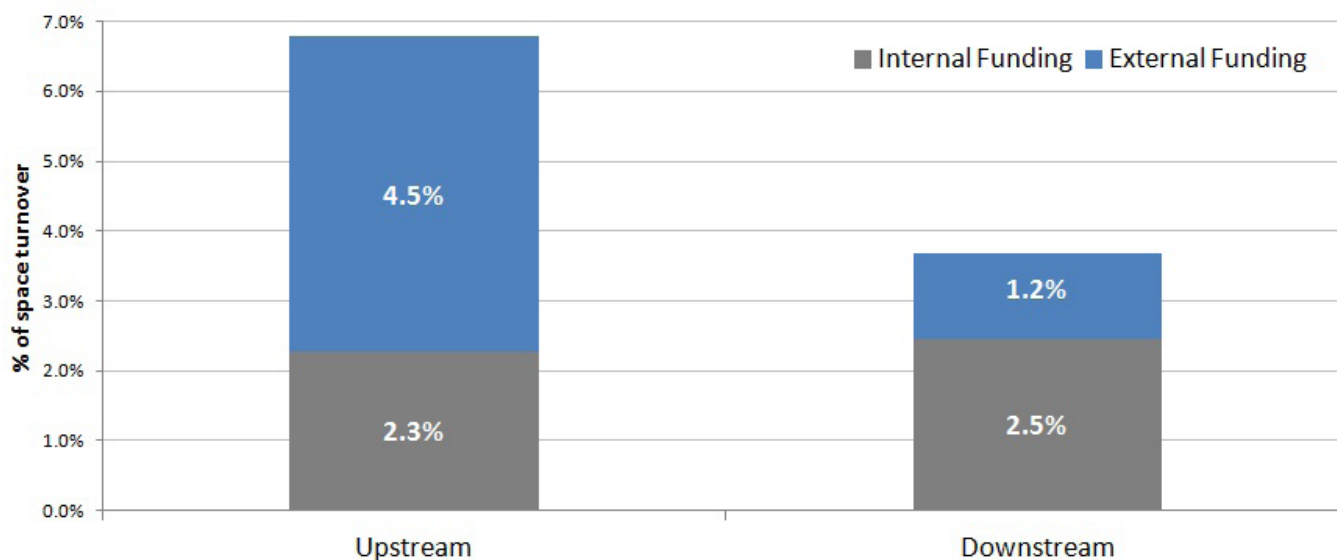


Source: London Economics analysis

Research and Development

R&D investment in the downstream segment is increasing. Following difficult years of financial and economic challenges, the results suggest that the levels reported in the 2008 edition of the study could return. In 2012/13, an equivalent of 3.7% of the downstream sector's turnover was invested in research and development activities, up from 0.8% in 2010/11. The upstream segment exhibits a higher R&D intensity but a different trend: the proportion of upstream turnover invested in R&D activities has been falling over time, from nearly 15% in 2006, to 5.2% of turnover in 2012. However, upstream R&D intensity recovered to 6.8% in 2012/13, albeit with a slightly lower 2.3% of turnover funded from internal sources (was 3.3% in 2010/11).

With the equivalent of 9.3% of direct GVA in the industry invested in Research and Development, the UK space industry compares favourably to key economic sectors such as telecommunications and computer programming/information services (3.4% and 4.1%, respectively). However, the much larger motor vehicles and parts sector and pharmaceuticals invest greater proportions of GVA than the space sector with 16.2% and 60.7%, respectively.

