

Government Response to the
UK Space Innovation and Growth Strategy
2014 – 2030

Space Growth Action Plan

APRIL 2014



Foreword

In the four years since the original Space Innovation and Growth Strategy we have seen the Government follow through on its commitments. We have created the UK Space Agency to be the strategic, influential leader requested by the sector, accelerated the commercialisation of ideas with the Satellite Applications Catapult, and demonstrated this Government's belief in the value of international partnership through the European Space Agency by dedicating £1.2 billion to ESA programmes over the next five years.

Having celebrated that continued success over the last four years, we are now looking toward delivering the ambition of capturing 10% of the global market for the UK by 2030.

I have identified space as one of Britain's 8 Great Technologies, and we are already targeting the key investments for our future, including a £60 million commitment to the development of the SABR engine which we hope will spark the next generation of launcher technology. We are also waking up to a growing awareness of how satellite applications and services form part of the fabric of every sector in the UK economy.

But the future of the space sector in the UK doesn't rely solely on top-down Government investment. Neither could British business hope to capture this new share of the global market on its own. Instead, this growth must come through partnership – through working more intelligently together.

And growth will not come from the same activities that have taken us to where we are today – we must capitalise on the next ideas rather than the last. We will be reliant on the British capacity for brilliance and invention, encouraging the UK's vibrant small businesses to develop their ideas and dive into the sector.

We also recognize that Britain is open for business. Space is a global market and international collaboration is the norm. We are encouraging inward investment from those companies who are prepared to make a real commitment to the growth of the space sector, creating jobs and opportunities for the wider UK supply chain.

I am very proud that this Government can endorse the Space Innovation and Growth Strategy's Growth Action Plan and to share our response to the challenges and ambitions that lie ahead.

With Tim Peake, the first British ESA astronaut, on a mission to the International Space Station in November 2015, we are entering a period where space will shape the imagination of the country in a way we could not have envisioned four years ago. We are in a new British space age. I look forward to realising the potential of this incredibly exciting sector, making our hopes for a brighter future a reality.

David Willetts

Minister for Universities and Science

Executive summary

The Government acknowledges the continuing opportunity for economic growth in the UK space sector. Following the completion of many of the recommendations in the original industry-led Space Innovation and Growth Strategy which was launched on 10 February 2010, Government has been pleased to see industry proposing a bold and ambitious Space Growth Action Plan¹ which will take the United Kingdom further towards a space economy worth £40 billion per year by 2030.

It is clear that the growth created from developing downstream applications and from maximising export opportunities will be the substantial part of the future growth story, and this is reinforced in this new report. This will require a continuing shift in approach and in investment from industry and from Government.

Achieving the recommendations in the 2010 report have provided a series of landmarks on a roadmap which has taken the British space sector to a new and more ambitious place and seen the industry continue to show annual growth rates averaging 7.5% over recent years. Whilst most of the recommendations in the Innovation and Growth Strategy report have been successfully implemented some of the original recommendations have been pulled through into more specific actions in the Space Growth Action Plan.

Since 2010, space has become one of the Government's *Eight Great Technologies*: an acknowledgement of the contribution that the sector makes to driving economic growth and creating jobs.

The Space Leadership Council, co-chaired by Government and industry, is now an established part of the landscape and has a recognised role offering strategic advice to Government on key issues facing the space sector.

The UK Space Agency has been established with a clear mission to lead the UK civil space sector and deliver an excellent space programme with maximum economic, scientific, and policy benefit for the United Kingdom.

The Government has defined both a Civil Space Strategy and a National Space Security Policy; and the UK is increasingly influential in space internationally and as a strong leader in the European space arena. The Government will continue to strengthen the UK presence in key European organisations including the European Space Agency (ESA) and will actively position the UK to exploit the €12 billion of European Union space investment over the next seven years. UK Government investment in ESA totals £1.2 billion with over the next five years much of this is focused on areas which will bring the strongest possible economic return.

The UK investment in ESA has also facilitated the establishment of the ESA European Centre for Space Applications and Telecommunications (ECSAT) at the UK Space Gateway at Harwell, Oxford. The Satellite Applications Catapult Centre, part of the UK's network of research and innovation centres, has also been established there in order to help businesses develop and commercialise space technologies and satellite applications. These developments are strongly linked to the UK strategy to capture strong growth in space applications and services. The UK Space Gateway is the focal point for the UK space sector and will link to the development of wider UK capabilities which, through links with Local Enterprise Partnerships (LEPs) and the Devolved Administrations, will lead to balanced economic growth.

The establishment of the £1million per annum 'Space for Smarter Government' programme recognises that the public sector can play a key leadership role by unlocking the potential of space to enhance public sector services and reduce costs. Developing this market can also enable the public sector to act as an anchor tenant for the export of applications and services.

The Government is determined to make the UK the best place to grow existing and new space businesses. This response sets out a range of measures which will promote enterprise and investment. The regulatory environment is an area where government will continue to actively study the options to ensure this overall goal is met. The industry analysis which is underway in this area is a

welcome contribution of evidence to further government policy development.

The Government shares the analysis that it is essential to stimulate the continued development of a vibrant SME sector. This response sets out a number of activities which will support that development and recognises that more needs to be done in this area. The space sector can be capital intensive, and government will continue to work with the sector to seek new ways of accessing long term capital. The provision of ground segment and facilities which support the exploitation of space assets and data are also key to economic growth and government is already active in ensuring synergy between public and private investment and is building a roadmap of future opportunities to keep the UK at the forefront of exploitation.

Access to skills is one of the cross cutting elements of government industrial strategy. Understanding the skills needed for the new businesses which will be created in the downstream focused space sector will be crucial.

The Challenger Business programme also shaped this Government response.

