



Government  
Office for Science

Annual Report 2017-18



## Contents

Foreword.....	3
What we do.....	4
Key functions .....	4
Key Workstreams 2017-18 .....	5
Future of Skills and Lifelong Learning.....	5
Future of the Sea .....	5
Future of Mobility.....	5
Futures and Foresight .....	6
The Faraday Challenge Outcome.....	6
Satellite-derived Time and Position: A Study of Critical Dependencies .....	7
From Waste to Resource Productivity.....	7
Services transformed: Growth Opportunities for the UK Service Economy .....	7
Responding to Emergencies .....	7
Government Science and Engineering Profession.....	8
Areas of Research Interest (ARIs) .....	9
Chief Scientific Advisers .....	9
Council for Science and Technology .....	10
Projects and speakers .....	10
Computational Modelling: Technological Futures .....	10
Council for Science and Technology members.....	10
Communications .....	11
Blogs.....	11
Social media .....	11
Website .....	11
Finance.....	12
Workstreams 2018-19 .....	13
Science Capability .....	13
Industrial Strategy.....	13
UK Research and Innovation.....	13
Supporting Policy Making .....	13
Brexit.....	13



## Foreword

This year's report demonstrates the depth and breadth of scientific advice the Government Office for Science undertakes and the inputs that our work has on policy making.

Our work has included:

- examining the UK's dependencies on global navigation satellite systems
- the global plastics issues affecting the Future of our Seas
- our response on scientific advice to the unfolding emergency incident in Salisbury
- helping to build Horizon Scanning capability and deploying our Futures toolkit across government, to help shape the Industrial Strategy Grand Challenges
- highlighting the increasingly blurred boundaries between manufacturing and services and the rapid disruption of new technologies through the Services report
- providing a strategic steer on governments to the academic community through the publication of departmental Areas of Research Interest (ARIs) documents
- continued support to DExEU and BEIS to ensure the UK's science needs are properly considered in the Brexit negotiations

We recognise that in everything we do, our success is founded on partnerships. We are fortunate to be supported by a network of departmental Chief Scientific Advisers, by academic research experts and many others, in order to deliver our work and provide the best scientific evidence to help policymakers.

We are confident that the Government Office for Science, along with the support networks that exist across government departments, within academia and beyond, are all well-placed to support our successor, Dr Patrick Vallance.

In summary, it has been a year of significant achievements and positive impact, and we express our thanks to everyone who has played a part in making this happen. The government's social and economic policies place increasing demands on excellent scientific research and analyses, around the Industrial Strategy Grand Challenges of Artificial Intelligence and data, clean growth and the future of mobility. Our role is to support government to access the science it needs articulating strategic steers through publication of the ARIs. Working with the newly formed UK Research and Innovation on these will be of increasing importance to policy making over the coming year.



Professor Sir Mark Walport  
Government Chief Scientific Adviser 2017



Professor Chris Whitty  
Interim Government Chief Scientific Adviser 2017-18



## What we do

The Government Office for Science ensures that government policies and decisions are informed by the best scientific evidence and strategic long-term thinking.

The Government Chief Scientific Adviser (GCSA) is head of the Government Office for Science and head of the Government Science and Engineering (GSE) profession.

We are responsible for:

- providing scientific advice to the Prime Minister and members of the Cabinet
- advising the government on aspects of policy on science and technology
- helping to assure and improve the quality and use of scientific evidence and advice in government

In 2017/18 there were three areas of focus:

- science for resilience
- science, engineering and technology for the economy
- evidence and analysis for policy

## Key functions

The Government Office for Science performs a number of key functions:

- acting as a transmission mechanism between leading scientists, engineers, technologists and social scientists from academia, industry, government and Whitehall policymakers
- working across Whitehall departments on complex issues that go beyond the domain of individual departments
- supporting strategic long term thinking in government policymaking through [Futures and Foresight](#)
- proactively identifying gaps and opportunities for the UK, particularly in emerging technologies, to drive economic growth
- providing the best scientific advice in the case of emergencies, through the [Scientific Advisory Group for Emergencies \(SAGE\)](#)
- assisting the independent [Council for Science and Technology](#) to provide high level advice to the Prime Minister



## Key Workstreams 2017-18

### Future of Skills and Lifelong Learning

The [Foresight Future of Skills and Lifelong Learning](#) report focuses on providing evidence to inform policy to tackle the issue of the UK's changing skill requirements with an aging population in a time of rapid technological advancement. This project has drawn on academic evidence reviews and essays assessing the current and future skills mix in the UK and the challenges of the coming decades.