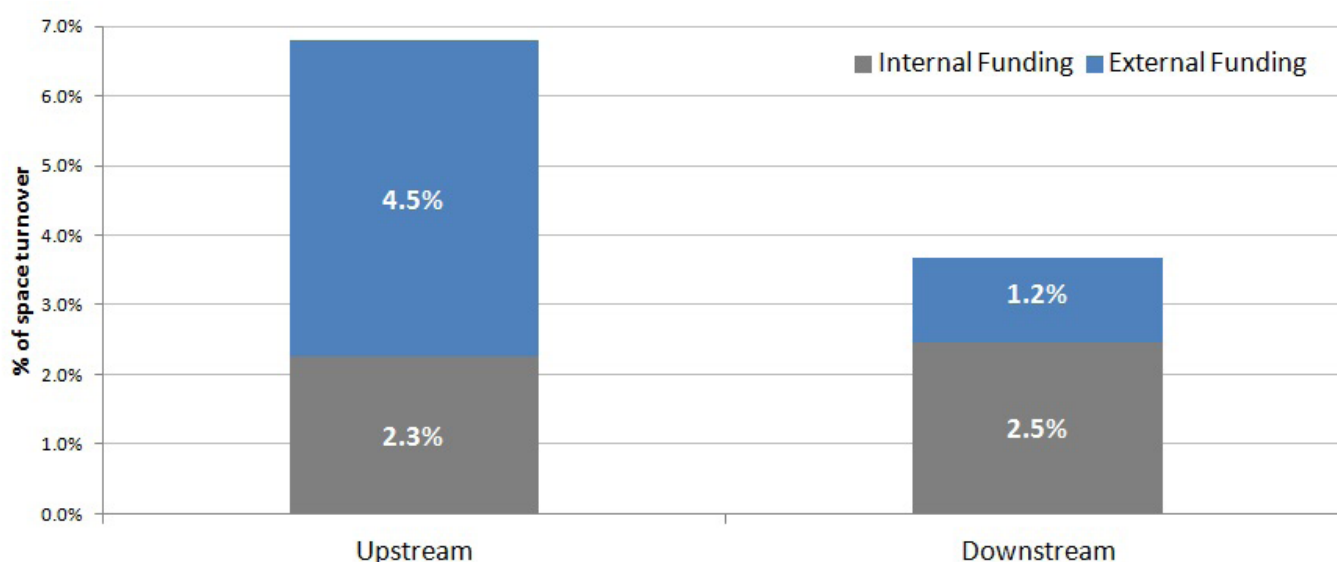
Figure 0.16: UK Space research and development expenditure, 2012/13

Source: London Economics analysis

Beyond 2014

Looking towards the future, survey respondents reported experience of barriers to growth and, on balance, cautiously optimistic expectations for future growth over the next three years:

- **Barriers to growth** were encountered by 70% of survey respondents in the last two years: Large organisations have experienced a lack of demand, while small organisations have difficulty accessing working capital and investment capital.
- **Small organisations have very optimistic outlooks**, with 79% of all respondents expecting performance in the next three years to be greater than the previous three years. These organisations do, however, only account for 64% of space turnover.

Figure 0.17: Growth prospects 2014-2017

Note: 79 respondents out of 111 space industry respondents, accounting for £1,538 million turnover in 2012/13.

Source: London Economics analysis

The wider space economy

An innovation on previous studies of the Size and Health of the UK Space Industry has been the extension of scope to cover the 'space economy', including the manufacturers, operators and providers of space-based services in the 'space industry', but also the commercial consumers of these services which use space-enabled technologies (e.g. satellite navigation, satellite imagery, mapping, meteorological forecasts, satellite broadband, satellite broadcasting content providers) in their operations, research and/or service provision in the UK.

The wider space economy contains two general types of entities: professional entities that employ space services to enable or enhance their own offerings; and users of space services whose productivity is improved as a result of space services.

In the attempt to engage the wider space economy and quantify its size, 228 companies were invited to participate in the survey. However, despite targeted invitations, just 12 companies participated, so supplementary analysis was undertaken of company accounts, finding that:

- Space services support various activities ranging from disaster relief, telemedicine, navigation of leisure craft, to broadcast of entertainment programming and sports.
- Earth observation enables or significantly enhances delivery of products and services among half the respondents to the survey question, implying existence of a significant community applying the service.
- Satellite navigation enables a smaller proportion of survey respondents, but does enable a large community of smartphone app developers, providing benefit to end-user consumers.
- The wider space economy comprises companies in multi-billion pound industries, with space-enabled revenue conservatively estimated as upwards of £1.5 billion. Additional benefits in terms of cost savings have not been monetised.

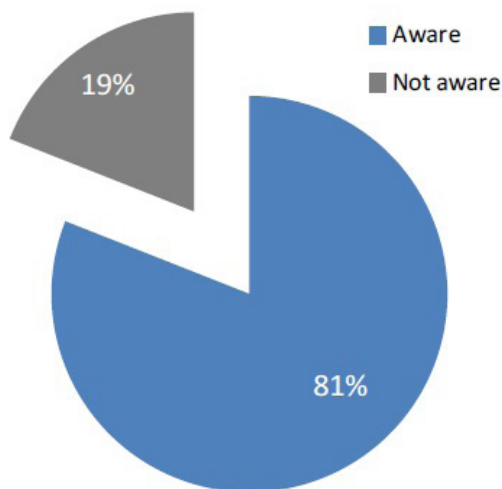
Performance of the UK Space Agency

81% of respondents are aware of the UK Space Agency's growth promotion activities. Among larger (medium-sized SMEs and large) organisations, this number increases to 85%, and in the downstream the proportion is 87%.

The UK Space Agency's ability to target high growth opportunities is confirmed by 89% of respondents, with 52% respondents rating performance as 'good' or 'very good'. Small organisations' ratings exhibit a broad range of opinions, with 18% saying the UKSA's ability at targeting opportunities is 'very good', and 4% saying 'very poor'.

