Government Office for Science Annual Report 2014-15

Contents

Foreword

Efficient and effective government needs all of the sciences: the natural and physical sciences, mathematics, engineering, technology, social science and the humanities. The Government Chief Scientific Adviser and the Government Office for Science, work closely with Departmental Chief Scientific Advisers to deliver the science advice, evidence and implementation that government needs to govern the country. We do this mainly by working as a 'transmission mechanism' between expert scientific communities working in academia, industry and government, and government policy makers.

We work at the centre of government as a single team with the Cabinet Office on Horizon Scanning for government, taking advantage of the very best insights from academia and industry in the UK and around the world. In concert with Cabinet Office we facilitate cross-departmental policy discussions where science is an important part of the policy mix. We catalyse the uptake and embedding of new technologies, including data science, across the Civil Service to increase its efficiency and effectiveness. With the Treasury we work to ensure that the UK benefits fully from its investment in science and innovation.

Drawing on access to the best science and scientists, we work with the Business and Science Group in BIS, the Research Councils, other government departments, the Prime Minister's Council for Science and Technology and the scientific community at large so that the UK gets the most out of its research assets and knowledge infrastructure.

Over the last year the benefit of having such world-leading science advice mechanisms in government has been clearly demonstrated. From effectively addressing the West African Ebola outbreak, to capitalising on the opportunities in Financial Technologies, to understanding the impacts of an ageing population, expert science advice is necessary for effective policy making. I am proud of the role the Government Office for Science plays in embedding such scientific advice across Whitehall, helping to deliver a healthier, more resilient and economically prosperous UK.

Professor Sir Mark Walport
Government Chief Scientific Adviser

What we do

The Government Office or 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 science and engineering profession. He is responsible for:
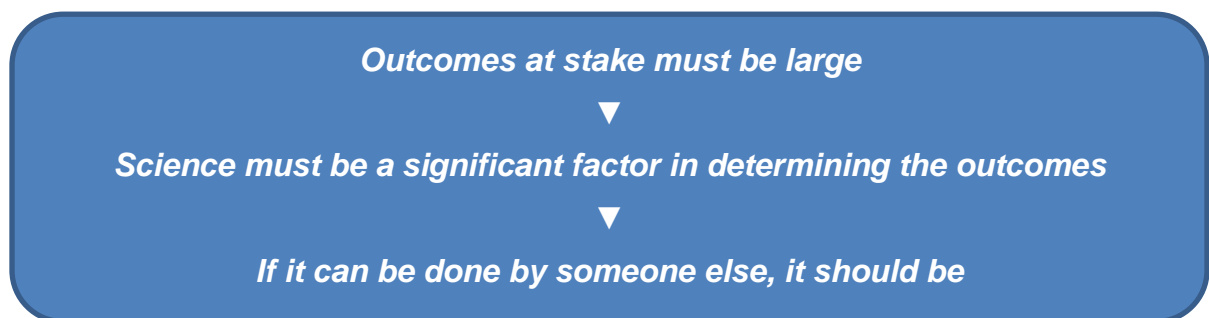
- providing scientific advice to the Prime Minister and members of Cabinet

- advising the government on aspects of policy on science and technology

- ensuring and improving the quality and use of scientific evidence and advice in government

Responsibilities

The Government Office for Science is responsible for:

- giving scientific advice to the Prime Minister and members of the Cabinet, through a programme of projects that reflect the priorities of the government;

- ensuring and improving the quality and use of scientific evidence and advice in government (through advice and projects, and by creating and supporting connections between government and the scientific community);

- providing the best scientific advice in the case of emergencies, through the Scientific Advisory Group for Emergencies (SAGE); and

- helping the independent Council for Science and Technology provide high level advice to the Prime Minister.

How we prioritise

> *Outcomes at stake must be large*
> ▼
> *Science must be a significant factor in determining the outcomes*
> ▼
> *If it can be done by someone else, it should be*

In practice this means we prioritise issues that are:

- important

- novel

- present, urgent policy challenges

- have long-term implications for science in relation to policy.