In October 2013 Government launched a programme led jointly by BIS and Cabinet Office with a broad remit to identify and support the UK's most dynamic businesses and sectors.
<https://www.gov.uk/government/news/government-to-launch-challenger-businesses-programme>

David Willetts asked the Challenger Business team to bring its focus onto the satellite and commercial space sector to ensure a growth strategy understood and addressed the key obstacles faced by front-line companies.

The Minister hosted a workshop and the team gathered evidence of barriers to growth and their impact and sought suggestions for solutions and plans for action. Issues raised reinforced many issues that were well known to Government but surfaced new evidence and ideas, for example around tax.

The Challenger Business team then worked with officials across government to deliver a swifter process for capping third-party liability and ensuring a competitive UK regime for cubesats. The team supported commitments to clearer web-based content and a swifter, more transparent process for licence applicants that delivers value for money for the taxpayer. Further outputs were a commitment to dedicated export control sessions for the space sector and to exempt satellites from insurance premium tax. These outputs are included in this document.

This government response demonstrates the progress made since the publication of the Space Innovation and Growth Strategy in 2010 and recognises that concerted action is needed particularly to ensure strong export growth and to ensure growth in applications and services derived from space. The direction of travel for government activity in the space sector is clear. Government welcomes the greater focus on implementation in the Space Growth Action Plan and the UK Space Agency will work alongside industry and the research base as part of the implementation team based at the UK Space Gateway. For the actions which are to be led by the UK Space Agency, the timetable for delivery will be set by the UK Space Agency's corporate plan, which sets out the Agency's annual work plan.

Government response to the recommendations

Government welcomes all five of the Space Growth Action Plan's high level recommendations. The Government shares the analysis that there are exciting opportunities open to the space sector and also remains committed to the goal of raising the UK share of the projected £400 billion global space-enabled market to 10% by 2030. Understanding the trajectory required to grasp the opportunities is essential, and so the Government welcomes both the analysis undertaken and the introduction of an interim goal of £19 billion annual turnover in the UK Space Industry by 2020 as a means to ensuring that the whole sector is working together on a clear roadmap.

The Government has considered each recommendation and action proposed and has set out its position under each of the five themes. There is a significant degree of coherence between

the recommendations in the Space Growth Action Plan and those proposed by the House of Commons Science and Technology Committee's report on the work of the UK and European Space Agencies (www.publications.parliament.uk/pa/cm201314/cmselect/cmsctech/253/25302.htm). Therefore the two sets of recommendations were considered in parallel. Likewise, the Challenger Businesses in Space and Satellite Applications process has also helped shape this Government response.

The recommendations and actions (and their reference numbers) referred to in this document, are contained within the Space Innovation and Growth Strategy 2014-2030: Space Growth Action Plan, published in November 2013
<https://connect.innovateuk.org/web/space/space-igs-2014-30>

DEVELOPING HIGH VALUE PRIORITY MARKETS

RECOMMENDATION 1: Develop the high-value priority markets identified to deliver £30 billion per annum of new space applications by promoting the benefits of Space to business and Government and engaging service providers.

Government welcomes the targeting of activity to build high value priority markets identified as having the potential to deliver a significant proportion of the anticipated growth in the UK Space Industry. The scale of the challenge in hitting the growth target should not be underestimated. Government recognises that by identifying ways that space applications can make a contribution to solving global and domestic challenges the value of the sector will grow.

ACTION 1.4 Technology Strategy Board to launch R&D calls that require cross-sector collaboration as part of the call scope and require a business case that promotes value in the space and recipient industries.

Government welcomes this action, as the impact of data coming from space can positively affect most, if not all, of the other 'Eight Great' technology areas currently being prioritised. The Technology Strategy Board will undertake a series of such calls.

ACTION 1.5 UK Space Agency to lead the positioning of the UK's exploitation of Earth Observation data by supporting the community to implement a Climate Services Centre for Europe in the UK.

The Government welcomes this recognition of the UK's strong expertise in climate science, monitoring and climate prediction modelling, and the value of the emerging climate services markets. The Space Agency, working with the National Centre for Earth Observation, funds a coordinating office to build an enduring UK Climate Services space partnership. The partnership will develop new climate services using data from space to address European and Global demands.

ACTION 1.6 UK Space Agency to work with the Earth observation community to identify and invest in new commercial opportunities for premium services beyond those supplied by institutional satellites.

The Government understands the need to support the Earth observation (EO) community in accessing new commercial opportunities. The UK Space Agency will promote and support bilateral dialogue helping industry to access emerging international commercial and institutional markets, and the government will encourage inward investors who bring access to international customers. Through programmes such as NovaSAR, the Government will support UK companies in showcasing new premium services and help demonstrate uptake. Similarly the UK Space Agency's Space for Smarter Government Programme will support government uptake of premium space services and the government will work with the EO community to identify opportunities for innovation in the provision and supply chains of institutional programmes.

ACTION 1.7 UK Space Agency to move the National Space Applications Programme from a set up to an operational phase, with the aim of increasing its base funding to a level twice the current published budget by 2015.

The Government welcomes this recommendation and will increase the funding level of the programme from £0.5 million to £1 million annually from 1 April 2014, the start of the operational phase.

The public sector is already a significant user of space-based data and services but there are yet further benefits and savings to be made from even greater use. The public sector can play a key

leadership role in developing the UK space sector by increasing the size of the domestic market through use of technologies to bring about efficiencies and cost reductions, and by acting as an anchor tenant for the export of applications and services. There will be a significant increase in the amount of free data and number of free services available to the Government from programmes already underway.

In 2013/14, the 'Space for Smarter Government Programme' (formerly the National Space Applications Programme) was in a set up phase. The programme is run by the UK Space Agency in close cooperation with the Satellite Applications Catapult and the Technology Strategy Board. The programme unlocks the potential of space to enhance public sector services and to reduce costs and will highlight to the public sector, at national and local levels opportunities to enable them to explore the use of space data products and services. The programme will help to leverage funding from existing budgets and funding mechanisms such as the EU's Horizon 2020 research initiative. The programme will encourage the public sector to be an enlightened and innovative user of space-enabled services.