The project considered the importance of digital skills, learning throughout the life course and the value of formal, informal and non-formal learning. Evidence has been gathered on the potential challenges to creating a high skills economy, including poor literacy and numeracy in young adults, high levels of skill underutilisation and the emergence of regional and sectoral low skills equilibria.

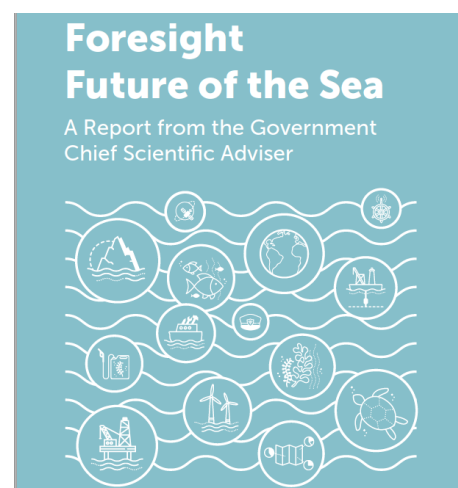
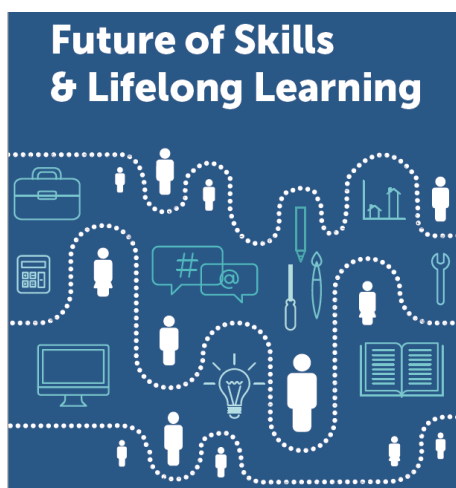
Project findings have contributed to the evidence base for the Department for Education's Lifetime Learning review, along with DCMS's policy for digital skills. The findings from the project played a key role in prompting the allocation of £40m for lifelong learning pilots, announced in the [Autumn Budget 2017](#).

### Future of the Sea

The sea covers 70% of the world's surface and is essential to regulating global temperature, water, and oxygen and carbon dioxide levels. Including its overseas territories, the UK has jurisdiction over one of the largest area of ocean of any country in the world.

The [Future of the Sea](#) report considers the science and technology plays in understanding and providing solutions to the long-term issues affecting the sea. It outlines a number of recommendations to help the UK utilise its current expertise and technological strengths to foster trade links, build marine capacity across the world and collaborate to tackle climate change.

From our Foresight Future of the Sea report, BEIS announced funding for a new global hub, bringing together scientific and technical expertise to share latest thinking on sustainable alternatives to plastic and stopping plastic entering our oceans. It also influenced the announcement by the Foreign Secretary of an International Ocean Strategy.





## Future of Mobility

The current [Future of Mobility](#) Foresight project is investigating what opportunities the transport system of the future could provide and the implications for government and society. Looking out to 2040, it will identify the challenges faced and potential opportunities it could provide.

The project has drawn on academic evidence, and those insights are being fused with those of a wide range of industry and government experts through written reports, workshops and meetings. Learning from history and anticipating coming trends, the whole transport system is being considered.

The evidence base will feed into policy makers across government to inform and future-proof their decision making. It will also be used to support the ongoing work that is underway as part of the Industrial Strategy.

## Futures and Foresight

The [Futures and Foresight](#) (including Horizon Scanning) programmes provide support to government departments to carry out projects with in-house analysis. This support includes the development of resources, capability development, coaching and advice, and networks development and management.

Three key products have been developed and refined over the last year. The [Futures Toolkit](#) is a guide that outlines how and when 12 'Futures' techniques can be applied help government decision makers develop policies and strategies that are resilient to future change. The 'Scan of Scans' is a set of cards from expert sources that illustrate trends in a range of government policy areas. This resource provides starting material for departments to carry out their own horizon scanning activities. Megatrends for government is an analysis of trends from industry, academic, and government sources to produce an overview of major opportunities and challenges to government across all policy areas.

Our previous work continues to have a positive impact on government policy making. One example of this success is our [Future of an Ageing Population](#) project, which supported the development of the [Industrial Strategy Ageing Society Grand Challenge](#).

