

# REFORM

## From sidelined to systemic The role of Whitehall's Chief Scientific Advisers

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Professor Sir John Aston  
James Sweetland

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Edited by Charlotte Pickles

## ABOUT REFORM

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## ABOUT REIMAGINING WHITEHALL

This paper is part of the *Reimagining Whitehall* work stream. To effectively reimagine the State, major change must occur in the behaviours, processes, and structures of central government. The specific reform proposals sit under three core themes: New Mindsets, Rewiring the Centre, and Decentralising Power. This paper is the second in the New Mindsets series and sets out ideas for transforming how scientific expertise is leveraged and embedded across Whitehall, via a renewed approach that seeks to make better use of the CSA model which exists in every ministerial department in government.

### Reimagining Whitehall Steering group

*Reform* is grateful to the expert members of the *Reimagining Whitehall Steering Group* who provide invaluable insight and advise on the programme. Their involvement does not equal endorsement of every argument or recommendation put forward.

**Dr Henry Kippin**, Chief Executive, North of Tyne Combined Authority

**Rt Hon Jacqui Smith**, Former Home Secretary

**Sir Geoff Mulgan CBE**, Former Head of Policy, Prime Minister's Office; former Director of the No.10 Strategy Unit

**Martin Stanley**, Author of 'Understanding the Civil Service' and 'How to be a Civil Servant'

**Angie Ridgwell**, Chief Executive Officer, Lancashire County Council

**Professor Tony Travers**, Associate Dean, School of Public Policy at the London School of Economics

**Philip Rycroft CB**, Former Permanent Secretary, Department for Exiting the European Union

**Rachel Wolf**, Founding Partner, Public First; Co-Author, 2019 Conservative Manifesto

**Professor Jonathan Slater**, Former Permanent Secretary, Department for Education

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The argument, and any errors that remain, are the authors' and the authors' alone.

### Interviewees

We would like to thank all interviewees for giving their time and candid insights to support this research paper. Serving senior officials wished to remain anonymous.

- Professor Sir Ian Boyd, Professor in Biology, University of St Andrews and former Chief Scientific Adviser, Department for Environment, Food and Rural Affairs (2012 – 2019)
- Hannah Guerin, Chief of Staff, HomeServe UK, CEO of Enterprise Trust, and former Senior Special Adviser to the Home Secretary (2019 – 2022)
- Sir Philip Rutnam KCB, former Permanent Secretary, Home Office (2017 – 2020)
- Professor Lawrence Sherman, Chief Scientific Officer, Metropolitan Police
- Sir Patrick Vallance KCB, Chair, The Natural History Museum, and former Government Chief Scientific Adviser (2018 – 2023)
- Dr Stu Wainwright OBE, CEO, UK Centre for Ecology and Hydrology and former Director, Government Office for Science (2019 – 2023)
- Rt Hon Lord Willetts, Chair, UK Space Agency and former Minister for Universities and Science (2010 – 2014)

## A NOTE ON AUTHORSHIP

This paper is a collaboration between *Reform* and Professor Sir John Aston (Chief Scientific Adviser to the Home Office and Director-General for Science, Technology, Analysis, Research and Strategy, 2017 – 2020).

While the research, writing and recommendations are a joint effort, there are two important caveats. Section 3.1, which evaluates the efficacy of John's approach to the CSA role in the Home Office, was written and developed by *Reform* – with John providing only factual information to inform this section. Linked to this, though interviews for the paper were generally conducted by both John and James, this was not the case where interview questions covered specific reflections on John's time as CSA in the Home Office. In these cases, James led the sections relating to the Home Office alone, with John leaving the interview after general questions about science in government, to enable interviewees to provide candid and critical feedback or reflections.

Finally, the interview conducted with Professor Lawrence Sherman was conducted by James alone. This was to ensure that there were no perceptions of any conflict of interest with Professor Sherman's role as the Chief Scientific Officer of the Metropolitan Police and John's membership of the independent London Policing Board.

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# Recommendations

**Recommendation 1:** Incoming CSAs should be provided with an informal induction during the period between being appointed and taking up the post. Subject to vetting sensitivities, this should include insights into current departmental, political and scientific activity and priorities. A ‘buddy system’ should be introduced, with a current CSA providing informal guidance and support to the incoming CSA to help them understand how the role works in the unique environment of Whitehall.