Key functions

We manage a rolling programme of projects providing advice and support as needed, including:

- Scientific Advisory Group for Emergencies (SAGE);
- Foresight strategic futures projects
- Horizon Scanning Programme, jointly with the Cabinet Office;
- Science and Engineering professional network; and
- Council for Science and Technology (CST).

Building capacity for science in government

In order that science is efficiently embedded in all policy making, the Government Office for Science is committed to ensuring that:

- Science and Engineering professionals in government work shoulder-to-shoulder with policy officials and analysts, supporting and complementing a strong network of Chief Scientific Advisers (CSAs), extending across government and outwards;
- the best scientists are engaged in informing policy, drawing on expertise from academia, industry and government;
- rich strategic conversations about R&D priorities are held across government departments, Research Councils and universities; and
- government has the scientific infrastructure it needs to support robust policy and governance.

Facilitating science advisory networks

Sir Mark Walport and the Government Office for Science continue to work across government to maintain a highly effective network of Chief Scientific Advisers located in most government departments. These advisers offer expert advice and intelligence across the full range of science, technology, engineering and social science disciplines as needed. The Government Office for Science has been involved in the process of appointments of new CSAs and in their performance management; their work is supported by guidance on the provision of science and engineering advice in government.

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. The GCSA met SAC Chairs, together with CSAs, in February 2015, helping to build relationships between senior science advisers across government and ensure the system for scientific advice is fit for the future.

The Government Office for Science continues to work closely with the Research Councils. Research Council Chief Executives now regularly join the CSA network to share ideas, build

links, and discuss common interests. We have looked at how the Research Councils can contribute to the provision of speedy advice. We are also developing links with the Learned Academies.

This work has facilitated stronger links between:

- the GCSA, CSAs and SACs;
- CSAs and Research Councils; and
- Government Office for Science and Learned Academies.

All of these feed into our knowledge and help us to develop an accurate picture of, and tap into, the research and expertise that exists in the UK.
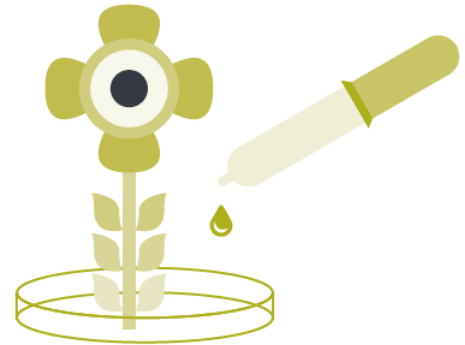
Key work streams of 2014-15

'Innovation: managing risk not avoiding it'

The Government Chief Scientific Adviser's first annual themed report 'Innovation - managing, risk not avoiding it' has helped reframe the debate on risk. Science is not the only lens though which to view major policy questions but evidence and rigour are essential. Discussion should focus on specific possible uses of a technology, their respective alternatives and attendant costs and benefits, as well as the implications of inaction.

Responses to GM crops illustrate the power of fear of threats to basic values.

In the Government Office for Science the report has strongly influenced how we work, the areas in which we work, the clarity of our message and the range and variety of our partners. The report has achieved significant influence in the debate around science advice in Europe and continues to inform UK regulatory priorities in the EU. It has stimulated Research Councils UK (RCUK) to develop proposals for coordinating research and communication activity on risk.

Blackett reviews

Internet of Things

Technologies that could allow billions of everyday objects to communicate with each other over the internet have enormous potential to change all of our lives. They could boost productivity, keep us healthier, make transport more efficient, reduce energy demand and make our homes and workplaces more comfortable.

The 10 recommendations from our recent review about the potential of the Internet of Things (IoT) were accepted by government. These include coordinating effort with the right leadership in and outside of government, securing technologies where data is sensitive and demonstrating system scale. The 3 autonomous car projects will be used to show how connecting roads and vehicles can lead to fewer accidents and shorter delays. A proposed health demonstrator will connect patients with GPs and hospitals for quicker diagnosis and more personalised care. IoT initiatives were funded by a £40 million investment announced in the 2015 Budget.