## The Faraday Challenge Outcome

The [Faraday Challenge letter of advice](#) evaluated the case for a new research institution to act as a focal point for work on battery technology, energy storage and grid technology. This evaluation was commissioned as part of the [Industrial Strategy green paper](#) during the previous financial year. Advice on how to harness the UK's capability in battery research to support the industrial strategy was provided to the Secretary of State for Business, Enterprise and Industrial Strategy (BEIS).

As a result, the [Faraday Institute](#) was established in October 2017 to bring together scientists and industry partners on research projects to reduce battery cost, weight, and volume, improve performance, reliability and develop whole-life strategies.



## Satellite-derived Time and Position: A Study of Critical Dependencies

Many of the UK's critical services, from telecommunications to transport, rely on global navigation satellite systems (GNSS) in order to operate.

The [satellite-derived time and position: a study of critical dependencies](#) report sets out the findings of a review exploring the UK's dependency on GNSS. Covering threats and vulnerabilities, both current and sector dependencies, mitigations, standards and testing. It recommends a number of measures to make critical services more resilient to potential disruption or loss of GNSS.

The Cabinet Office has formed a dedicated cross-government Blackett implementation group to consider these recommendations. A Position Navigation and Timing Technical Group has been established to improve governance of GNSS risk and guidance for infrastructure operators. Loss of GNSS will have greater prominence in the next iteration of the National Risk Assessment. The report has been regularly cited in debate over future of UK involvement in Galileo and over whether UK develops a sovereign GNSS

## From Waste to Resource Productivity

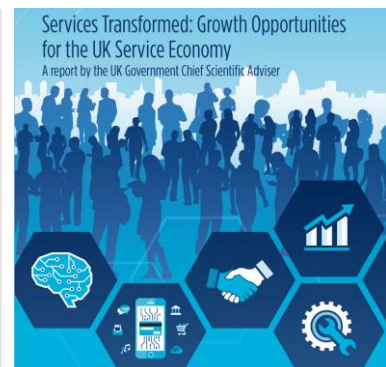
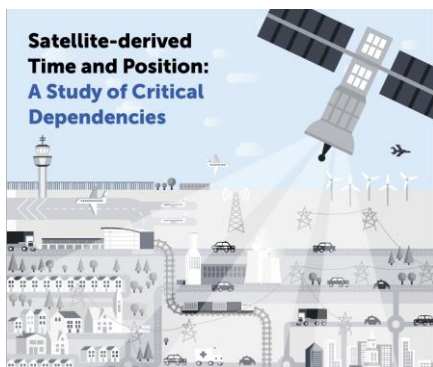
Working with the Department for Environment, Food and Rural Affairs (Defra), our [From Waste to Resource Productivity](#) report explores how waste can be treated as a valuable resource, and how new technology and approaches can be used to get the most from UK waste.

The report brings together evidence on waste from a range of industry, academic and government sources and is accompanied by an evidence report that brings together evidence and opinions from a range of stakeholders. It concludes that there are opportunities for the UK to become a more prosperous and secure society by generating value from material that is prevented from entering waste pathways and material extracted from waste pathways.

## Services transformed: Growth Opportunities for the UK Service Economy

The [Services transformed: growth opportunities for the UK service economy](#) report explores the growth opportunities for the UK service economy. It reviewed how technology could enhance UK services, identifying strengths in trade, automation, digital technologies, servitisation and spreading successes.

The report recommends 11 actions for government to safeguard and build on our strengths in services in order to retain the UK's competitive advantage in this sector. Evidence provided by the expert panel contributed to the successful Services 4.0 [Industrial Strategy Challenge Fund](#) bid, which was incorporated into the [AI Sector Deal](#).





## Responding to Emergencies

The [Scientific Advisory Group for Emergencies \(SAGE\)](#) provides scientific and technical advice to support government decision making during emergencies. SAGE is responsible for ensuring that timely and coordinated scientific advice is made available to decision makers to support UK cross-government decisions in the Cabinet Office Briefing Room (COBR).

This year the SAGE mechanism was triggered following an initial Ministerial COBR on 7 March 2017 covering the Salisbury Incident. SAGE provided scientific advice to COBR. Public communications activities were coordinated by the Cabinet Office.