The longer term aims of the programme are to create intelligent customers and users within public sector bodies who can help to aggregate the demand for space based solutions and technologies. Aggregation of demand could influence the services that could be available in the future and lead to tasking satellites, for example for specific products or services.

PROMOTING ENTERPRISE AND INVESTMENT THROUGH REGULATION

RECOMMENDATION 2: Make the UK the best place to grow existing and new space businesses and attract inward investment by providing a regulatory environment that promotes enterprise and investment in the UK.

The Government shares the goal that the UK should be the best place to grow existing and new space businesses. The Government will continue to work to deliver a regulatory environment that promotes enterprise and investment in the UK. This is a key element of our industrial strategy. Government welcomes the recognition that we have a strong and internationally highly regarded framework of regulatory principles and that holding a UK Outer Space Act (OSA) licence lends credibility at the international level.

The Government announced in 2011 the intention to introduce a cap on the unlimited liability facing UK satellite operators. The aim of this is to level the playing field for UK companies when competing for international business. The requirement on licensees to obtain third party liability insurance was reduced

from £100 million to €60 million (for standard missions) at that time. Following a positive response to a consultation on the subject, to which the Government's response was published in December 2013, work is progressing to implement the liability cap. The favoured route to achieve this would give the Secretary of State the power to set/vary the liability limit.

The UK Space Agency will also review the UK approach to cubesats and other small satellites and develop a clear, accessible framework that will consider the risks they pose and ensure proportionality of treatment.

The active application by the UK Space Agency of the discretion available to the Secretary of State will ensure UK space companies remain internationally competitive.

To further reduce the insurance costs facing UK-based satellite operators, the Chancellor announced at Budget 2014 that Government will amend legislation to create an exemption from insurance premium tax for space satellites. The intention is to publish draft legislation and consult with industry and other relevant bodies on the process for the introduction of this exemption, including a transitional period. The intention would be to apply the exemption from the 6% tax currently applied to premiums received under policies incepting on or after the implementation date, which we anticipate will be before the end of 2014. This measure will benefit any businesses whose activity includes either operating or insuring space satellites.

During the financial year 2013-14 the UK Space Agency continued to see year-on-year demand for OSA licences growing. 2013-14 saw an increase of over 60% in the number of OSA licences issued, compared with the previous year. Despite the increase, 100% of applications resulted in licences being issued well before the launch date. To further aid applicants, Ofcom and UKSA will explore how licensing processes could be made clearer, including through updated website information.

ACTION 2.2

UK Space Agency to lead the creation of a Space Regulatory & Spectrum group reporting to the Space Leadership Council (SLC) and the Department for Business Innovation and Skills (BIS) and Department for Culture Media and Sport (DCMS) Ministers to prepare support for the UK's agreed space growth agenda at international regulatory meetings, secure satellite spectrum needed for new services, and provide advice and support for future regulatory reform.

The Government notes the recommendation for the UK Space Agency to lead the creation of a Regulatory and Spectrum Group reporting to Ministers in the Department for Business Innovation and Skills (BIS) and the Department for Culture Media and Sport (DCMS). Government agrees that the space sector could improve its coordination and representation on spectrum and regulation activities. However, Government would support a different structure to achieve this, which it believes would be a more effective way for industry to present its views to Government and which would be more efficient for all stakeholders.

Industry could create a Regulatory and Spectrum Group with the support of the UK Space Agency and other Government stakeholders, with the aim of establishing cross-industry positions on spectrum and licensing issues. In particular, this group could draw on the evidence produced by the UKspace review of the

space business environment (action 2.1) and further analysis of the economic and social arguments for the use of spectrum by space services and applications.

The Government encourages this group and the industry to work closely with the Spectrum Policy Forum (SPF). This group was established last year as the key industry sounding board to Government and Ofcom on spectrum issues and was endorsed in this role by DCMS's Spectrum Strategy published by Government on the 10 March 2014.

A strong voice for the space sector on the SPF will ensure that it is fully able to represent stakeholder concerns to Government and Ofcom so that the economic growth and social arguments for allocating spectrum to the space sector continue to be heard and to help support the growth of services, applications and science activities in the UK space sector.

The chair of the Spectrum Policy Forum already meets regularly with the DCMS minister responsible for spectrum and the CEO of Ofcom. The chair of the SPF and Ofcom will in future be invited to join the Space Leadership Council and the Information Economy Council. The SPF will also provide input to the UK Spectrum Strategy Committee (UK SSC), which is jointly chaired by DCMS and Ministry of Defence (MoD).

ACTION 2.3

Ofcom should prioritise the interests of UK satellite operator companies creating wealth, employment and taxes in the UK, in matters related to access to international satellite spectrum allocated by the International Telecommunication Union (ITU), treatment of satellite network filings by the UK to the ITU and to framing of international satellite regulations at the ITU.

Ofcom is the UK's independent communication regulatory authority. It is required under the Communications Act 2003 and by direction from the Secretary of State for Culture, Media and Sport to represent the UK at the International Telecommunications Union (ITU) and submit satellite filings to the ITU on behalf of the of UK and its overseas and Crown dependent territories. Ofcom will continue to develop its approach to satellite and spectrum issues in close consultation with the UK space industry, including through consultative fora such as the International Frequency Planning Group, which Ofcom chairs, and the Spectrum Policy Forum.

ACTION 2.4

UK Space Agency to revise guidance and due diligence process for Outer Space Act licenses such applicants or their parent groups must meet agreed targets in terms of investment, jobs and use of UK services. They must also conduct the operations to be licensed substantially from the UK and with their primary tax base from these operations in the UK. To minimise the administrative burden for applicants this should be a common criteria used by Ofcom when companies first apply for a satellite filing that will subsequently need an OSA licence.