Financial Technologies (FinTech)

The UK is a world leader in the development and commercialisation of new financial business models and disruptive innovation, known collectively as 'FinTech'.

UK FinTech generated **£20bn** in revenue in 2014

Recommendations from our recent review of the opportunities and barriers will shape the UK FinTech sector out to 2025. The review featured in the 2015 Budget. Firstly, the development of a regulatory 'sandbox' will create a safe and controlled environment for financial services innovators to experiment without risk to the financial system. Secondly, support for adopting new technologies to meet rapidly evolving regulatory requirements – so-called 'RegTech' - and finally the development of regional FinTech hubs to promote collaboration.
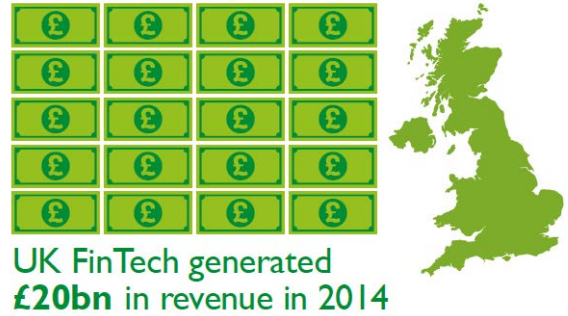
Responding to emergencies

Nepal earthquake

A 7.8 magnitude earthquake struck Nepal on the morning of 25 April 2015. The earthquake and its subsequent aftershocks, including a 7.3 magnitude aftershock on 12 May, caused widespread destruction and triggered more than 3,500 devastating landslides. Over 8,800 people were killed, 23,000 injured and over 2.8 million displaced.


Experts were called on immediately from the British Geological Survey and several UK universities to provide initial assessments of the expected number of fatalities and casualties, as well as secondary hazards. The Scientific Advisory Group for Emergencies (SAGE) further refined the assessments for the best and worst case scenarios, providing technical advice to the Cabinet Office Briefing Room (COBR) on the risk of further aftershocks and earthquakes, the risk of landslides and additional hazards posed by the monsoon season. Scientific advice also fed into Foreign Office decisions on travel advice for the region.

Ebola

Scientific advice and technical information have been critical in getting the outbreak of Ebola in West Africa under control. While the outbreak continues at low levels, weekly case numbers in Sierra Leone have been reduced from a peak of over 500 in December 2014 to fewer than 10 in June 2015.

SAGE and its sub-groups provided advice to COBR on a range of issues; including the likely evolution of the outbreak, when case numbers would start to decline, key interventions to get the outbreak under control, and vaccine trials and treatment options. They also provided advice on the risk to the UK and it spreading to other countries. In addition to medical scientists and modellers, we gathered a multidisciplinary team of anthropologists and social scientists to advise on burial practices, travel behaviour and general communications.
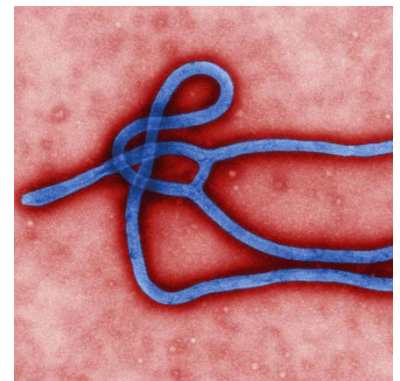
Horizon Scanning

The Horizon Scanning programme supports the government to identify and respond to future challenges. It deploys the expertise of independent organisations within Whitehall and through specialists at the centre of government. For example helping government to think innovatively about opportunities from emerging technologies and the future of regulation.

The programme also works to strengthen core departmental capability to address uncertainty and spot opportunities for departments to collaborate so that work is done well but only once. For example, a competence framework has been embedded in the policy profession to ensure good practice is shared across government.

The Foreign Office is piloting a module on horizon scanning for the Diplomatic Academy.

