

## CSTI POLICY BRIEFING NOTE

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# Country Overview of Manufacturing Policy United Kingdom

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### Overview

The relative share of manufacturing in the UK economy has declined markedly in recent decades, from 30% in the early 1970s to 10% in 2013. This trend has been accompanied with the loss of manufacturing facilities, capabilities and jobs, though the UK remains a global player in high-technology areas in aerospace and pharmaceuticals.

In recent years the UK has witnessed a substantial shift in the government's approach towards industrial strategy and manufacturing policy. The evolution over recent years shows a marked trend away from a primary emphasis on a 'horizontal' and regional focus to a more strategic national approach in partnership with industry towards key sectors. A new determined effort to bring the science base into closer conjunction with industry is also evident, as manifested by the consolidation of a network of 'Catapult Centres'.

This shift in the national policy agenda has occurred in the context of calls to rebalance the UK economy, and to give greater emphasis to manufacturing. The predominant policy response has been the Government's Industrial Strategy, developed from 2011 onwards, along with the Foresight Future of Manufacturing Project, although traces of this emerging approach can be discerned since the early 2000s. The Government's Industrial strategy focuses on five themes of strong relevance to the manufacturing sector including sector partnerships, technologies, skills, access to finance and procurement.

### National Policy

#### UK Government Industrial Strategy

The [Government's Industrial Strategy](#) (BIS 2012) provides a framework for the whole of government to work in partnership with industry to set out and deliver long-term plans to secure jobs and growth. This policy response was developed from 2011 onwards, contemporaneously with the Foresight Future of Manufacturing Project.

The Government's Industrial Strategy recognises that over the last decade, the UK government became increasingly concerned about the risks associated with over-specialization in services as well as the decline in manufacturing. It also recognises that the recent financial crisis made clear that "a more diversified economy is less vulnerable to sector specific shocks".

The industrial strategy focuses on [five themes](#) of strong relevance to the manufacturing sector:

- Providing support for all sectors to help increase global competitiveness, support innovation and maximise export potential.

- Supporting the development and commercialisation of technologies where the UK has the research expertise and business capability to become a world leader.
- Helping businesses get the finance they need to invest in people and equipment and to grow
- Working to deliver the skills that employers need, giving businesses more say over how government funding for skills is spent.
- Developing UK supply chains and creating a simpler and more transparent public sector procurement system.

The strategy announces a ‘spectrum of support’ for all sectors, “from a more horizontal approach with certain sectors to one where the Government is involved with the sector in shaping its development” (see Figure 1).

Light touch	Action	Sustained dialogue	Strategic Partnership
Government sets the environment through horizontal policies (e.g. tax, IPR, skills)			
	Government takes action to respond to specific issues (e.g. tourism in 2012)		
		Sustained dialogue and action e.g. sector councils, joint strategies	
			Strategic long term partnership

**Figure 1: A spectrum of support for different sectors**

The UK government also introduced a number of manufacturing focused policy measures, aligned to the wider programme of Industrial Strategy, to strengthen the UK’s manufacturing capability. These include the following measures:

- Prime Minister announced [Reshore UK](#), a one-stop service to help companies bring back production to the UK.
- [Advanced Manufacturing Supply Chain Initiative](#) (AMSCI). Up to £245m committed to improve global competitiveness of UK supply chains by supporting innovative projects where the UK is well placed to take a global lead.
- More than 14,800 manufacturing firms have received specialist support from the [Manufacturing Advisory Service](#).
- There are 9 world-leading Catapult Centres set up to transform the UK’S capability for innovation (7 operational), including the establishment of the ‘[High Value Manufacturing Catapult](#)’, a new national technology and innovation centre, in 2011.
- 16 new university-based [Centres for Innovative Manufacturing](#), to “maximise the impact of innovative research for the UK, supporting existing industries, and open up new industries and markets in growth areas”.
- A total of 50 University Technical Colleges have been announced as well as investment in the [Employer Ownership](#) and STEM capital teaching funds.
- [UK Trade & Investment](#) (UKTI) providing expert trade advice and practical support to companies.

In the 2014 UK government budget the following announcements were made:

- A package of energy cost relief measures that will save a mid-sized manufacturer almost £50,000 on their annual energy bill.
- Extending compensation for the carbon floor price and EU Emissions Trading System beyond 2015-16. Helping EII from Renewable Obligation & Feed in Tariffs from 2016-17.
- Business rate discounts and enhanced capital allowances in enterprise zones extended for 3 years
- Further cut in Corporation Tax from 21% to 20% in 2015.
- Annual Investment Allowance: will double to £500,000 at the end of 2015.
- £74m funding in the Catapult Network to take advantage of emerging opportunities.