The Prime Minister outlined at Davos (January 2014) key features of the UK's competitive business environment, including the lowest corporation tax in the G7, and his pride in the UK's success in attracting inward foreign direct investment. The UK's world-renowned science and innovation environment is a core commercial asset for international companies in the development of market-leading products and services.

Government agrees that the space licensing process can also serve to stimulate growth and investment by both UK companies and inward investors into the UK economy. The purpose of the Outer Space Act (OSA) and its licensing regime is to ensure compliance with the UK's international obligations and to balance the risk posed by space activity against the scientific and financial benefits. The Outer Space Act has been extended to some of the Overseas Territories (OT) and Crown Dependencies (CD) and upon satisfactory completion of the licensing procedure an applicant from one of these territories will receive a licence. To mitigate against the financial risk, the UK Government has established several Memoranda of Understanding (MOU) and letters of agreement with a number of the governments in these territories to share the risk involved. These agreements were concluded through the close working relationship of officials. As the UK has certain constitutional responsibilities for the Overseas Territories and Crown Dependencies, it is important that these relationships are maintained.

The OSA licensing procedure must remain fair and consistent in its application and any new measures must be equitable across the broad range of licence applicants. The Government considers that the proposed additional condition on licensing would pose an unnecessary burden on potential applicants, is outside the scope of the original intention of the OSA and there are serious questions over its legality under EU law. Therefore Recommendation 2.4 is currently unsuitable for application to the OSA licensing regime. However, the Government recognises

the advantages of gathering information about the growth of UK companies engaged in space activity and intends to do so via the OSA licence application form. The information provided will not influence a licensing decision but applicants will be asked how the proposed activity will benefit the economies of the UK, or relevant Overseas Territories and Crown Dependencies. This update to the OSA licence application form will be completed in conjunction with the recommendations in action 2.5.

The Government encourages cross-departmental working and recognises the Agency's excellent relationship with Ofcom. The Agency has its own dedicated spectrum lead who ensures open communication on spectrum and licensing matters. Following feedback from industry, this relationship will be maintained and improved.

ACTION 2.5

UK Space Agency should simplify its licensing procedures wherever practicable to reduce fees and introduce unambiguous, flexible and achievable criteria for SMEs and start-up companies in the UK taking into account the outputs of its Regulatory Working Group and UK economic growth.

Licensing is a statutory requirement and the Government welcomes the comments in the report that the UK provides a strong and internationally highly regarded framework of regulatory principles and the knowledge that receiving an OSA licence offers credibility at international level. The Space Growth Action Plan also recognises the very real risk posed to the Government by failed space activities. When considering reforms to the licensing process the right balance must be struck between ensuring a competitive approach and upholding our reputation as a responsible regulator complying with international obligations.

The UK Space Agency is committed to providing licence applicants with clear and transparent advice about the licensing process. There is a wealth of information on the UK Space Agency website including standard technical question sets relating to launch, in orbit activities, ground segment and operational activities, an outline of the main stages of the licensing process and an example licence.

However, the UK Space Agency acknowledges that the guidance it publishes for licence applicants could be improved, in particular, with regard to SMEs and start-ups. For example it is widely but erroneously thought that three years of audited accounts are required in order to apply for an OSA licence, when in fact only two years are specified in the published guidance. Further, for start-ups that are unable to supply such accounts, alternatives can be explored. The regulation team at the UK Space Agency welcomes early contact from potential licence applicants to

explain the process, answer queries and explore pragmatic solutions.

Thus, the UK Space Agency will review its web-based content to ensure it is accessible, accurate and helpful. In addition UK Space Agency will work with Ofcom to see if a commitment to a swifter and more seamless end-to-end process could be delivered, including whether a 3 month deadline to complete OSA licence applications (whilst recognising relevant caveats) could be set, and thereby give the UK an advantage internationally.

The UK Space Agency will also review the economic cost of delivering the space licensing regime and the fees charged to ensure value for money for the tax-payer and a clear and transparent fee system for applicants.

ACTION 2.6 UK Space Agency to champion policy and investment to establish a Space Port in the UK by 2018 and identify further reforms to regulation needed to allow space flight in the UK.

The Government has set up a cross departmental National Space Flight Coordination Group, chaired by the UK Space Agency, to take forward space plane regulation, investments in space planes and the selection of a UK Space Port. This group reports to Ministers. Its cross-cutting nature is recognition of the scale of the challenge inherent in identifying, approving and building a UK spaceport and in supporting all the necessary innovation and technology that it would require.

The Government acknowledges that this is an important area of work which has the potential to provide a valuable addition to the UK space ecosystem, in the longer term potentially leading to more reliable, affordable launch services and new local and regional growth opportunities for space business. The Government has already been active in this area, commissioning an initial review into regulation aspects, which will report in July 2014, as well as a technology feasibility study into the elements of a UK spaceport within the National Space Technology Programme. All of this work will inform the work of the National Space Flight Coordination Group.

INFLUENCING EUROPE

RECOMMENDATION 3: Increase the UK's returns from Europe by continuing to grow the UK's contributions to ESA programmes and securing greater influence in large European-funded programmes.

ACTION 3.1 UK Space Agency to create a European Space Engagement Plan.

The Government welcomes this recommendation. The European Union is an increasingly important actor in the space sector with nearly €12 billion allocated to space activity over the next seven years. It is important that the UK reacts to opportunities and challenges that will arise from these programmes and initiatives, including on new policies and regulations for the sector which could establish barriers for existing markets (e.g. on high resolution space data) or open up entirely new ones (e.g. on space plane operations). Considerable opportunities for the use of space-based data and services exist in EU policies such as agriculture and transport which should be exploited. Space activity in Europe is also undertaken by the European Space Agency and through specialist organisations such as European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

The Government is very active in seeking to exploit opportunities from European level work. For example, the UK Space Agency is implementing the second phase of a £7 million programme to demonstrate working prototypes of technologies which exploit

Galileo's Public Regulated Service. The programme is expected to demonstrate how new technologies can be used to meet the needs of specific sectors and position UK industry to secure a lead over international competitors.