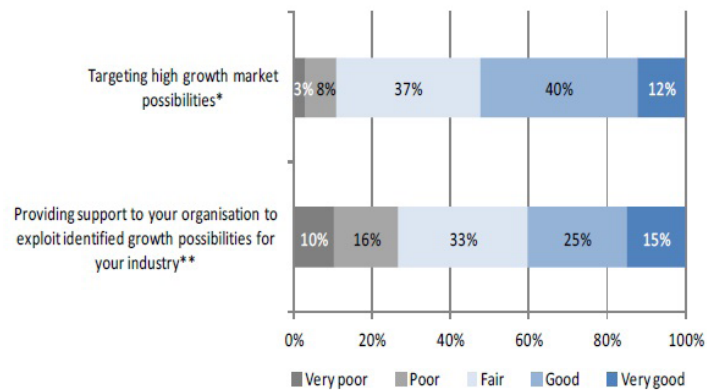
73% of respondents approve the UK Space Agency's ability to provide support in exploiting growth opportunities and 40% rate performance as 'good' or 'very good'. Among small enterprises, however, 35% of respondents say support is 'bad' or 'very bad'.

Figure 0.18: Awareness of UK Space Agency's growth promotion activities



Note: 84 respondents.

Figure 0.19: Performance of the UK Space Agency in delivering growth in delivering growth



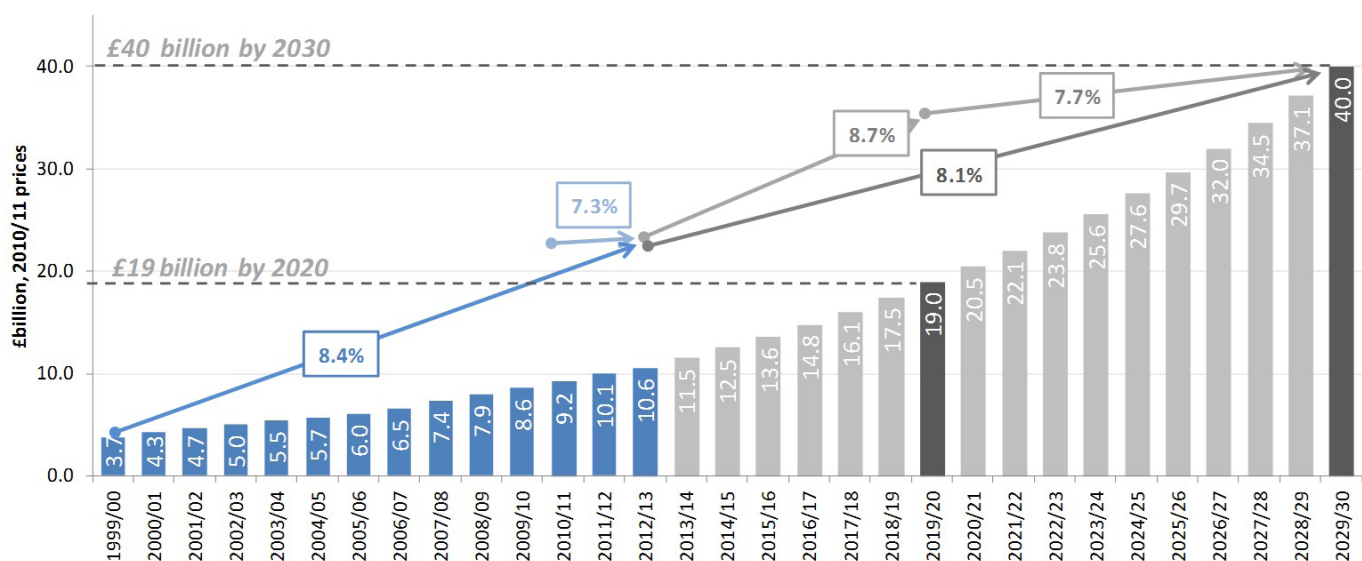
Note: * 65 respondents. ** 67 respondents

Source: London Economics analysis

Towards the Space Growth Action Plan objectives

The study further analysed the current position and considered the future growth path required to achieve the government's objectives, as set out in the Space Innovation and Growth Strategy 2014-30 and the Space Growth Action Plan, in the context of actual historical growth rates. The conclusion is that a continuation of historical growth trends would be sufficient to reach the target of 10% of the global space economy in 2030, as shown in Figure 0.20.

Figure 0.20: Space Growth Action Plan targets



Note: Arrows indicate compound annual growth rates of UK space industry. Figure does not include forecasted turnover for the 2013/14 financial year, but instead presents values required to achieve the target of £19 billion by 2019/20 (based on a compound annual growth rate of 8.7% from 2012/13 to 2019/20). All values are in 2010/11 prices, the base year of the Space Growth Action Plan.