A 2014 [Industrial Strategy Progress Report](#) by BIS discusses the need for a new approach to how government and industry work together. One in which government does not prescribe actions for industry, but also one which does not adopt a hands off approach. This new industrial strategy features five themes: skills, technologies, access to finance, procurement and sector partnerships. A year previously, 11 sector strategies were published, and engagement with other sectors has been undertaken since to identify upcoming challenges. Over the past year Government has allocated more than £2 billion to industrial strategy objectives, which has mostly been match-funded by industry. Among the prominent initiatives emanating from this strategy are the following:

- Aerospace Technology Institute operational using £2 billion joint funding commitment by government and industry between 2013 and 2020.
- Advanced Propulsion Centre established with up to £75 million available initially from Government for pilot projects to develop a new generation of low carbon powertrain technologies, kick-starting a £1 billion joint investment by Government and industry over 10 years.
- £70 million [Agri-Tech Catalyst](#) launched to support industry-led ‘proof of concept’ development of near-market agricultural innovations.
- Dedicated funding at £100 million per year to support projects to grow skills in key sectors and technologies, through co-funding with employers.
- Seven catapult centres now open for business, with £1.5 billion of public and private funding over their first five years.
- The British Business Bank launched in interim form. Its programmes made £660 million of finance available to Small and Medium sized enterprises (SMEs) in 2013 – a 73% year-on-year increase from 2012.

### **UK Foresight Future of Manufacturing Project**

The 2013 [Foresight](#) document, [Future of Manufacturing](#), produced by the [Government Office for Science](#) identifies manufacturing as being “essential for long term economic growth and economic resilience. However, many of its characteristics are changing profoundly. Physical production processes are increasingly at the centre of much wider value chains.” In evaluating its contribution to the UK economy, it points out that manufacturing contributed £139 billion (in 2012) to UK Gross Domestic Product, that manufacturing businesses are more likely to engage in R&D, to innovate, and to export compared to non-manufacturers, that growth in total factor productivity was higher for manufacturing between 1980 and 2009 (2.3%) than it was for the UK as a whole (0.7%), and that manufacturing performance affects other sectors through its wide range of input-output and other inter-industry linkages. It also notes that “economies with strong, export-led manufacturing sectors typically recover from recessions faster than those without equivalent manufacturing sectors”.

The report stresses that policies and measures need to be developed to support manufacturing as it becomes:

- Faster, more responsive and closer to customers
- Exposed to new market opportunities
- More sustainable
- Increasingly dependent on high-skilled workers

Furthermore, the report posits three systemic areas for future government focus:

- Taking a more integrated view of value creation in the manufacturing sector
- Targeting specific stages of the manufacturing supply chain
- Enhancing government capability in evaluating and coordinating policy over the long term

### **Sector strategies**

The Industrial strategy published in 2012 pledged to provide support for all sectors of the economy. The UK government has announced 'long-term strategic partnerships' with industry sectors where we can have the most impact on growth. These partnership strategies:

- are long term
- are created with industry, committing business and government to specific actions
- involve the whole of government
- identify actions to benefit all businesses

11 sector strategies have been developed:

- [aerospace](#)  
The aerospace strategy was developed jointly with business through the Aerospace Growth Partnership, established in 2010. It sets out a programme to secure the future of the UK's aerospace industry, and to "capture the huge market opportunities from global growth in air travel". Moreover, it aims to maintain the UK's position as a leader of world aerospace manufacturing, ensuring the UK has "the capabilities to be at the leading edge of the design, development and production of wings, engines, aerostructures and advanced systems".
- [agricultural technologies](#)  
This strategy sets out how "the government, science researchers and the food and farming industry will build on the strengths of the UK agricultural technologies sector". Measures include government investment in an Agri-Tech Catalyst (a single fund for projects to translate research into practice), Centres for Agricultural Innovation, and a Centre for Agricultural Informatics and Metrics of Sustainability.
- [automotive](#)  
This strategy aims to "make the sector's long term future more secure, grow the UK share of the value chain and secure strong global competitive positions in low carbon research and development and in premium and niche vehicles". It covers measures including a new Advanced Propulsion Centre (APC) to support new technology and supply chains for low carbon vehicles, the Automotive Investment Organisation, and a "collective road map for the skills and training needed to address skills gaps in the automotive sector".
- [construction](#)  
This strategy sets out a "vision and a plan for long-term strategic action by government and industry to continue to work together to promote the success of the UK construction sector", focusing on key growth markets in smart technologies, green construction, and overseas trade.
- [information economy](#)