The UK has set clear policy positions on a range of issues affecting ESA and the EU funded space programmes, for example taking a clear view that ESA should remain an inter-governmental agency and not be absorbed into the European Union. The UK has also been influential in shaping the legal framework for Galileo and has pressed to secure our goals for the way in which the European Commission and ESA work together on Copernicus. In addition the UK Space Agency sends delegations to every ESA programme board and the EU Programme Boards and policy groups as a means of continuing to influence and ensure benefit from the substantial investments that have been made.

The UK Space Agency has already increased its resources dedicated to managing and exploiting EU space programmes. The work of industry's newly established EU affairs group will provide important input to the consideration of how the Agency and industry can better exploit and react to opportunities arising from EU policy initiatives. The UK Space Agency will participate in the group to support its thinking so that the combined resources of

the Agency and industry can be used to influence EU activities.

The priorities for the UK Space Agency's European work are set out in the UK Space Agency's annual Corporate Plan.

ACTION 3.2 UKspace and the UK Space Agency to ensure the UK plays a bigger role in the European space sector by seconding industry experts into the EU and other European bodies.

The Government agrees that UK space expertise should be applied in the work of European bodies.

The UK represents 12% of the EU's population yet it only makes up 4.8% of the EU's civil service workforce. In 2011 British applicants accounted for only 2.6% of all applicants, lower than any other EU Member State. As a result, the Government is seeking to increase UK representation in the European Union institutions through a targeted series of measures led by the Foreign Office.

The situation is better for ESA where the proportion share for UK staff is in line with the UK's contribution to the Agency, although as the Growth Action Plan notes, that representation does not currently extend to senior positions within ESA (see action 3.4 below).

Short to medium term secondments to the European Commission are possible for experts working in public administrations. The UK Space Agency will continue to explore opportunities for staff to work on EU space programmes. However, given the UK Space Agency's modest size, there is modest potential here. The Agency has in the past arranged for technical staff to be loaned from other Government departments to work in the European Commission on Galileo which may be another source of opportunities.

For the industry side, a greater openness to the idea that staff may work abroad in a European institution for several years,

gaining valuable experience, and then return to the parent company through short term recruitment would be another way to apply UK expertise in these organisations and also increase our influence in European programmes.

ACTION 3.3 UK Space Agency to promote the wider use of European Space Agency (ESA) Public Private Partnerships (PPP) to drive ESA programmes into new services that the UK can exploit.

Government will support ESA to use Public Private Partnerships that create new commercial opportunities for space and exploit technology. These will be evaluated on a case-by-case basis.

ACTION 3.4 UK Space Agency and UKspace to secure a British Operational Director position at European Space Agency (ESA) in the next reorganisation as part of strengthening the presence of UK nationals in senior positions in ESA.

The Government agrees that there should be one or more UK nationals in Director-level posts within ESA, as this would be positive for the UK's interests. The UK Space Agency is discussing options for ESA Director posts with potential UK candidates. It will provide support and advice (including from former ESA Directors and other senior ESA staff), briefing on key issues and support on key skills necessary so that the UK is able to put forward well prepared candidates for these posts at the right time.

The Government is also aware of the ESA Director General's views that influence is also related to the level of investment in ESA's optional programmes, where weighted voting is becoming more common. However, it is the level of influence in ESA as a whole that matters, this comes from the UK's level of investment and domestic expertise, as well as staffing in key posts relating to the delivery of the Government's objectives for the sector.

The European Centre for Space Applications and Telecommunications (ECSAT), Harwell.



SUPPORTING GROWTH IN THE UK SPACE SECTOR

RECOMMENDATION 4: Support the growth of UK Space exports from £2 billion to £25 billion per annum by 2030 by launching a National Space Growth Programme and defining an International Policy that will improve collaboration with nations across the world, enhance the UK's competitive edge in export markets and enable targeted and market-led investments in leading edge technology.

Government recognises that a significant proportion of growth in the space sector must come from exports. The scale of the challenge is significant with a twelve fold increase in exports required over the next 16 years. In order to be successful both Government and industry will need to give this area significant focus.

ACTION 4.1 UK Space Agency to establish and seek funding for a National Space Growth Programme that enables the UK to seize growth opportunities that exploit bi-lateral collaboration with other nations, national technology research and demonstration, national science projects and national missions in a way that secures continuity of funding for planning and maximises value-for-money.

Government has provided some £140 million in national funding since 2011 and recently announced a further £80 million over 5 years to support a Global Collaborative Space Programme. Government recognises the importance of public investment in national activities to aid planning and attract additional overseas and industry investment but cannot guarantee to sustain current levels of funding support in the current fiscal environment.

Government is currently undertaking a consultation with the research community to identify priorities for long-term science and research capital investment. The consultation will inform the Science Capital Roadmap, which it has been announced will be central to the development of a Science and Innovation Strategy. The sector is urged to participate in this consultation.

The Government recognises that there are currently three main delivery mechanisms for UK national space policy:

1. UK contributions to and participation in the European Space Agency (ESA) programmes (representing 80% of current UK Space Agency spend) and through our membership of the European Union the space programmes of the European Union, and
2. UK National Space Programmes.
3. A Global Collaborative fund.

The UK is now positioned as a leading space nation, but one which lacks a significant element which other leading and competitor nations have; the ability to undertake a planned programme of collaborative space projects and programmes with all nations, including developed economies, outside of existing arrangements either nationally or through ESA and the EU and to put together these collaborations in a flexible and dynamic way. The Government will continue to consider ways to address that gap in our capability.