Once in post, CSAs should receive a standardised, formal induction from both GO-Science and their department. In addition, GO-Science and the department should agree a bespoke induction addressing the set of cross-cutting scientific issues that need to be understood by that particular incoming CSA.

**Recommendation 2:** CSAs should be appointed at the rank of director general (or departmental equivalent) or above. They should also be members of the department’s executive team.

**Recommendation 3:** The Government should commit to implementing the findings of the 2019 ‘Government Science Capability Review’ within the next 12 months.

In the meantime, the Government Chief Scientific Adviser should commission an update to the 2019 Review to capture the post-COVID state of science across the entirety of Whitehall. This should be led by GO-Science and conducted as a rapid review to be published by the end of 2024.

**Recommendation 4:** GO-Science should work with departments to generate a full round of in-depth departmental science reviews, akin to those conducted in the 2000s.

Government should resource GO-Science to conduct and publish these evaluations by the end of 2025. These should identify strengths and weaknesses in the respective science system, integration with the department’s wider policymaking and delivery processes, and examine how the CSA is perceived and utilised in the department.

The departmental reviews should recommend adoption or continuation of either the ‘system leader’ or ‘system regulator’ approach, depending on the state of the department’s wider science system.

**Recommendation 5:** CSAs should be required to produce an annual report on the state of the science system in their department, activities undertaken during the year and a forward look to the coming year. This should be based on a simple template and published and submitted to the House of Commons Science, Innovation and Technology Committee for scrutiny.

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# Foreword

Science, and the insights and innovation it delivers, is crucial to the future health, well being, resilience and prosperity of the UK. Embedding science in government is key not only to dealing with crises, but to designing and implementing better policy, to enabling better decision-making, and, ultimately, to delivering better outcomes for citizens.

Progress has been made over the past decades, with investment in people and resources, to boost Whitehall's scientific capabilities. Government-owned laboratories are driving discovery. Public-private partnerships and R&D investment are driving innovations that will tackle our most difficult threats, from climate change to antimicrobial resistance. In Whitehall itself, in some departments, mature science systems are underpinning the everyday activity of civil servants.

While there is much to celebrate, there is still a long way to go to ensure science carries the weight and influence in Whitehall that is needed for any modern effective government. The experience of the pandemic has shone a bright light on the importance not just of science itself, but of the role science must play *alongside* other skills and specialities. There is no *one* science. Government must be able to leverage the insights of a multitude of disciplines and specialities, integrated with other core Whitehall expertise, in order to realise the full benefits. Failure to do so means worse outcomes for those government serves.

That means addressing the areas of government where science remains sidelined. Since 2011, each government department has had a Chief Scientific Adviser (CSA). This is a vital role designed to provide deep science expertise and leadership across a department's work. The scope and influence of CSAs is, however, variable. While the answer is not a single, uniform model, it is vital that all departments recognise the value of this resource and position and support them to have meaningful impact.

This *Reform* paper puts forward practical ideas for how to achieve that, moving away from a lone operator model of CSA to one in which these individuals are taken seriously as science leaders, fully embedded in the work of their departments. John's experience as CSA at the Home Office provides the case study for how impactful such a transition can be.

The next government, whatever its colour, will face huge challenges. Science will hold the key to many of the solutions. I very much hope government acts on the sensible ideas in this report.

**Sir Patrick Vallance**

**Chair, Natural History Museum, and former Government Chief Scientific Adviser (2018 – 2023)**

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# 1. Introduction

In the history of British government, the role of science and scientific expertise has become gradually more influential. In the account of the first Government Chief Scientific Adviser, Lord Zuckerman (in post 1964 – 1971), much of this change reflected developments in wartime.<sup>1</sup> After proving essential to the work of British government in both world wars, the value of science and scientists was better recognised.

In our most recent national emergency, COVID-19, we once again saw scientific expertise as essential: from the role of SAGE and the prominence of the Government Chief Scientific Adviser, to the message that government was merely ‘following the science’, science was a defining element of the Government’s response.

While typically deployed during crises, scientific insight should be central to the day-to-day work of government. This goes beyond the obvious applications in areas such as net zero, defence or transport, where its value is well understood, to ‘social policy’ decision-making in areas such as policing or welfare.