Made up of representatives from government, business and academia, the new Information Economy Council will set the agenda for actions towards this strategy. Its main themes include a strong, innovative information economy sector, to see UK businesses across the economy making smart use of information technology and data, and ensuring citizens benefit from the digital age.

- [international education](#)  
This strategy aims to build on the UK's strengths in higher and further education, its schools overseas, in educational technology and products and services, and in delivering English language training. The strategy will include supporting transnational education, encouraging development of Massive Open Online Courses (MOOCs), commercialising education technology, and expanding the number of [Chevening scholarships](#) for study in the UK.
- [life sciences](#)  
The government's strategy for the UK life sciences industry focuses on "applying biology in healthcare applications", providing an "unrivalled ecosystem to translate discovery into clinical use for medical innovation within the NHS" and an "environment and infrastructure that supports pioneering researchers and clinicians to bring innovation to market earlier and more easily, making the UK the location of choice for investment".
- [nuclear](#)  
The [Nuclear Industrial Strategy](#), the government's response to the 2011 report from the [House of Lords on the UK's nuclear R&D capabilities](#) and the recommendations of the Ad-Hoc Nuclear Research and Development (R&D) Advisory Board, takes a "long-term approach to the opportunities for economic growth and job creation from the nuclear industry". The goals of the strategy are to enable nuclear power to "contribute to the UK's energy mix and security of supply and help ensure the UK nuclear industry is able to realise its commercial ambitions".
- [offshore wind](#)  
Developed in partnership with the Offshore Wind Industry Council (OWIC), which brings together offshore wind developers, supply chain companies, government, The Crown Estate and the devolved administrations, this strategy sets out how "government and industry will work together to promote innovation, investment and economic growth in the UK offshore wind sector".
- [oil and gas](#)  
This industrial strategy seeks to "promote purposeful collaboration across industry and between industry and government", to "maximise the economic production of the UK's offshore oil and gas resources", and support the growth of a supply chain in both domestic and international markets which sustains high quality jobs in the UK.
- [professional and business services](#)  
This strategy aims to ensure that the wider economy benefits from the UK's professional and business services, e.g., engineering consultancy, and includes commitments both to increase access to the high level skills demanded by professional firms and to promote professional and business services exports to emerging markets.

### **BOX 1: UK Sector Strategy in the Aerospace Industry**

The Government published its strategic vision for UK aerospace in 2012, entitled [Reach for the Skies](#), a publication by the [Aerospace Growth Partnership](#) (AGP), in association with BIS. Its vision is to ensure that the UK remains Europe's largest aerospace manufacturer, and to support UK companies at all levels of the supply chain to broaden and diversify their global customer base.

The report describes areas in which the UK is particularly prominent in aerospace, namely the most complex parts of the aircraft. About half of the world's modern large aircraft fly on wings manufactured in the UK. Notable facilities include the new Airbus A350 wing factory at Broughton in North Wales, GKN's advanced wing component facility near Bristol, Rolls-Royce's new engine-blade casting facility at Rotherham, Bombardier's composite wing facility in Belfast and Spirit AeroSystems's new composite development centre in Prestwick. Recent Government investments include a new UK virtual centre for aerodynamics, research into new engine manufacturing techniques and low-emissions engine technology.

The report notes that next generation aircraft, which will target reduced environmental impact and operating costs, will require new technologies and new manufacturing processes. Moreover, decisions about the technology and manufacturing processes need to be taken many years in advance of an aircraft's entry into service. This is where Government and industry will collaborate, the Government's industrial strategy being to work with industry to "recognise where the UK has strong capability and backing it".

### **Other Key Documents**

In 2010 the [Department for Business, Innovation & Skills](#) (BIS) published an [Economics Paper](#) that analysed the manufacturing sector, the third largest in the UK economy, representing just over 11% of the economy and over 8% of total UK employment. Aside from established industries such as food and drink, aerospace, pharmaceuticals, electronics and automotive, it highlighted new industries based around new emerging technologies including low carbon, industrial biotechnology, nano-technology, digital and advanced materials.

