UKSPACE
THE SPACE TRADE ASSOCIATION

WPI STRATEGY

Securing our future in space

A report commissioned by UKspace

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UKspace Securing Our Future in Space: a report from UKspace

About UKspace

UKspace is the trade association of the UK space industry and has been its leading voice for over 30 years. We represent the interests of industry with the UK government, parliament and national and international stakeholders. To achieve the best business framework to promote growth, UKspace works alongside the UK Space Agency, Innovate UK, the Satellite Applications Catapult, the Satellite Finance Network, Ofcom and government departments.

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Steve Hughes was previously the head of economic and social policy at the think tank Policy Exchange, and published reports on increasing savings rates and reducing youth unemployment. Before Policy Exchange he worked at the Bank of England, where he helped manage the regulatory system that governs cash distribution in the UK. He has previously worked as an economist at the British Chambers of Commerce where he advised on tax, international trade and SME finance policy, and in parliament, where he researched HM Treasury legislation as it passed through the House of Commons.

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Foreword

By Nick Shave, chair, UKspace

The coronavirus pandemic exposed as never before just how dependent we have become on what is going on above our heads in space. Data beamed from satellites has not just been critical for relaying data to hospitals to combat Covid-19. It has kept our economy afloat by enabling a massive increase in online working, meetings and shopping.

Of course, there is more to space than satellites. Advanced manufacturing and ground launch technology are enabling scientists to expand our study of the secrets of our solar system and helping Tim Peake become the first British astronaut on the International Space Station. But while it is space exploration that often gets the headlines, in our day-to-day lives the extent to which we rely on satellites cannot be understated and is the focus of this report. We look at how the share of our economy dependent on satellites is growing and the opportunities this is creating for new, high-tech industrial jobs and growth.

If the Prime Minister is prepared to take bold action then we could get transformational results from space. With the right investment, the UK space sector could power the Covid-19 recovery, enabling many hundreds of thousands of highly skilled, technology-based jobs to be created. Advanced manufacturing, clean energy, aerospace, health and genomics are the kinds of jobs that will fuel our future and help us to compete in a post-Brexit global economy.

Yet we are running out of time. If important decisions on national space capability are not made and programmes implemented now, the sector will see a continued decline while other nations in the global space race move further ahead of us.

Between them, the world's big three space powers - the USA, Russia, and China - now have the lion's share of the 2,200 operational satellites in orbit. The likes of Germany and Canada are also investing far more in space than the UK. The Ministry of Defence has declared Space an operational domain of the same importance as air, land and sea, but for space services and data we depend more heavily on other nations than any of the other domains. Being so critically dependent on infrastructure provided by other powers is not ideal for our resilience.

More than a year after Boris Johnson committed to making the UK a world-leader in space technology with "an ambitious national space strategy", we still need to see the blueprint for the development of a sovereign Global Navigation Satellite System to rival GPS or the EU's Galileo system. We also need more effort to tackle the space debris problem, and a national earth observation system to support military operations and climate change monitoring, now we are locked out of the EU space programme.

To deliver all of this, we need Government action to ensure that the space sector can achieve its growth potential. We are also calling for a national space procurement fund that would give the green light to more UK-developed products and services. The Chancellor's new space innovation fund could then support the sector to drive forward a clean approach to and from space.

Rather than depending more and more on satellites and assets operated overseas, we should aim to build up our own capabilities. This will not mean our overseas partnerships are reduced, but strengthened, as we show our allies we have more to contribute in critical areas like security and climate change services. The UK could still be a world leader in space technology, but the risk of inaction is that we could soon be permanently stuck as a "tier three" space nation, sleepwalking into greater and greater dependency on others for our economic resilience and security.