ACTION 4.2 UK Space Agency with HM Treasury to develop a repayable investment funding mechanism similar in principle to the civil aviation "Repayable Launch Investment" scheme that can provide support for innovative platform, payload, services and/or applications.

The Government is considering a launch investment scheme for space investments that are exceptional in terms of scale, but which have a strong strategic fit to the UK sector and economy, and also have repayment potential. Launch investments are infrequent and there is no budget for this scheme where each project is considered on its merits and a case will need to be made to HM Treasury for new funding if the benefits and strategic importance are high.

ACTION 4.4 UK Space Agency to use the National Space Growth Programme to launch three bi-lateral science projects with nations offering new opportunities for export growth.

Government will continue to identify new opportunities for future funding by the UK Space Agency in conjunction with the Department for Business, Innovation and Skills (BIS). The sector are encouraged to ensure this aspect is covered in responses to the long-term science and research capital investment consultation, particularly emphasising how industry and academia will work together to build coherent business cases.

ACTION 4.5 UK Space Agency and Technology Strategy Board to align R&D calls with the set of market-led and prioritised technology roadmaps developed by the National Space Technology Steering Group. This should include increasing the number of opportunities for industry to demonstrate new innovative technologies in space.

The UK Space Agency and the Technology Strategy Board will align research and development calls with the National Space Technology Steering Group's report.

ACTION 4.6 UK Space Agency to work with industry and academia to create a programme to understand and spur increased commercial and Government investment into game-changing technologies. Specifically, to be included should be: (i) feasibility studies to establish the technology development and business cases for game-changing technologies; (ii) prizes or other promotional activity to spur entrepreneurial investment; and (iii) the evaluation by industry and ESA of the benefits of establishing a Disruptive Technology Centre at Harwell with a view to supporting such an initiative in 2014.

Government agrees that identifying and supporting viable game-changing technologies is crucial to growth in the sector. Indeed the Government has already undertaken a significant amount of work in this area. This has included £21 million of funding for NovaSAR, an innovative, low-cost radar satellite to be launched in 2016 with potential for repeat orders worth £500 million to the UK economy; UK start-up investment of £60 million for the development of SABRE, the novel air breathing rocket engine that could open the way to new launch capabilities at much lower cost than present.

The UK Space Agency's National Space Technology Programme (NSTP) is the national capability-building programme for the space sector. A number of pathfinder and flagship projects have already been completed. These high quality innovative projects bring together academic, industrial and public sector partners to advance UK technologies which will support UK industry's ability to accelerate innovation, grow sales in the commercial space market and reinforce the UK as a strong player in future international programmes.

An important aspect is to develop sound business plans that provide a direction of travel for new technology. As part of the NSTP, the UK Space Agency will support up to 10 reviews of game-changing technologies and continue with its horizon scanning activities. It will consider the use of NSTP funded prizes to spur new technology development.

In terms of any future initiative at Harwell, the UK Space Agency will work with ESA and other partners to examine the benefits of establishing a Disruptive Technology Centre or wider technical activities at Harwell and establish how they could increase ESA and UK capabilities.

ACTION 4.7 UK Space Agency to establish a strategic export group and develop a high level export promotion plan.

Government agrees that establishing a strategic export group and the development of a high level export promotion plan is vital in light of the £25 billion export target by 2030. This high level export group will build on the work of the Trade Policy and International Collaboration Group. Recognising the importance of the 'growth through exports' pathway in the UK civil space strategy, the UK Space Agency has strengthened its export team both at senior management level and at working level.

The UK Space Agency will work with industry to define the terms of reference for an Export group and appoint a Chair agreed by industry and Government. The group will be responsible for developing an export plan with the UK Space Agency supporting this activity and the group.

Export controls exist to ensure a proper balance between promoting global security and facilitating responsible exports. The UK's Export Control Organisation (ECO) is committed to ensuring that export controls do not unnecessarily hinder exports, and will work with UK Space Agency's Export group, UK Trade & Investment (UKTI) and companies in the sector to provide exporters with export licensing solutions to meet their needs, whilst fulfilling the UK's international obligations.

To raise awareness among SMEs about the UK's export controls, ECO will work with UK Space Agency, Satellite Applications Catapult and the UKSpace trade body to deliver sector-focused events in response to the demand. A first event is planned for September 2014.

ACTION 4.8 Space Leadership Council (SLC) to promote the use of space to achieve overseas aid and other UK policy objectives.

Government agrees that projects that create benefits in eligible countries as well as longer term economic benefits in the UK are important for the space sector, particularly given the sectors ability and track record in delivering on-the-ground benefits from initiatives such as the International Charter on Space and Major Disasters.

Space assets are a vital part of the essential infrastructure for economic development and welfare for developing countries. Satellites provide the only communication options in the poorest countries in the world particularly in places like sub-Saharan Africa. In addition, environmental monitoring from space can make a valuable contribution to resource management and response to environmental crises. Satellites in space can help in everything from reducing Rhino poaching, to providing e-education or e-health in remote areas, through to researching the behaviour of viruses. Satellites are essential for the response to humanitarian crises as they enable aid operations to pinpoint where help is needed most.

In this way, development investment is targeted at specific health, education and poverty reduction activities and into enabling developing economies to build essential infrastructure and their economies so that long term they can reduce their reliance on foreign assistance.

The announcement of the Global Collaborative Fund, a fund of £80m over five years at Autumn Statement 2013 directly addresses this action. The UK Space Agency will ensure that the Space Leadership Council has an opportunity to review this programme on a regular basis.

STIMULATING A VIBRANT REGIONAL SPACE SME SECTOR

RECOMMENDATION 5: Stimulate a vibrant regional Space SME sector by improving the supply of finance, business support, information, skills and industry support.