In analysing the global economy, a key feature has been the globalisation of the supply chain, with increasing competition from emerging economies which are steadily moving up the value chain into higher value activities and industries. Manufacturers in developed countries have tended to outsource to emerging countries lower value activities in the value chain and differentiate by means of 'servitisation', a trend in which the sale of a product is combined with associated services. Global trends will lead to new product and geographical market opportunities, potentially leading to the emergence and expansion of new industries, particularly those based around new technologies, and a revival of others. The report also makes a case for government intervention when markets for labour, capital, knowledge, goods and services fail to function properly, whether that's in relation to skills, innovation, investment, supply chain collaboration and institutions.

Also in 2010 BIS published its '[Growth Review Framework for Advanced Manufacturing](#)'. The document set out the Government's ambitions for manufacturing, developed through consultation with industry, and also the actions the Government was taking to provide a conducive business environment. It also examined major future long-term growth opportunities and challenges. Manufacturing policy has been developed since then as part of the wider [Industrial Strategy development](#).

## Actors and Institutions

### Central Government Policy Actor

The [Department for Business, Innovation & Skills](#) (BIS) is a department with manifold responsibilities, many concerned with the promotion of economic growth. It is a ministerial department supported by [49 agencies and public bodies](#). The department “invests in skills and education to promote trade, boost innovation and help people to start and grow a business”.

Contained within BIS, the [Government Office for Science](#) is an office that seeks to “ensure that government policies and decisions are informed by the best scientific evidence and strategic long-term thinking”. “GO-Science”, which works with the [Department for Business, Innovation & Skills](#), conducts what are termed [Foresight projects](#) that “examine either an important public policy issue where science might be part of the solution, or a scientific topic where potential applications and technologies are yet to be realised”. A Foresight report published in 2013 addressed the manufacturing sector.

### Sector Teams in BIS

BIS operates a number of sector teams, one of which is focused on [manufacturing and materials](#). The BIS manufacturing sector team works with manufacturers and their supply chains, while also encouraging innovation, business investment, technology commercialisation, skills and exports.

The [BIS Automotive Unit](#) supports the UK’s automotive industry in several ways. It seeks to encourage best practice in design and manufacture, supports inward investment, and is involved in the delivery of the Automotive Industrial Strategy. Components of this unit include the Relationship Management Team, the Automotive Policy & Regulation Team, the Innovation and Technology Team, the Analysis Team and the Automotive Council.

The UK Government has created an [Office for Life Sciences](#), which is a part of both BIS and the Department of Health. The UK boasts a significant life sciences sector, generating turnover of over £50 billion, and employing close to 200,000 people. It is a diverse sector, spanning bio-pharmaceuticals, diagnostics, devices and medical technology engineering. In recent years, the Government has committed £1 billion through the Research Councils and £2 billion through the National Institute of Health Research (NIHR).

Another notable initiative in this area is the [Medicines Manufacturing Industry Partnership](#), established by the UK’s biopharmaceutical industry, which seeks, in partnership with Government, to position the UK as a world leading economy for existing and advanced medicines manufacturing capability.

## Innovation Agencies and their Initiatives

There are a number of initiatives emerging to advance the UK government's advanced manufacturing agenda.

### Innovate UK

[Innovate UK](#), the UK's innovation agency, is the new name for the Technology Strategy Board (TSB). The aim of Innovate UK is to accelerate economic growth by stimulating and supporting business-led innovation.

One of Innovate UK's priority areas is High Value Manufacturing. Manufacturing makes up 10% of UK Gross Value Added (GVA) and 54% of UK exports and directly employs 2.5 million people. Prominent industries include aerospace, in which the UK ranks second globally, and chemical and pharmaceutical industries, which add £20m per day to the UK balance of trade. Innovate UK also seeks to take advantage of the "re-shoring" phenomenon, in which some production is coming back to the UK.

Innovate UK defines high value manufacturing as the "application of leading-edge technical knowledge and expertise to the creation of products, production processes, and associated services which have strong potential to bring sustainable growth and high economic value" [to the UK]. And it encompasses a wide range of activities, spanning R&D to recycling. Innovation in manufacturing "requires new knowledge to generate entirely new products, processes or services, or new technology to improve existing processes". For many enterprises, introducing new technologies, products, processes and services is a significant challenge, which can constitute a barrier to innovation. It is here where Innovate UK intends to play a beneficial role.