Executive summary

Space is a very high-value sector that underpins much of the UK economy

- The space sector itself is worth around £14.8 billion to the UK economy. Its productivity is nearly three times the national average and its productivity gains are spread across the UK.
- The wider value of the sector is massive: satellites provide the data and infrastructure that enables all our business and personal communications, our security, transport and logistics, weather monitoring and much more. As such, it underpins the digital infrastructure that drives much of the UK's economic activity.
- A great deal of industry activity is enabled by telecommunication satellite services, which currently support just over £300 billion of output. This supports millions of jobs across every region of the UK. This figure does not include many other sectors enabled by satellites, including health, military and security functions.
- Even a short, temporary disruption to this satellite data would therefore unleash havoc, causing almost £1 billion of damage each day.

Becoming a bigger space power is essential to accelerate the UK's economic recovery and secure its future resilience

- Our future in the global economy will be driven increasingly by our capacity for innovation: high-tech, high-value sectors that commercialise advances in science and technology and export them. These sectors are critically dependent on satellites.
- We conducted new analysis for this report with the help of former Bank of England economist, Steve Hughes, which projects the present £300 billion of output enabled by satellite data to reach around £340 billion by 2030, based on conservative estimates.
- This growth will be critical to levelling up: satellites currently support around £52 billion of output in the North, for example, and over £40 billion in the Midlands. By 2030 we expect these figures to reach £59 billion for the North and £46 billion for the Midlands.
- All this growth is contingent, however, on the UK at least maintaining its position in the international competition to secure value from space. By enabling the sector to grow further, there would be much bigger national and regional gains.
- The UK is perfectly positioned to become a bigger space power. With decisive Government action, Britain could very realistically double its share of the global space market to £30 billion by 2030.

Falling behind in the space race brings major risks to our recovery

- We spend less on the space sector than many peer countries in Europe and across the rest of the world. The UK Space Agency has an annual budget of £500 million, around a third that of France's equivalent, and less than half as much as Germany's.
- If we do not expand, we will find ourselves even more critically dependent on the space infrastructure and data provided by other countries, given that our economy will be increasingly reliant on high tech and digital capabilities.

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- We have undertaken new analysis to ascertain what proportion of UK industry data arrives via non-UK (foreign operated) satellites. Of the £300 billion of UK output dependent on this data, we estimate conservatively that at least 90% (£270 billion) of this is from non-UK (foreign operated) satellites and that this proportion will reach £306 billion by 2030 – or more if Britain falls further behind other countries.
- This is not a sustainable situation. Government should view space assets as critical to our economic resilience, as well as security, and seek to address long-standing vulnerabilities, primarily our overreliance on non-UK (foreign operated) assets.

The policy action we need to secure our future in space

- The Government must commit to increasing space funding from all current sources, including through the European Space Agency (ESA), which is not linked to the European Union and serves as an excellent platform upon which to drive development of sovereign capability, global collaborations and international trade.
- As well as investing in key international partnerships such as ESA, we should focus on expanding our sovereign space capabilities. This will build our economic and security resilience, as well as allow UK industry to capture more global market share for UK job creation. To achieve this, we propose three simple actions:

1. **Set the Space Innovation Fund at £150m per year,** sustained over 10 years. This would bring new advances in technology, research and science to commercially viable projects and thus create huge new value for the UK.
2. **Create a National Procurement Fund** of £250m per year, sustained over 10 years, for the specific procurement by Government of UK products and services. This would help grow our domestic space sector, enabling UK space products and services to play a much bigger role in our trading with the rest of the world.
3. **Establish a Space Delivery Agency** to drive the programme of complex, hi-tech initiatives forward. Such an agency would be accountable to the National Space Council with a focus on delivery. This would complement the UK Space Agency's key roles of policy, relations with international space agencies, and regulatory aspects which are best developed from within government by government.

CHAPTER 1

The value of the space economy

The space industry is the driving force behind much of the UK's economy. Through satellite communications and satellite navigation, satellites facilitate communications and mobility, and millions of jobs, across every region of the UK. This is all enabled by advanced manufacturing and launch capabilities.