The Government sees this as an important area of focus if the economic growth targets are to be met and it is therefore an area for concerted action including ongoing active consideration of measures to support start ups and SMEs as well as continuing to grow established larger SMEs.

Research and development in the space sector can be highly capital intensive and the UK Space Agency and the British Business Bank are looking at ways to improve the supply of capital into the space sector.

ACTION 4.10 Technology Strategy Board and UK Trade & Investment (UKTI) to help secure 20 new partnerships in the next 5 years by running missions to fast-growing overseas” hot spots” in priority markets.

Government agrees this action is important and the Technology Strategy Board will work with UK Trade and Investment (UKTI) to run a first Entrepreneur mission in 2014. The UK Space Agency and UKTI have recently collaborated on UK missions to China, Chile and Colombia. A Memorandum of Understanding between the UK Space Agency and UKTI will be signed, which will enhance effective relations between the two organisations. Technology Strategy Board will coordinate our engagement with UKTI and UK Space Agency which will enhance the combined effectiveness of the three organisations.

ACTION 4.11 UK Space Agency and UK Trade and Investment to develop a plan to support world-leading companies establish space services and applications businesses in the UK.

Government supports this action and the UK Space Agency is already working with UK Trade and Investment to design a strategic approach to investment based around value chain opportunities and implement activity to support these important businesses.

ACTION 5.3 Technology Strategy Board to elevate the current Space Special Interest KTN Group to become a full Space Community within the new Knowledge Transfer Network (KTN) structure.

Government agrees that it is now the right time to create a bespoke Knowledge Transfer Network community for Space. The Knowledge Transfer Network community has been restructured into a single legal structure - the KTN Company on the 1 April 2014. As part of the restructuring the Technology Strategy Board has instructed the KTN company to establish a dedicated space domain within the new structure and appoint a Space KTN Director.

ACTION 5.4 UK Space Agency to develop a mutually supportive national environment for Space with the Harwell Space Gateway acting as the focus for UK inward investment by promoting the capabilities of regional clusters and championing the use of regional centres of excellence.

ACTION 5.5 UK Space Agency to work with Northern Ireland, Scotland, Wales, Local Enterprise Partnerships (LEPs) and Councils to develop regional growth plans for space and secure non-space funding for new projects, centres-of-excellence and business incubation centres across the UK.

The Government agrees that local economies across the UK have an essential role to play in delivering the space sector's growth aspirations. These Space Growth Action Plan aspirations resonate with the Government's objectives to rebalance the economy and to support local communities in developing their own economies. Within Scotland, Northern Ireland and Wales, the Devolved Administrations are responsible for local economic development. In June 2010, the Government invited businesses and councils to come together to form Local Enterprise Partnerships (LEPs) whose geography reflects the natural economic areas of England. Thirty-nine LEPs have been established. The Government welcomes the space sector's desire to engage strongly with LEPs and Devolved Administrations to secure balanced economic growth.

Harwell Oxford remains an important focal point for the UK space sector, but a wider role has been identified for Harwell to provide a gateway to the rest of the UK and in linking to wider UK capabilities.

A number of Local Enterprise Partnerships (LEPs) have been identified, and are looking to build on, strengths in the space sector and / or in application of space assets to other sectors as part of their Strategic Economic Plans, which were submitted to Government on 31 March 2014. The Devolved Administrations (DAs) have also recognised that space can play an important role in economic development. Through the UK Space Agency-led UK Space Gateway Programme, the Agency and BIS will work with LEPs and DAs to help them to fully understand the current and potential value of the space sector to their local economies - both in the traditional upstream and also where increased use of space assets will provide opportunities to grow existing local clusters that operate in the target markets identified within the SGAP. Building on this, we will further work with them to ensure that they can exploit potential opportunities and support them

in using space as a focal point for delivering their plans. Areas of focus will include:

- Exploring opportunities to establish a network of regional space business incubators to nurture high potential companies with new ideas in both the upstream and downstream, building on existing space incubator provision.
- Ensuring alignment between locally provided business support schemes (for example, through Growth Hubs, academic / Catapult Centres of Excellence and opportunities from Enterprise Zones) and national support available through the Satellite Applications Catapult's SME schemes (action 5.2).
- Identifying and quantifying local STEM skills needs, to provide the proposed National Space Skills Contact Point with evidence of skills needs (action 5.7).
- Working with UKTI and local partners to ensure that inward investors are aware of the UK's national capabilities and facilities, and are supported in identifying the location that is most suitable for them to grow as part of the wider UK sector.

ACTION 5.6 UK Space Agency, Satellite Applications Catapult and Research Councils to develop a nationwide plan to co-ordinate investment in ground segment infrastructure and technology centres-of-excellence to secure facilities that support exploitation and growth, and provide value-for-money from Government investments and to ensure that the UK takes a global lead in exploitation of space infrastructure.

The Government supports this objective as a means to better understand current and planned investments in both the public and private sectors. Space infrastructure is high value, and it is important to ensure that synergies between industry and Government investments (including investments for scientific work) are identified to maximise their effectiveness. The recognition that space has applications in a significant number of other sectors should also be exploited through seeking opportunities for joint infrastructure investments (for example, in high performance computing) and it is by linking these investments that we can open up new growth opportunities for the UK.

In 2013, the UK Space Agency and Satellite Applications Catapult initiated a group drawn from the public and private sectors to catalogue current infrastructure, identify a road map of future opportunities and develop sound business cases for investment. These business cases will be based upon a clear understanding of potential economic and/or scientific impact to ensure that the UK remains at the leading edge of exploitation. This work will

require support from across the space sector to ensure that a complete picture can be achieved.

ACTION 5.7 UK Space Agency to establish a national space skills 'point of contact' to support SMEs in finding training in business and specialist skills that their staff need to succeed and grow the business by supplying 'one stop' information about UK-based training providers.