Science networks

The Government Office for Science works with a wide range of networks: embedded Chief Scientific Advisers, a range of scientists and engineers within government, the What Works Networks, National Academies, the Research Councils and the country's best universities and scientific institutions. Together we work on projects which address the most important scientific challenges confronting the UK and provide the best evidence and analysis to inform policy decisions.

We led the review with Defra on 'Animal and plant health in the UK: building our science capability'. The report, which is now being taken forward by Defra, set out a way forward for more effective and more co-ordinated research to tackle diseases in animals and plants, which can have significant impacts on the economy, the environment and society.

We are working with the Council for Science and Technology and research networks across industry and academia to develop a clearer picture of the Science Landscape in the UK.

We commissioned the Royal Society report 'Observing the Earth - expert views on environmental observation for the UK' which gathered expert views on how the UK might create an integrated system for environmental observation to manage the increasing volume of observation data in a way that creates knowledge to inform policy and action.

Science and Engineering fast stream

The Science and Engineering fast stream is the flagship development scheme for postgraduate scientists and engineers across government. Science and Engineering fast streamers play an essential role in ensuring the best science underpins the development and application of government policies.

Foresight projects

Future of Cities project

The Foresight Future of Cities project focusses on the role that science can play in shaping our urban future. This project provides policy makers with the evidence, tools and capabilities needed to support policy decisions in the short term which will lead to positive outcomes for the UK's cities in the long term.

The project identified issues that are inhibiting the growth potential of UK cities and, in collaboration with Cabinet Office and the DCLG cities unit, is now mobilising a plan to address one of the most pressing – retention of skilled labour in order to boost productivity in regional urban areas.
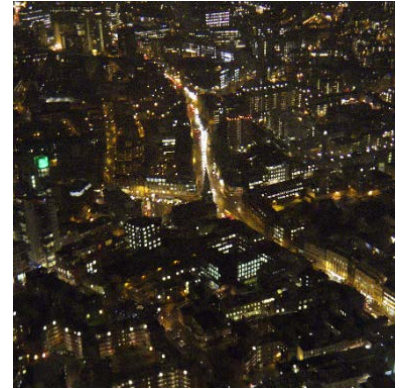
Working with our academic partners and respected authors, the project has gathered a large body of evidence to answer questions around city governance, planning and organisation. The project has informed HMT's work on the devolution of power to regional authorities. The project has provided analysis on the benefits of linking places through transport and digital connectivity; economic evidence around good governance and the mayoral model; and international benchmarks for what makes an 'attractive' city.

Future of an Ageing Population project

The Foresight Future of an Ageing Population project is focused on developing the scientific evidence to underpin the government's response to an ageing population, providing policy makers with the evidence and tools to develop new policy ideas.

The project is drawing on over 20 academic evidence reviews, 10 expert workshops held around the country and innovative approaches to understanding public attitudes to future demographic challenges. Together these have identified the key trends and interdependencies within an ageing population in cross-cutting areas such as work, education, technology, housing, health and care.
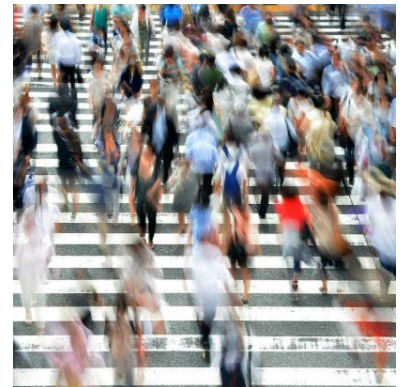
Council for Science and Technology

The CST operates at the very highest level in government, reporting to the Prime Minister directly. Building on the expertise from its membership, the CST meets with ministers across government and has offered advice to the government on a range of topics.

In November 2014, the CST worked with the Royal Academy of Engineering to produce a report on the economic and social costs of electricity shortfalls in the UK.

In January 2015, it launched a new online tool to understand better how the UK's research community defines itself and the links that exist between research disciplines. CST also held Science Landscape seminars on the following topics:

- big data, e-infrastructure and supercomputing
- population health sciences
- life sciences and medical
- robotics and autonomous systems
- space, satellites and astronomy
- meteorology and climate science
- energy
- advanced materials

Reports of these seminars can be found at: www.gov.uk/government/collections/uk-knowledge-landscape.