Our reliance on the actual data produced by these services is growing as we move to a high-tech, high-skilled future. During the coronavirus pandemic, this data has been critical in enabling millions of people to keep working from home and has powered the most critical communications applications, including the GPS technology in Covid-19 social distancing apps.[1]

Aside from propping up all of our digital communications and internet-based commerce, space satellite capabilities are essential to weather forecasting, including early flood and drought warning. They underpin services to our military, enable maritime search and rescue and support the navigation of emergency 'blue light' services such as ambulances.[2]

Satellites play a key role in traffic management and they improve farm productivity through precision agriculture. Energy, gas and fuel infrastructure are all enhanced by satellites, with precise positioning being exploited to position offshore wind farms in Scotland to electrify the North Sea's oil and gas installations. They are central to the nation's current and future digital ecosystems, including autonomous transportation, the Internet of Things and Smart Cities.[3] And as the climate crisis threatens the earth's ecosystems, earth observation satellites enable us to monitor our environment whilst also providing essential services in times of natural disaster.

In the future, new applications of satellite data, combined with satellite positioning and communications technologies will help drive down carbon emissions as well as providing key capabilities required to manage the devastating effects of the climate emergency to communities up and down the country and around the world.[4]

The space sector that drives all the above is itself a major contributor to the UK's economy, being valued recently at around £14.8 billion a year.[5] Its indirect economic footprint, however, is massive. It has been estimated that space and satellite services support and enable industries with a combined turnover of at least £698 billion and which contribute around £300 billion to GDP.[6] In addition, data-enabled UK service exports were estimated to be £243 billion in 2019, or 75 per cent of total service exports.[7]

As such, it is no exaggeration to say that if satellite services were to be disrupted even temporarily, complete economic havoc would be unleashed, with business-critical internet services and mobile telephony being lost, not to mention the disruption socially. The financial cost of this kind of disruption is incalculable.

On the positive side, this level of value enabled by satellites means that public investment in the sector delivers a very high return. Every £1 of investment in the European Space Agency, for example, delivers £10 back to the economy.[8]

The sector's productivity is nearly three times the national average[9] and it has previously demonstrated year on year growth five times that of the national average.[10] Furthermore those productivity gains are spread across the UK, with clusters in Scotland, the Midlands, South West, and North East supporting the Government's levelling up agenda.

With satellites enabling and enhancing so much of what we take for granted every day, the space sector is both a highly successful contributor to the UK economy and a critical part of the UK's national infrastructure, communications, defence and security.

CHAPTER 2

How space will drive our economic future

Becoming a modern space power

The UK space sector has built, over the past 20 years, one of the most innovative, highly skilled sectors in the whole UK economy. We must, however, go further. Space is only growing in importance globally, as is the value of the space economy worldwide. With decisive Government action, the British space industry could perfectly reasonably double its global market share to £30 billion by 2030.[11] Such growth would make the UK a real space power, securing vital British jobs and giving us greater capabilities to defend our assets and our future economic resilience. In a world facing climate change and an increasingly unpredictable geopolitical environment, this is now imperative.

Even at the domestic level of resilience, many areas of traditional British industry depend on satellite data for their modernisation and continued survival. 'Precision agriculture', for example, uses satellite imaging and analysis to enable UK farmers to precisely target crop development and optimally distribute resources according to forecast weather patterns. The use of satellite technology is enabling efficiencies based on topographic data processed by machine learning algorithms, to reduce significantly the on-the-ground construction and maintenance costs. For example, thanks to satellite mapping, farmers can now get an accurate picture of their soil which means they can end the expensive blanket application of fertilizers and instead only fertilize the parts of the field that need it.[12]

Satellite technology is also central to the development of new industrial activity. Digital ecosystems, for example, such as 5G, the 'Internet of Things', Smart Cities, and autonomous transport systems, are all emergent digital tools or forms of digital infrastructure that will power the next generation of innovation. This is foundational infrastructure which must be invested in and protected as it will become increasingly central to everyday life and work.