## Government Science and Engineering Profession

The Government Science and Engineering (GSE) profession [launched its strategy](#) in October 2016, with a new vision for a “high profile, proud and effective GSE profession that attracts fresh talent and has a secure place at the heart of government decision making.” The strategy committed to an ambitious action plan to transform the profession in 5 years, focussing on ten workstreams that are important to government scientists and engineers, and which impact upon their continuing professional development (CPD) and careers.

This year the focus has been on implementing the strategy and good progress on the workstreams has been made, as detailed fully in the [One Year On report](#). The GSE Profession Board has taken ownership of the strategy and work continues at pace to embed it within government departments. Department Heads of Science and Engineering Profession (HoSEPs) have been developing departmental action plans, tailored to meet their needs and are aligned to their department’s business priorities.

The numbers of GSE Champions has grown substantially since the Champions’ Network launch, with 184 champions working across 28 departments. These volunteers have built a series of self-sustaining, self-managing GSE networks spanning the UK and they have raised the profile of the profession within their organisations.

In addition, a number of cross-departmental working groups have been set up to coordinate and join up activity in workstreams. We have been working extensively with our external stakeholders and professional bodies.

Looking forward to the year ahead, GSE is contributing to the Year of Engineering 2018 and the 100 years of women’s votes campaigns.







## Areas of Research Interest (ARIs)

In response to the [2015 Nurse review of the UK Research Councils](#), the government accepted the review's recommendation to provide a more strategic approach to departmental research and development programmes, a more sophisticated dialogue with academia and to produce documents that set out the most important research questions facing each government department.

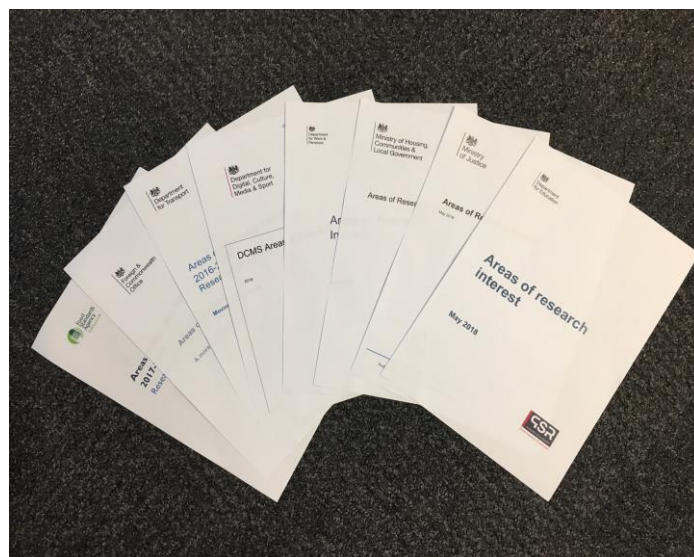
The aim of the [ARI documents](#) is to improve how government departments align scientific and research evidence from academia with policy development and decision-making, to access a wide range of research suppliers, engage with researchers, access stronger policy evidence bases and share research commissions. They provide a basis for conversations with experts in academia, which will help to inform and take forward departments' research interests.

This year seven additional ARIs were published from the [Department of Health and Social Care](#), [Department for Transport](#), [Department for International Trade](#), [Department for Work and Pensions](#), [Ministry of Defence](#), [Health and Safety Executive](#) and the [Food Standards Agency](#).

After publication of their ARI, DWP toured several universities, holding events and discussions with academics to promote the document. Defra held a two-day conference at the Royal Society which featured a discussion of their ARI. Both departments report that these activities have resulted in the department gaining a broader network of academics engaging with them on their interests.

## Chief Scientific Advisers

We continue to work across government to maintain a network of [Chief Scientific Advisers](#) (CSAs) located in most government departments. These advisers offer expert advice and intelligence across the full range of science, technology, engineering and social science disciplines to support policy as needed. This cross-disciplinary network of CSAs meets weekly. Members contribute individually, and also work together where needed. Many departments also have deputy CSAs, who meet regularly to discuss current issues and share expertise. The network of over 70 Science Advisory Councils and Committees (SACs) continue to provide their expert independent advice to policy makers.





## Council for Science and Technology

### Projects and speakers

The [Council for Science and Technology \(CST\)](#) is the government's advisory body on science, technology, engineering, social sciences and disruptive innovation. It operates at the very highest level in government, reporting directly to the Prime Minister. Jointly chaired by the GCSA and Professor Dame Nancy Rothwell, its members come from industry, the National Academies and academia.