Source: London Economics analysis and Space Innovation and Growth Strategy Steering Board (2013)

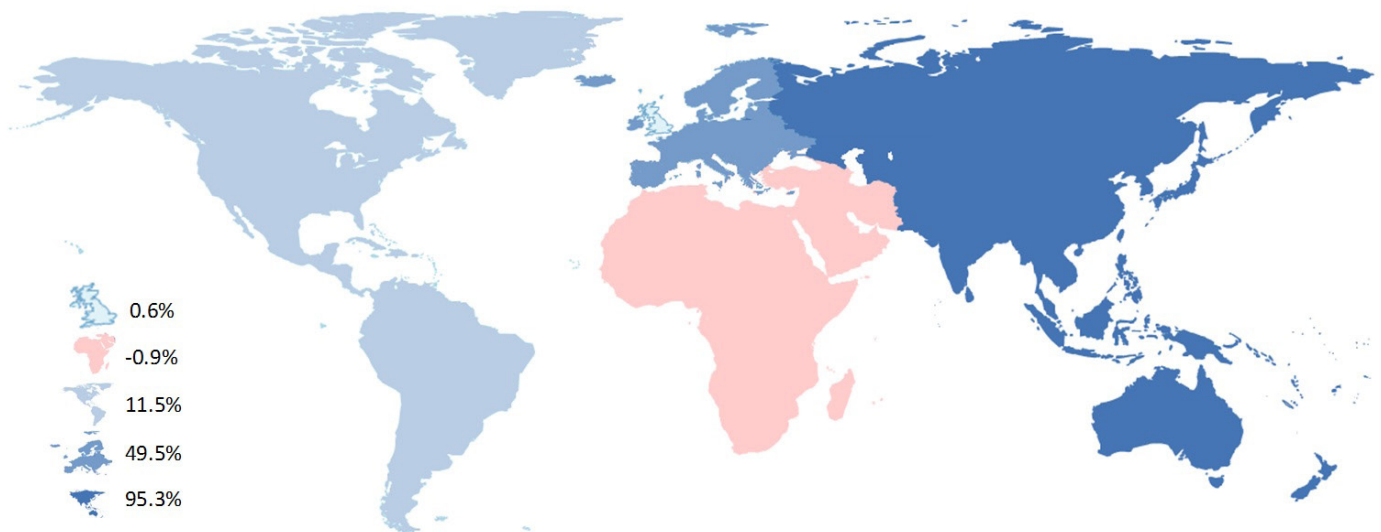
While the UK space industry’s revenue experienced average real growth of 8.4%⁵ between 1999/2000 and 2012/13, growth over the past two years has slowed to 7.3%. In comparison, to achieve the interim objective set by the Space Growth Action Plan for 2020, industry turnover will need to grow by an average of 8.7% per year, to increase from £10.6 billion in 2012/13 (in 2010/11 prices) to the targeted £19 billion in 2019/20. In light of lower historical growth trends particularly since 2010/11, the timeframe set for the interim objective thus appears a challenging target, and would necessitate a significant acceleration in revenue growth over the next six years.

In contrast, the UK space industry looks more likely to achieve its long-term target of £40 billion of total revenue by 2030. To realise this objective, UK space sector turnover would have to increase at an average of 8.1% per year, i.e. 0.3 percentage points lower than actual growth observed between 1999/2000 and 2012/13. Hence, though short-run average growth between 2010/11 and 2012/13 implies that the interim target for 2019 will be relatively difficult to achieve, the long-term growth trend exhibited by the UK space industry appears sufficiently strong for the industry to reach 10% of the global space sector by 2029/30.

However, the target is unlikely to be achieved by the current space industry members alone as broadcasting is unlikely to be able to deliver the growth needed. Some of the current applications, on the other hand, space transportation and satellite navigation, could deliver growth over and above the required rate to 2030. In all likelihood, however, the space industry needs to expand into new markets in terms of applications to realise the targets. Some of the High Growth Markets identified in the Space Growth Action Plan are already being exploited, with many firms already active in the market for ubiquitous M2M⁶ and smart cities. The optimistic growth expectations of smaller companies also suggest that they could be an important engine for long-term growth.

New geographical markets could represent another channel towards success for the space industry, with the current survey returning considerable growth in export intensity. As Figure 0.21 shows, the space industry’s sales to foreign customers have grown in most regions and sustained growth rates that will help to reach the target.

Figure 0.21: Real growth rate of turnover by customer location



Source: London Economics analysis

⁵ Compound average growth rate per year.

⁶ Machine-to-Machine, and the associated Internet of Things.

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