Additionally, In Orbit Services and Manufacture (IOSM) is projected to be a significant new space market, focused on servicing satellites in geosynchronous orbit. Emergent services such as Active Debris Removal (ADR) and End of Life Services (EOL) will actively contribute to the sustainable use of space and safeguarding the space environment. Launch services that are significantly more regular, reliable and lower cost than are currently available are needed for these new markets to develop.

More than anything, however, it is our future in the global economy that is increasingly being defined by satellite data. Our economy will be driven more and more by our capacity for constant innovation from high-tech sectors that are able to commercialise advances in science and technology and trade them with the world. This is the most realistic way the UK can exist outside the EU and stand a chance of maintaining competitiveness. The space sector should thus be seen as an essential portal through which we both secure our economic future and our ongoing resilience.

An uncertain future

As the Prime Minister made clear in his speech to Conservative Party Conference in 2020, the country faces a clear choice as we embark on our economic recovery from Covid-19: to go back or to do better.[13] Choosing to do better must mean taking concrete steps towards becoming a bigger space power.

This is all the more important as the UK leaves the EU. Space capabilities that were developed in the UK via programmes such as Galileo and Copernicus risk being lost without immediate action, threatening UK jobs and security. Leaving the EU is also an opportunity, however, as these space programmes have helped the UK develop strategic technology and pan-European supply chain capabilities over the last 15 years. These capabilities, if built upon, provide a significant asset to the UK in a post-Brexit Europe.

The Government recognises rightly that the UK has the potential to take a global lead in developing high-tech specialisms such as in fintech, life sciences, advanced manufacturing, robotics, cyber security and artificial intelligence; but all these are critically dependent on satellites and a growing space sector. The share of our economy dependent on satellites is growing and will do so at a much greater rate as we focus on these new, high-tech industrial opportunities.

Growing the space sector and 'levelling up'

The space sector has a crucial role to play in the Government's levelling up agenda. The activities that satellites facilitate are spread across the whole of the UK and have the capacity to help the regions in the most need to capitalise on growth opportunities.

In the previous chapter, we set out above how satellites were responsible for enabling over £300 billion of UK economic output – which was a statistic established from a 2018 baseline.

We estimate conservatively that over the next ten years to 2030, this figure will reach around £340 billion.

The output of businesses that employ satellite data has been growing very rapidly in recent years – 20% in the two years to the 2018 baseline, for example. However, the construction of our £340 billion projection was based on very conservative assumptions that assume output in the sectors enabled by satellite data match only the output of the wider economy, when it is more likely they will outstrip it; and we also take into account the impacts of Covid and any potential Brexit uncertainty. For the latter, we have used official near-term forecasts for UK GDP growth to 2021, plus the Office for Budget Responsibility's long-term forecasts for real GDP growth.[14]

This growth could be a key enabler of the task of levelling up the UK's regional economies. The below table shows how the current and projected output breaks down regionally and again for prudence, we have assumed the present regional split remains and there is no redistributional impact from any new 'levelling up' policy:

Region	Present value (£bn)	To 2030 (£bn)
North East	£ 6.39	£ 7.27
North West	£ 26.60	£30.26
Yorks and the Humber	£ 19.20	£21.85
West Midlands	£ 22.51	£25.61
East Midlands	£ 17.79	£20.24
East	£ 30.38	£34.56
London	£ 69.73	£79.32
South East	£ 43.54	£49.53
South West	£ 21.99	£25.01
Northern Ireland	£ 8.69	£9.88
Scotland	£ 24.87	£28.29
Wales	£ 8.14	£9.26

The original 2018 baseline number was created by London Economics who produce the 'Size and Health of the UK Space Industry' publication which contains a regular update of space industry activity, including the amount of economic output dependent on satellite data.[15] In our analysis we looked at projected output from the same industrial sectors they cited, as defined by the Government's Standard Industrial Classification.

In terms of the direct value of the space sector itself, it already provides **42,000** jobs and our analysis shows it could create a further **30,000** in the next decade,[16] many of which are 'green jobs' in areas like climate change monitoring, smart transport routing and flood prevention.