In government, much of this function falls within the purview of Chief Scientific Advisers (CSAs). These individuals, usually externally appointed, are tasked with providing independent advice to ministers and other policymakers on scientific evidence, delivering a “challenge function to the department” they work in, and embedding science into its work as much as their role permits.<sup>2</sup> They may work closely with ministers, sit on departmental boards, serve as directors general (DGs), allocate significant budgets, and develop R&D strategies – though many CSA positions lack some or even all of these characteristics.

Yet, the role of CSAs is generally poorly understood, despite the significant value they can offer if deployed effectively. This paper seeks to better understand the role of CSA and their varied experiences in government. Drawing on insights from Professor Sir John Aston, Chief Scientific Adviser in the Home Office from 2017 to 2020, as well as interviews with former ministers, scientific advisers and experts, it presents a new approach to CSAs across ministerial departments.

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<sup>1</sup> Lord Zuckerman, ‘Science Advisers and Scientific Advisers’, *American Philosophical Society* 1244 (8 November 1979).

<sup>2</sup> Government Office for Science, *Guidance for Government Chief Scientific Advisers and Their Officials*, 2020.



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## 2. Science in government

The current government has, to its credit, emphasised the importance of science – both in its rhetoric and in policy terms. The Prime Minister has set a public ambition to become a “science and technology superpower by 2030”,<sup>3</sup> and, within Whitehall, a target to ensure the Civil Service Fast Stream hires at least 50 per cent STEM graduates has been exceeded.<sup>4</sup>

Indeed, over the past decades, there have been numerous efforts to improve the role of science expertise within British government itself. Some of this emerges from the wartime developments that Lord Zuckerman highlights, where military necessity brought science into the government machine and where it remained even once conflict had passed.<sup>5</sup> But there have also been various attempts to establish fresh structures, among them the CSA role across all ministerial departments, the National Science and Technology Council (a PM-chaired cabinet committee), and the Government Office for Science (GO-Science), all of which have – in different ways – strengthened the role of science within Whitehall.

Yet, despite all this, science is still too often sidelined in government. The civil service still lacks sufficient cognitive heterogeneity and is dominated by generalists, with policy skills prized over specialist (including scientific) expertise.<sup>6</sup> Science is often low down the list of priorities when it comes to influencing the strategic direction or the policy decisions adopted by any given department.

In this context, CSAs are particularly valuable. They are one of the few (usually) externally appointed specialist roles that almost every ministerial department has, and can therefore offer constructive challenge and insight to help improve policymaking in government.

This chapter provides a brief summary of the position of science in government today – exploring the structures that exist within the current system to utilise scientific expertise, describing what the CSA role looks like in reality, and sketching out an initial model for how this essential role might be constructed. The following chapter draws more directly on John Aston’s experience as CSA in the Home Office, exploring the benefits of this model, as well as its wider applicability.

### 2.1 Scientific structures

The fundamental problem of specialists being marginalised in the Whitehall system is deeply familiar. As the 1968 Fulton Report (commissioned by the Wilson Government to examine the performance of the civil service) explained: “many scientists, engineers and members of other

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<sup>3</sup> ‘Plan to Forge a Better Britain through Science and Technology Unveiled’, Press Release, GOV.UK, 6 March 2023.

<sup>4</sup> ‘Civil Service Fast Stream Exceeds Target to Boost STEM Expertise across Government’, Web Page, GOV.UK, 25 October 2023.

<sup>5</sup> Zuckerman, ‘Science Advisers and Scientific Advisers’.

<sup>6</sup> Simon Kaye, *Reimagining Whitehall: An Essay* (Reform, 2022); Charlotte Pickles and James Sweetland, *Breaking down the Barriers: Why Whitehall Is so Hard to Reform* (Reform, 2023).

specialist classes get neither the full responsibilities and corresponding authority, nor the opportunities they ought to have... their access to higher management and policy-making is restricted.”<sup>7</sup> The opportunities and access were retained for the policy generalist.