The Council discussed science and technology issues with a range of ministers and officials, including:

- Jeremy Heywood, Cabinet Secretary
- Rt Hon Greg Clark MP, Minister for Universities, Science and Cities (2014-15)
- Philip Rutnam, Permanent Secretary at the Department for Transport
- Martin Donnelly, Permanent Secretary at the Department for Business, Innovation and Skills

It agreed to undertake work on autonomous vehicles, to be published later in the year.

CST members

Co-chairs

- Professor Sir Mark Walport, FRS, FMedSci - Government Chief Scientific Adviser
- Professor Dame Nancy Rothwell, FRS, FMedSci - President and Vice-Chancellor of Manchester University

Other members

- Professor Philip Bond, BSc, DEA, FIMA, FInstP - visiting fellow at the Oxford Centre for Industrial and Applied Mathematics and visiting professor at the University of Bristol
- Professor Sir Keith Burnett, CBE, FRS - Vice-Chancellor of Sheffield University
- Professor Steven Cowley - CEO of the UK Atomic Energy Authority
- Rowan Douglas - CEO of Willis Re Global Analytics and Chairman of Willis Research Network
- Professor Ann Dowling - President of the Royal Academy of Engineering (from September 2015)
- Anne Glover - Chief Executive of Amadeus Capital partners Ltd
- Dr Paul Golby, CBE, FREng - Chair of the Engineering and Physical Sciences Research Council
- Professor Dame Julia Goodfellow, FMedSci - Vice-Chancellor University of Kent
- Professor Sarah Harper - Professor of Gerontology at the University of Oxford
- Dr Michael Lynch, OBE, FREng - founder of Invoke Capital
- Dervilla Mitchell, BE, FIEI, FREng - Director of Arup
- Professor Fiona Murray - Professor of Entrepreneurship at MIT Sloan School of Management
- Sir Paul Nurse, FRS* - President of the Royal Society
- Sir John Parker, FREng* - President of the Royal Academy of Engineering (until September 2014)
- Lord Stern of Brentford* - President of the British Academy
- Colin Smith, FREng - Director of Engineering and Technology at Rolls-Royce
- Professor Sir Christopher Snowden, FRS, FREng - Vice-Chancellor and CEO of Surrey University
- Dr Graham Spittle, CBE - Vice President, CPO, IBM
- Professor Sir John Tooke* - President of the Academy of Medical Sciences

* Ex-officio member

Annex A: Communications

The Government Office for Science supports open policy by ensuring the public also has access to the scientific facts that inform key issues. Public communication forms a key part of the work the GCSA does.

Social media

Twitter is an important channel for the GCSA to communicate with the public about our work. Our @uksciencechief twitter feed continues to grow in popularity with new followers joining all the time. From 1 April 2014 to 31 March 2015 the GCSA account gained over 3,000 new followers to reach over 16,500.