The UK Government wants to enlarge the role of manufacturing in the economy (including emerging technologies such as composite materials, plastic electronics and industrial biotechnology), and a [High Value Manufacturing strategy](#) has been published that articulates that vision. It identifies five strategic themes where there is potential for innovation in high value manufacturing to contribute to multiple sectors, and which will inform investment decisions over the coming years:

- Resource efficiency
- Manufacturing systems
- Integration of new materials with manufacturing technologies
- Manufacturing processes
- New business models

"National competencies", as defined in the 2012 [Future Landscape Study](#), will need to be developed by business in order to exploit the opportunities for innovation in these areas. They will be supported through feasibility studies and collaborative research and development competitions, and through the [High Value Manufacturing Catapult](#).

The strategy outlines means by which innovation can be accelerated, from concept to commercialisation. That includes a doubling of direct investment in high value manufacturing innovation to around £50 million a year, focusing investment in the most attractive technologies and market sectors, utilising those manufacturing competencies to make investment choices, investing in the High Value Manufacturing (HVM) Catapult, and providing open access to the most effective platforms for knowledge exchange.

### **High Value Manufacturing Catapult**

The High Value Manufacturing (HVM) Catapult opened in October 2011, and is conceived as providing a “transforming resource to accelerate the commercialisation of new and emerging manufacturing technologies”. It is a strategic initiative that aims to revitalise the UK manufacturing industry and more than double the sector’s contribution to UK GDP. Established and overseen originally by the Technology Strategy Board, and with over £200 million of government investment, the HVM Catapult network consists of seven technology and innovation centres:

- [Advanced Forming Research Centre](#) (near Glasgow)
- [Advanced Manufacturing Research Centre](#) (Rotherham)
- [Centre for Process Innovation](#) (Redcar/Darlington/Sedgefield)
- [Manufacturing Technology Centre](#) (Coventry)
- [National Composites Centre](#) (Bristol)
- [Nuclear Advanced Manufacturing Research Centre](#) [Nuclear AMRC] (Rotherham/Manchester)
- [WMG centre HVM Catapult](#) (Coventry)

The Catapult is designed to provide businesses with access to the best manufacturing expertise and facilities in the country, in academia, research, industry and government. It is also intended to bridge the gap between early innovation and industrial scale manufacturing, while also acting as a means by which public and private sector funding for projects and initiatives can be channelled.

### **Other Initiatives in UK Manufacturing Policy System**

#### **Manufacturing Advisory Service**

Funded by BIS and in part by the [European Regional Development Fund](#), the [Manufacturing Advisory Service](#) (MAS) is a business support service for manufacturing businesses in England. It comprises a team of 80 advisors who “work with management teams to plan long-term strategies, improve processes and bring new products to market, helping to develop activity and capacity in supply chains”. Their particular focus is on assisting manufacturing SMEs.

#### **Centres for Innovative Manufacturing (EPSRC)**

[EPSRC](#) is the main UK government agency for funding research and training in engineering and the physical sciences, and invests more than £800 million a year in a broad range of subjects. The [EPSRC Centres for Innovative Manufacturing](#) are part of an initiative to “maximise the impact of innovative research for the UK”. They support both existing industries, while also opening up new industries and markets in growth areas. Centres receive five years funding to “retain staff, develop

collaborations, carry out feasibility studies, and support up to two research projects”. EPSRC support is intended as a platform from which the centres can secure further investment from industry and other sources of funding.

### **Advanced Manufacturing Supply Chain Initiative (BIS)**

Created in 2011, the [Advanced Manufacturing Supply Chain Initiative](#) (AMSCI) is a funding competition for collaborative research and development “designed to improve the global competitiveness of UK advanced manufacturing supply chains”. Funding amounting to £120m is available for “research and development, skills training, and capital investment to help UK supply chains achieve world-class standards and encourage major new suppliers to locate in the UK”. There are several delivery partners for this initiative. While BIS is the policy owner for the initiative, [competitions](#) are run by the Technology Strategy Board (now Innovate UK), and [Birmingham City Council](#) is the accountable authority for the initiative.

## **Manufacturing R&D**

Several UK agencies have proposed advanced manufacturing strategies with priorities for manufacturing R&D.