The Council provides advice to the government on a wide range of science and technology topics and has provided advice to the PM on the following areas:

- how to improve the use of technology in social care
- science and technology for economic benefit across the UK

CST discussed science and technology issues with a range of senior officials, as well as experts from business and academia. Key guests this year included:

- Antonia Romeo, Permanent Secretary, Department of International Trade (DIT)
- Professor Sir Alan Wilson, CEO, Alan Turing Institute
- Melanie Welham, CEO, Biotechnology and Biological Sciences Research Council (BBSRC)
- Professor Jane Elliott, Chief Executive, Economic and Social Research Council (ESRC)
- Ruth McKernan, CEO, Innovate UK

Meeting summaries are provided on the [Council for Science and Technology website](#).

### Computational Modelling: Technological Futures

Working with a panel of experts from business and academia, CST produced the [Computational Modelling: Technological Futures](#) report following a review into the rapid evolution of UK computational modelling capability, how it could be leveraged in both the public and private sector.

The report aims to demystify computational modelling, to demonstrate UK capabilities, and to consider steps which could be taken to fully exploit these capabilities both now and in the future.

### Council for Science and Technology members

In September 2017, the Prime Minister appointed five new members to the council:

- Professor Sir David Cannadine, President of the British Academy
- Suranga Chandratillake, General Partner at Balderton Capital
- Professor Dame Ottoline Leyser, Director of the Sainsbury Laboratory
- Professor Max Lu, President and Vice-Chancellor of Surrey University
- Professor Joyce Tait, Director of the Innogen Institute, University of Edinburgh

They bring with them a breadth of experience and expertise which will enable the Council to continue to provide excellent advice to government on science and technology opportunities and challenges. This will help ensure the UK remains at the forefront of global science.

A full list of members is available on the [Council for Science and Technology website](#).



## Communications

The Government Office for Science utilises blogs, Twitter and gov.uk as the main channels for disseminating messages to our external stakeholders, promoting our areas of focus, current priorities and scientific expertise.

### Blogs

From 1 April 2017 to 31 March 2018, the [Government Science and Engineering blog](#) has received over 30,000 page views and the [Foresight Projects blog](#) has received over 13,000 page views.

### Social media

The [@uksciencechief](#) Twitter account continues to grow with a steady increase in the number of followers. From 1 April 2017 to 31 March 2018 the account gained over 2,000 new followers to reach over 23,300 followers in total. 92 tweets were published and over 16,700 engagements were received. The most popular posts were those regarding the changes in GCSA.

Total Followers	Follower Increase	Tweets Sent	Organic Impressions	Organic Impressions per Follower	Engagements
23.3k	100%	92	886k	38.07	16.7k

Figure 1: Statistics for the @uksciencechief Twitter account 2017/18

In addition, the Foresight projects focused [@foresightgovuk](#) twitter account also continues to grow at a steady pace. From 1 April 2017 to 31 March 2018 the Foresight account gained over 400 new followers to reach over 4,000 followers in total. 22 tweets were published and over 2,500 engagements were received. The most popular posts were those regarding the Future of Mobility and Future of Skills and Lifelong Learning projects.

Total Followers	Follower Increase	Tweets Sent	Organic Impressions	Organic Impressions per Follower	Engagements
4,185	100%	22	116.4k	27.82	2,548

Figure 2: Statistics for the @foresightgovuk Twitter account 2017/18

### Website

Between 1 April 2017 and 31 March 2018 the Government Office for Science, Government Science and Engineering profession and [Council for Science and Technology](#) webpages received 34,788, 8,963 and 9,218 page views respectively.



## Finance

GO-Science total spend in 2017-18 was £4.5m. Of this £3.4m is administration spend and £1.1m is programme spend.

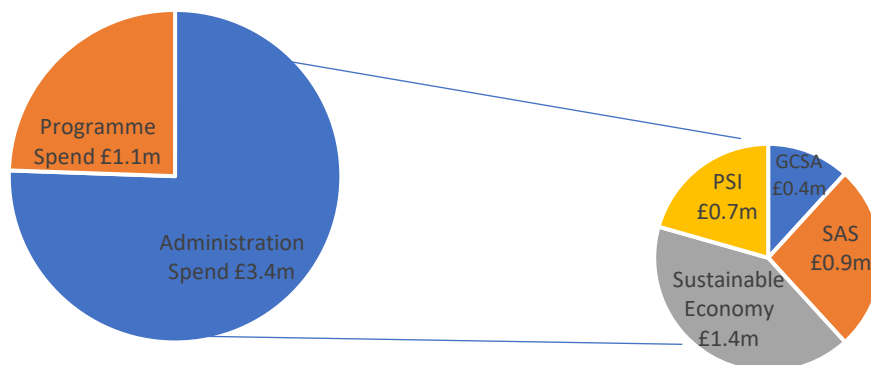


Figure 3: GO-Science spend 2017-18

This table shows outturns for 2013-14, 2014-15, 2015-16, 2016-17 and 2017-18. Values are in £m.