The £14.8 billion of value directly created every year is premised on strong regional distribution, with clusters in Scotland, the Midlands, North West, and South West.

Space, perhaps more than any other form of infrastructure capability, is an investment in both present and future economic resilience.

CHAPTER 3

UK in the new global space race

Falling behind

As we have seen, the UK space sector underpins many of the high-tech, high-growth sectors crucial to the UK's recovery, future resilience and success. Despite this, we spend less on our space sector than many peer countries across the world. The UK Space Agency has an annual budget of £500 million, around a third that of France's equivalent, for example, and less than half as much as Germany's.[17]

The latest international figures, published last year, show space spending as a percentage of GDP up to 2018. These show Russia invests most, at 0.25%, closely followed by the USA at 0.2%. Further down the table are India at 0.1%, Germany at 0.05%, China at 0.04% and Canada at 0.025%. With space spending at just 0.014% of GDP, the UK is one of the lowest investors among the advanced economies.[18]

By maintaining higher levels of investment, other nations have major space programmes which secure their national interests. The USA, Japan, France, Germany, Italy, India, and Australia all have established national space programmes focusing on specific areas of capability and expertise. The UK should be taking the same approach.

The UK Space Agency's 2019 Innovation Consultation identified that an industry investment of £900 million could be catalysed with an initial £700 million from Government. To date, only a £15 million National Space Innovation Programme has been launched, in July 2020.[19] That investment, though small, will allow for crucial grant funding for projects to tackle climate change and enable widespread digital communications access.

However, our major competitors know that this level of funding is not enough to position the UK anywhere near the front of the global space race. It leaves the UK's economy and national security vulnerable in a time of economic and geopolitical uncertainty and also represents a massive missed economic opportunity.

Size of the prize

The international market for space equipment and services is huge. Euroconsult's latest Space Economy Report, published in December 2019, looks at what the international space market will be worth by 2028: it projects this to reach $485bn globally.[26]

This includes "upstream" revenues, including from manufacturing, launch and ground equipment, of $11bn and "downstream" revenues, consisting of commercial operations and satellite services, including satellite navigation, of $474bn.[27]

Dependency on overseas states

Satellites are fundamental to our security – from enabling military surveillance and operations, through to supporting the functioning and resilience of our economy, public and emergency services. Many satellites which provide these critical functions to us, however, including enabling our GPS systems, are owned and operated by overseas states.[20]

There are around 2,600 operational satellites in space at present, according to the latest publication of international data in April 2020, of which only around 4% are registered to or owned by UK companies or our Government.[21] These include satellites in the recent £784 million deal to rescue OneWeb, where the UK Government took a 45% stake in the company, which has 74 satellites in space and will in December launch a further 36.[22]

While this is already a very small proportion, it could shrink even further as our economy, and economies around the world, shift progressively towards digitally-enabled business. The consultancy firm McKinsey has predicted that if current international satellite proposals become reality, about 50,000 more active satellites will be in space within the next ten years.[23] This scenario means the UK would need to have around 2,000 extra satellites in space in late 2030 just to maintain our current 4% level. That means launching around an additional 190 satellites every year.[24]

We should not be rushing to expand our satellite fleet just for the sake of it. Many of the additional satellites in space within the next ten years will be Low Earth Orbit satellites which typically communicate through constellations and have shorter life spans than highly capable traditional communications satellites with GEO orbits (estimated to be about five years with Starlink, the SpaceX constellation, for example).

Nevertheless, we must be mindful that satellites are critical to our future resilience and our future economic prosperity. We cannot ignore the fact that almost all of the data routed through satellites which ends up creating commercial usage and benefit is provided by non-UK (foreign operated) satellites. This means data received and interpreted in other countries before it is sent to us, including sensitive business communications.