The Foresight twitter feed @foresightgovuk also continues to grow at a steady pace. From 1 April 2014 to 31 March 2015 the Foresight account gained over 845 new followers to reach over 2,200.
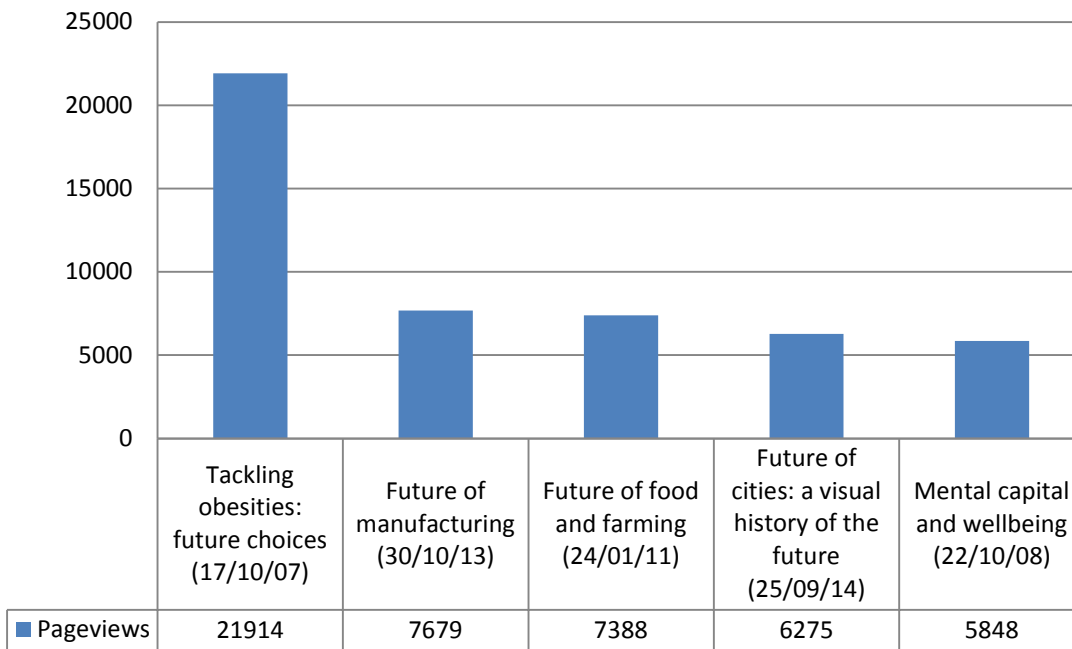
Website

In the last year about 60 new reports were published on the GOV.UK website and between March 2014 and April 2015 the combined web pages received over 700,000 page views.

The most popular reports were:

**Figure 1: Top 5 reports - GO-Science (excl. Foresight) 2014-15**

	Innovation: managing risk, not avoiding it (19/11/14)	Internet of things: Blackett review (18/12/14)	Futures toolkit for policy-makers and analysts (08/07/14)	Ebola: call for volunteers to staff laboratories in Sierra Leone (18/11/14)	FinTech futures: Blackett review (18/03/15)
■ Pageviews	7917	5814	5021	2584	1704
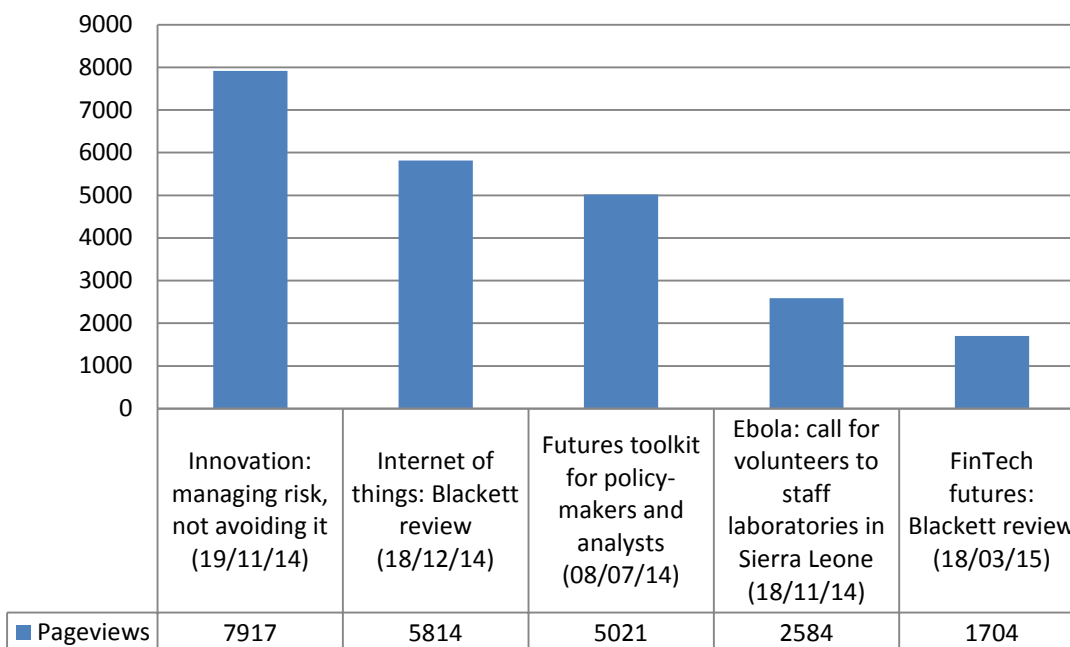
Figure 2: Top 5 reports – Go-Science: Foresight 2014-15