	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Programme</b>	<b>1.7</b>	<b>1.4</b>	<b>1.1</b>	<b>1.1</b>	<b>1.1</b>
GCSA/Deputy Head	0.7	0.9	0.7	0.7	0.4
Foresight <sup>1</sup>	1.4	0.7	0.6	0.6	-
Science in Government <sup>2</sup>	1.9	-	-	-	-
Growth and Security <sup>1</sup>	-	0.9	0.9	0.7	-
Science Capability and Climate Change <sup>1</sup>	-	0.7	0.8	0.9	-
Data Analytics, Horizon Scanning and Project Development <sup>1</sup>	-	0.8	0.8	0.6	-
Science and Security (SAS)	-	0.9	0.9	0.7	0.9
Sustainable Economy and the Corporate Centre	-	0.7	0.8	0.9	1.4
Public Services Innovation (PSI)	-	0.8	0.8	0.6	0.7
<b>Administration</b>	<b>4.0</b>	<b>4.0</b>	<b>3.9</b>	<b>3.5</b>	<b>3.4</b>
<b>Overall Total</b>	<b>5.7</b>	<b>5.4</b>	<b>5.0</b>	<b>4.6</b>	<b>4.5</b>

Table 1: GO-Science spend for financial years 2012-13 to 2017-18

Programme budget covers work commissioned to meet the GCSA's objectives, including research. The administration budget covers activities related to staff costs. Due to organisational restructuring, administration costs are not directly comparable across the years.

The low cost for the GCSA/Deputy Head reflects the absence of a full time GCSA for a significant portion of this financial year. Sustained low programme spend is a result of effort to efficiently procure expert scientific advice.

<sup>1</sup> Foresight capability was distributed as relevant depending on the nature of the activity between the other three areas, which were slightly restructured and renamed as a result.

<sup>2</sup> Science in Government was split into Science Capability and Networks, and Global Issues Science Team between 2012 and 2013. The Government Office for Science was restructured in 2014 as set out in the table.



## Workstreams 2018-19

### Science Capability

We will develop the departmental Areas of Research Interest, heading towards a clearer understanding and expression of the research questions that are most relevant to government's work, ensuring departments have the necessary scientific support, which includes participating in recruitment of key CSA posts. Making the CSA network a closer, more effective team, providing support on science issues right across the range of governmental responsibilities. We will continue our work on implementing the Government Science and Engineering profession strategy, providing leadership to ensure that government's own scientists are equipped with the skills and tools that they need to do their jobs, and have a clear and attractive career path.

### Industrial Strategy

Provide input, in co-ordination with the GCSA, the PM's CST and CSAs across government, to ensure that the Industrial Strategy is supported by robust scientific evidence. This includes new governance structures that put us at the heart of the use of evidence and analysis to develop new 'missions' to help deliver specific goals under the Grand Challenges. Our work will include helping shape future waves of the Industrial Strategy Challenge Fund (ISCF), advice on the development of new Sector Deals and supporting the commitment to raise research and development investment to 2.4% of GDP by 2027.

### UK Research and Innovation

Continue working closely with UK Research and Innovation to deliver on government strategic priorities, as outlined in the ARIs. Support the selection procedure for future funding bids within the ISCF and the Strategic Priorities Fund (SPF), and co-ordinate our work with through continuing working-level and strategic engagement.

### Supporting Policy Making

Continue to provide high quality evidence to support policy making on key priorities across government, working alongside departmental science and policy teams, academia and industry. Areas of focus will include air pollution, materials, agriculture, food production and completing our work on the Future of Mobility. We will continue to support government on high profile Horizon Scanning and Futures initiatives and we will undertake a new Foresight project this year.

### Brexit

Supporting government departments and the network of departmental CSAs to identify and manage the full range of science implications of exiting the EU.