2013 – GO Science/Foresight

- [The future of manufacturing: a new era of opportunity and challenge for the UK - project report](#)
- [The future of manufacturing: a new era of opportunity and challenge for the UK - summary report](#)

2013 – BIS

- [Eight Great Technologies](#)

2012 – Technology Strategy Board

- [A landscape for the future of high value manufacturing in the UK](#)

In the UK, there have been studies and reports that delve into manufacturing R&D. The 2013 Government Office for Science Foresight report ([The future of manufacturing: a new era of opportunity and challenge for the UK - project report](#)) distinguishes between primary or underpinning technologies that are “likely to become increasingly pervasive in products and processes”, and secondary or contingent technologies that will make use of those underpinning technologies to collectively facilitate a number of improvements in products, services and manufacturing systems.

Primary/underpinning technologies Impacts & consequences

- ICT
- Advanced Materials
- Sensors
- Biotechnology

- Sustainable / green technologies
- Numerical modelling & algorithms
- Mechatronics
- Photonics
- Knowledge systems
- Micro electronics
- Tribology
- Nanotechnology
- Networks
- Artificial intelligence
- Human-machine interfaces

#### Secondary technological developments

- Mobile internet
- Knowledge-based automation
- The ‘internet of things’
- Big data
- Cloud computing
- Autonomous robotics
- Energy intelligence
- Additive manufacturing
- Printable electronics
- Integrated safety systems
- Virtual product creation
- Low impact transportation
- Virtual manufacturing
- Adaptive systems

The report also notes that the secondary or underpinning technologies are relevant to the ‘eight great technologies’ that are receiving current Government investment: big data, space, robotics and autonomous systems, synthetic biology, regenerative medicine, agri-science, advanced materials and energy.

The [summary report](#) of the same Foresight project offers pared down lists of what it terms “important pervasive and secondary technologies for future manufacturing activities”.

#### Pervasive Technologies

- Information and communications technology (ICT)
- Sensors
- Advanced & functional materials
- Biotechnology
- Sustainable/green technologies

#### Secondary Technologies

- Big data and knowledge based automation
- Internet of things
- Advanced and autonomous robotics
- Additive manufacturing (also known as 3D printing)
- Cloud computing

- Mobile internet

A 2012 study conducted for the Technology Strategy Board, [A landscape for the future of high value manufacturing in the UK](#), identified a collection of key national competencies clustered into five strategic themes.

- Securing UK manufacturing technologies against scarcity of energy and other resources
  - Energy generation, storage, management and security
  - Design and manufacture for sustainability and through life
  - Biotech, biological and synthetic biology processing
  - Design and manufacture for lightweight vehicles, structures and devices
- Increasing the global competitiveness of UK manufacturing technologies by creating more efficient and effective manufacturing systems
  - Understanding designing and manufacturing formulated products
  - 'Plug and play' manufacturing
  - Design & manufacture for small-scale & miniaturisation
  - Process engineering capability and efficiency across food, pharmaceuticals & chemicals
  - Novel mechanical conversion processes for scale economy and efficiency
  - Systems modelling & integrated design/simulation
  - Automation, mechanisation and human/machine interface
- Creating innovative products, through the integration of new materials, coatings and electronics with new manufacturing technologies
  - Smart, hybrid and multiple materials
  - Intelligent systems and embedded electronics
  - Development and application of advanced coatings
- Developing new, agile, more cost-effective manufacturing processes
  - Flexible and adaptive manufacturing
  - Combining product development steps in parallel/concurrent engineering
  - Additive manufacture
  - Net and near net shape manufacture
- Building new business models to realise superior value systems
  - Managing fragmented value chains including distributed manufacturing to support HVM
  - Building new business models to support HVM
  - Developing and retaining skills to support HVM
  - Managing risk and resilience to support HVM

The government's [Industrial Strategy](#) is underpinned by supporting technologies with the UK's science strengths and business capabilities combine. BIS has highlighted what it terms '[eight great technologies](#)' where the UK can lead the world:

- big data and energy-efficient computing
- Satellites and commercial applications of space
- robotics and autonomous systems
- synthetic biology
- regenerative medicine
- agri-science
- advanced materials and nanotechnology
- energy and its storage

## Appendix 1

### Key Documents

#### 2014

BIS

- [Industrial strategy - Government and industry in partnership. Progress Report](#)

#### 2013

Foresight

- [The Future of Manufacturing: A new era of opportunity and challenge for the UK](#)

#### 2012

BIS

- [Industrial Strategy: UK Sectoral Analysis](#)