The Government agrees that the first step in bridging this skills gap is to gather together information on existing training provision in order for space businesses to train their staff. It is also important to understand the full range of skills that will be needed to support the different types of businesses that will be created in the downstream space sector. The UK Space Agency will determine with partners in the sector the best way to establish the national space skills point of contact requested by industry to support SMEs to find training in business skills that they need to access to grow.

There is a need to raise awareness of opportunities among traditional space companies and among non-space companies to

help them incorporate space technologies into their products and services. We note that further work on quantification of need is also required, which may demonstrate a need to roll out courses to new audiences and locations or to facilitate the creation of new courses to fill gaps in provision.

ACTION 5.8 UK Space Agency to provide financial support for a cross-disciplinary Space Doctoral Training Centre that will support PhD Students that are moving into the Space sector to build relevant specialist and business skills that are needed in both the upstream and down-stream space sectors.

Centres for Doctoral Training (CDTs) are an important element of ensuring a supply of trained scientists and engineers to key sectors of the UK economy including the space sector. A further 113 CDTs around the UK were recently announced and funded by EPSRC, several of which are in areas which have relevance to the space sector. The UK Space Agency will continue to consult with EPSRC and other relevant research councils to investigate the possibility of setting up a Space CDT to support PhD students wishing to move into the space sector.

ACTIONS BEING DELIVERED BY OTHER ORGANISATIONS

ACTION 1.1 Satellite Applications Catapult supported by UKspace to undertake an integrated marketing campaign to champion the use of space services, applications and data in other sectors of the global economy.

ACTION 1.2 Satellite Applications Catapult supported by UKspace to develop a delivery roadmap plan for each of the priority markets initially identified and to ensure that this activity is coordinated with stakeholders and is visible to the SLC. Update and re-validate priority market delivery roadmaps at least annually.

ACTION 1.3 Satellite Applications Catapult to update and re-validate priority market delivery roadmaps at least annually.

ACTION 2.1 UKspace to review the competitiveness of the UK's space business environment on a three-yearly basis. The priority is to produce a regulatory benchmark report with relevant evidence by March 2014.

ACTION 4.3 UKspace to produce and update an economic analysis to demonstrate the extent to which industry has driven economic and social benefit from Government investment in ESA and National programmes.

ACTION 4.9 UKspace to run four 'Are you Export Ready?' symposia per year, aimed at SMEs.

ACTION 5.1 UKspace to run a Space Manufacturing and Services Supply Chain Challenge with the aims of increasing the number of SMEs in the UK's space supply chains and increasing the number of suppliers to UK primes and first-tier companies by highlighting opportunities for UK-based suppliers and improving supplier performance.

ACTION 5.2 Satellite Applications Catapult to provide a comprehensive package of measures to support the growth of SMEs in the Space sector, with a single point of access, comprising improved access to finance, business management tools, skills training, and mentoring. It will promote these activities in regular regional road shows.

There are a number of actions throughout the Space Growth Action Plan, as shown in the table above, which are not for Government to deliver. Government welcomes these initiatives and the UK Space Agency and other Government actors will support these activities where appropriate.

In order to achieve the growth of the UK's space sector so that it is worth £40 billion per annum to the UK economy by 2030, new markets are needed for space based services and technologies. The work that the sector has done in identifying 15 of these new major markets is very helpful in understanding how resources should be focussed.

The Satellite Applications Catapult is one of a network of centres that have been established by the UK's Technology Strategy Board in order to foster business-focussed innovation, and stimulate economic growth. Satellite Applications was selected as one of the initial set of Catapults, very much as a consequence of the first Space Innovation and Growth Strategy published in 2010, which highlighted the potential for the sector to deliver the level of growth being sought, and set out a coherent economic vision, encompassing industry, academia and government, within which the Catapult could clearly play a significant role.

The Government believes that it is crucial to develop a more effective and comprehensive space supply chain in the UK and

ACTION 5.9 UKspace to lead a National Schools Challenge to engage schoolchildren in the space flight of Major Tim Peake.



UK Space Agency

will support industry to deliver the relevant action. Moreover, Government is keen to promote existing competitive support schemes such as the Advanced Manufacturing Supply Chain Initiative, the Regional Growth Fund and the Manufacturing Advisory Service. This support was recently boosted through the creation of Reshore UK - a joint MAS/UKTI service to help companies bring production back to the UK. At the moment, these initiatives are under used by the space sector in comparison with other UK high tech industries.

Government agrees that support is vital to nurture, grow and anchor the many SMEs that the UK needs in the space sector to meet the growth targets. The UK Space Agency will support the Catapult to deliver and maintain the 'one stop' web-based support centre envisaged.

The UK Space Agency is already well advanced in its planning of a range of challenges and other activities for schools and the public in support of Tim Peake's flight to the International Space Station, working with ESA and a number of key education and outreach organisations. It would welcome the support and involvement of the commercial space sector to ensure that a well-founded programme can be created that capitalises on the opportunity to raise awareness of space activities in the UK and to help inspire an interest in STEM subjects in the next generation.

Conclusion

Achieving a UK space economy worth £40 billion per year by 2030 is a bold and ambitious target, requiring a bold, ambitious and evidence based response. The IGS 2014-30 Space Growth Action Plan recommendations build on the success of the original IGS and provide the roadmap to achieve the shared sector target. This Government response is both a strong endorsement of that roadmap and a statement of the part that Government must play in order to secure the 2030 ambition.

Regular monitoring of progress against the plan will be essential to ensure that the sector remains on course. The Government welcomes the importance placed on implementation in the Space Growth Action Plan and it will, through the UK Space Agency, be part of the implementation team based at the UK Space Gateway in Harwell, Oxford.

Government will work with industry to conduct the planned regular reviews of progress against the Space Growth Action Plan which will be reported to the Space Leadership Council.

An executive agency of the Department
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UK SPACE AGENCY

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