	Tackling obesities: future choices (17/10/07)	Future of manufacturing (30/10/13)	Future of food and farming (24/01/11)	Future of cities: a visual history of the future (25/09/14)	Mental capital and wellbeing (22/10/08)
Pageviews	21914	7679	7388	6275	5848

Annex B: Financial information

Our total spend in 2014-15 was £5.4 million. Of this £4m is admin and £1.4m is programme spend.

Figure 3: GO-Science spend 2014-15
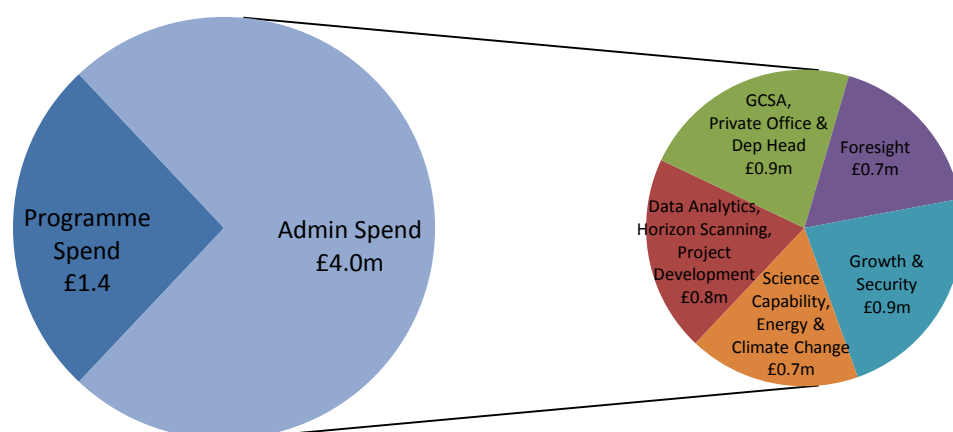
The table below shows outturns for 2010-11, 2011-12, 2012-13, 2013-14 and 2014-15. Figures are quoted in £m.

Table 1: GO-Science spend 2010-11 to 2014-15

Programme	2010-11	2011-12	2012-13	2013-14	2014-15
	2.3	**2.3**	**2.6**	**1.7**	**1.4**
GCSA/Private Office/Deputy Head	*0.9*	*0.7*	*0.8*	*0.7*	*0.9*
Foresight, Lifecourse and Cities	*1.4*	*1.3*	*1.4*	*1.4*	*0.7*
Science in Government[1]	*2.1*	*2.0*	*2.0*	*1.9*	*-*
Growth and Security	*-*	*-*	*-*	*-*	*0.9*
Science Capability and Climate Change	*-*	*-*	*-*	*-*	*0.7*
Data Analytics, Horizon Scanning and Project Development	*-*	*-*	*-*	*-*	*0.8*
Total Admin	**4.4**	**4.0**	**4.2**	**4.0**	**4.0**
Overall Total	**6.7**	**6.3**	**6.8**	**5.7**	**5.4**

---

[1] What was previously called Science in Government was split into Science Capability and Networks, and Global Issues Science Team between 2012 and 2013. Government Office for Science was restructured in 2014 as set out in the table.

The continuing reduction in Programme Spend results from the improved ability to obtain expert science advice at little or no cost. In addition a number of activities were delivered in house which also kept costs down. Decisions on the next Foresight project have been deferred, as the GCSA wishes to ensure the right topic area is selected where significant value can be added. The restructuring of the Office in 2013 also means that figures are not necessarily directly comparable across the years, for instance Horizon Scanning moved out of Foresight into one of the new teams.