We estimate conservatively that of the c.£300 billion of economic output that is supported by satellite data in the UK, at least 90% (£270 billion) is provided by satellites owned or operated by foreign states. This will increase to £306 billion by 2030, based on our estimated increase in satellite-enabled output by 2030 to £340 billion.

It is fair to note that almost all commercial telecommunications satellite services globally are carried over international satellites, as companies sell that service to many customers. This is fairly normal practice internationally. With the exception of operators in Russia and China, and to some extent India, there are virtually no commercial telecommunications satellites that only serve their own country. As well as this, however, we buy almost all data from overseas providers in navigation, earth observation and weather forecasting.

In contrast, France, Germany and the USA are progressively tackling this and building up sovereign satellite capabilities which enable them to produce greater sovereign data capability, as well as data that can be exported to overseas civilian and defence customers. As such, they are forging increased security resilience, while being integral to the security systems of other states.

The USA has an explicit policy objective of developing its industry. This provides long-term commercial frameworks and encourages the USA to boost both defence and the civilian economy. France and Germany have had similar approaches whereby they have sovereign capability goals for improving commercial, national infrastructure and defence applications, as well as infiltrating other states' markets. The UK is well behind the curve here.

The other issue to highlight is that the £300 billion of our economy presently supported by satellites does not include large sectors of industry data, such as in health, military and security functions.[25] Our reliance on overseas states for these is in some areas even greater than basic economic data.

In Earth Observation, for example, there is a very strong case to create a national constellation of satellites because presently much of the space imaging services used by our military for surveillance and operational uses are bought from the USA. It means the UK has to go through either a private company or the US Government for critical operations. While the USA is of course a trusted ally, this dependency is clearly a suboptimal basis on which to rest our future resilience. Indeed, our military allies are increasingly concerned that we develop our own space capabilities in order to be able to "burden share" roles such as global surveillance. The UK Ministry of Defence itself recognises this.[28]

What capabilities do we need to build?

There are at least five key areas in which the UK needs to build capability in order to remain internationally competitive, domestically resilient and militarily robust. All of these areas will enable further space access, and develop our sovereign capability:

- **GNSS** – The Government's decision in December 2018 to no longer seek access to secure aspects of the Galileo system after the UK leaves the EU has necessitated Government reviewing multiple replacement options. In September 2020, the Government announced that it had "set a clear ambition for a sovereign space programme which will bring long-term strategic and commercial benefits for the UK."[29] Despite recent Government investment in OneWeb, this area has long been underfunded and further expansion is needed to exploit commercial opportunities.
- **Earth Observation satellites** – The UK has long been dependent on foreign-owned satellites in this area. For critical civilian and defence applications, we should be looking to develop serious future capabilities. An ambitious but reachable goal could be establishing a UK sovereign capability of Earth Observation data services by 2025. A joint venture arrangement would establish a cost-neutral, critical, national asset in the medium term.
- **Space situational awareness** – Monitoring the space environment to prevent collision underpins all other forms of space flight capability. Establishing national capabilities in this area are also crucial to global collaboration. This is an area in which the UK could quickly develop a specialism and lead efforts to create an international forum in which to debate, discuss and develop an approach for a space situational awareness and space traffic management system.
- **In Orbit Servicing & Manufacturing** - Previously, space products have not been reused or recycled. IOSM is set to change this, turning the problem of reusing of space debris in orbit into a valuable asset and affecting the way space systems will be designed and operated in the future. The Space Growth Partnership (2018) identified the IOSM market as one of the key growth areas of the UK space industry and a cumulative overall global market size for IOSM of greater than US$ 4.5 billion is projected by end of this decade.[30] The UK should invest in relevant space system technologies and we should target becoming a dominant space player globally in the IOSM market with the objective of capturing 25-35% of the global market by 2030.
- **Launch capability** - With the space economy forecast to be worth upwards of £400bn per annum by 2030, a change in the existing approach to space-access will be key to unlocking this growth. UK investment in a launch capability which provides safe, reliable and regular transfer of payloads from the Earth into orbit will be a critical enabler for the utilisation of the space environment. Lower launch costs and improved operational characteristics will start a virtuous cycle that will lower the barrier to participation in the space economy. This will drive growth, expanding existing industry and making new industries, such as in-orbit manufacturing, space pharma, space debris removal and space-based solar power viable. Growth in the space economy will further increase launch rates and demand and drive greater reduction in launch costs, reinforcing and fulfilling the virtuous cycle.

Ultimately, although we may buy satellite and other services from economic and military allies, such as the USA and France, dependency on them for our future resilience is not an ideal basis on which to build the resilience of our future economy and jobs. We need urgently to build up UK sovereign capability and, at the same time, capture more market share of a growing global space market.

CHAPTER 4

Securing the future - the policy action we need

To ensure that the UK fulfils its potential of becoming a modern space power, we need to keep investing in key international agencies and partnerships. At the front of the queue has to be ESA, which has always delivered excellent returns for business, with the UK getting an average £10 return for every £1 invested. The ESA funding increase announced in December 2019 was a step in the right direction, but we still have further to go to match the contributions of Germany, France and Italy. In addition, we need ministers to take the following actions:

1. Create a National Procurement Fund of £250 million per year

While successful peer space nations have active government-funded national space programmes which propel their commercial sectors, the UK is a significant procurer of foreign products and services. If our nation is to build resilience in these uncertain times and fulfil its potential economically, this needs to change. Government investment is vital if the UK is to realise the commercial opportunities offered by space.

A national space procurement fund is the key to achieving this. It will pave the way for the UK Government to procure UK-developed products and services, helping to accelerate commercialisation of the space sector. It will also encourage industry to invest further in UK research and development knowing the Government will be an 'anchor customer'.

This investment, in addition to the ESA contribution, the MoD SKYNET programme, and recent investment into OneWeb, would provide the stimulus needed to transform the sector and allow us to compete effectively on the global stage.

2. Set the Space Innovation Fund at £150 million per year

With the Prime Minister having acknowledged that our future in the global economy will be driven increasingly by our capacity for innovation, the launch of the innovation fund in July 2020 was welcomed by industry as a vital recognition of the role that the space sector can play in this agenda. The next step for the Chancellor is to set it a more useful level in terms of money that the industry is prepared to match.

UKspace recommends a National Space Innovation Programme of £150 million a year over ten years with the expectation that this would be matched by industry.

A programme of this scale and longevity would drive forward major new planks of research and development that would be internationally sellable and allow development of any additional infrastructure required to support growth. It would give industry the long-term stability and confidence to invest in UK space development. A £150m innovation fund would also provide leading-edge research in academia with a route into industrial collaborations and attract international inward investment, creating an attractive innovation ecosystem that would encourage more businesses to be based in the UK.

3. Establish a Space Delivery Agency

To ensure that the ambitious objectives we identify are achieved, it is important to have a delivery vehicle sitting in the heart of Government. A stronger commercial function is needed to perform this role. This could be a newly-formed part of an existing department or agency, or a new body – however ministers need to manage it – but the important issue is that it drives a much stronger focus in Government on pushing a programme of complex, hi-tech initiatives forward.

Replicating the success of the Aerospace Technology Institute and the Advanced Propulsion Centre, the SDA would be an independent body sitting alongside Government. The new agency would not be a replacement for the UK Space Agency. Instead it would complement the UK Space Agency's key roles of policy, relations with international space agencies, and regulatory aspects. The new role would be purely commercial.

This new body would take the lead on establishing a National Space Programme with a focus on ensuring the best leverage of taxpayer money. It would be responsible for managing both the National Space Innovation Fund and the National Space Procurement Fund. It would also provide better alignment of space requirements across departments and ensure the UK has the technology and capabilities needed to take advantage of new opportunities presented in the global space market.

The establishment of the SDA is urgently needed to bring maturity and further growth to Britain's space sector. It could be established within twelve months to lead the execution of a well-funded National Space Programme.

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