As with many aspects of Whitehall reform, progress has been slow. The 2012 ‘Civil Service Reform Plan’ also highlighted the need to move on from the idea of the generalist and find the “right combination of professionalism, expert skills and subject matter expertise.”<sup>8</sup> The 2021 ‘Declaration on Government Reform’ echoes these previous reports, with a call to develop expertise in “digital, data, science, and project and commercial delivery.”<sup>9</sup>

However, as Rupert McNeil, former Civil Service Chief People Officer told the Public Administration and Constitutional Affairs Committee, Whitehall “is a sector; it is not a single organisation and even within departments, there are many sub-sectors.”<sup>10</sup> In some departments, scientific expertise *is* valued and integrated successfully, certainly more so than in other parts of the Whitehall ‘sector’. Numerous interviewees for this paper cited the Department for Environment, Food and Rural Affairs (Defra) as the prime case study of this, with scientists embedded across the organisation within interdisciplinary teams and their expertise seen as central to policy development. The Ministry of Defence (MOD) was another example given, where science is seen as key to its operational work.

Indeed, the military has played an essential part in the history of science in government. The very first government chief scientist – though not formally holding that title – was Frederick Lindemann, appointed by Churchill to provide scientific advice and guidance through World War 2.<sup>11</sup> The MOD has itself had a departmental CSA since 1946, the first Whitehall department to have done so.<sup>12</sup> The first formally appointed Government Chief Scientific Adviser (GCSA), the zoologist Lord Zuckerman in 1964, had previously held the CSA role at the MOD.<sup>13</sup> The GCSA role has been a fixture within Whitehall ever since, with a remit to provide scientific advice to the PM and Cabinet across the full range of government priorities.

Alongside the GCSA position, there have been important institutional developments that seek to embed science into government. The current Government Office for Science was formed in 2007 and, having sat primarily in the Department for Innovation, Universities and Skills (DIUS) and the Department for Business, Energy and Industrial Strategy (BEIS) over its subsequent history, is now part of the Department for Science, Innovation and Technology (DSIT). Its focus is on building effective scientific advice across government and supporting the work of scientific crisis response through bodies like SAGE, which became so prominent in COVID-19. It also convenes cross-cutting horizon scanning and other future thinking

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<sup>7</sup> Lord Fulton, *The Civil Service Vol. 1 Report of the Committee 1966-68* (London: The Stationery Office, 1968).

<sup>8</sup> HM Government, *The Civil Service Reform Plan*, 2012.

<sup>9</sup> Cabinet Office, *Declaration on Government Reform*, 2021.

<sup>10</sup> Public Administration and Constitutional Affairs Committee, *Oral Evidence: Civil Service Human Resources*, HC 1399 (London: The Stationery Office, 2023).

<sup>11</sup> Zuckerman, ‘Science Advisers and Scientific Advisers’.

<sup>12</sup> Zuckerman.

<sup>13</sup> Institute for Government, ‘Government Chief Scientific Adviser’, Web Page, 2020.

projects for government and supports the expert committee, the Council for Science and Technology, which provides independent science and technology policy advice to the PM.<sup>14</sup>

For this paper, it is GO-Science's role in supporting CSAs – above all by coordinating the cross-governmental CSA network – that is of greatest interest. This body brings together CSAs from across government, partly through a formal Wednesday morning meeting which acts as a forum for information sharing and building links between scientific advisers working in different departments.<sup>15</sup> Several interviewees – both on the scientific and political/official side – suggested that this network offers real value in sharing material that is often unable to escape the usual departmental siloes. It also allows, on occasion, government to access valuable specific disciplinary expertise from CSAs across Whitehall.

GO-Science also plays a role in recruiting CSAs, developing induction materials for new appointees to the position, and facilitating informal mentoring relationships between new and established CSAs.

In addition to the structures discussed above, there is the Government Science and Engineering (GSE) Profession, established in 2008, chaired by the GCSA and supported by GO-Science, which is intended to raise the profile of scientists and engineers within Whitehall.<sup>16</sup> There is also the re-established National Science and Technology Council (NSTC), a cabinet committee now chaired by the PM, which covers cross-cutting strategic decisions on a broad swathe of science and technology issues.<sup>17</sup> DSIT itself may also be expected to play a role in how science functions in government, though exactly how is to be seen.

All this demonstrates a solid base from which to build. This is true both in terms of 'science for policy' (providing scientific advice to underpin policymaking) and 'policy for science' (enabling the development of British science and technology both inside and outside of the public sector).

Yet science undoubtedly remains underutilised within government. Dame Kate Bingham's recent critique of Whitehall posited that, just as "over the past thirty years, it has become unthinkable for policy not to be deeply informed by economics. The same should be true of science, starting now."<sup>18</sup> GO-Science's own 2019 review of government science capability similarly called for "a clearer model of science leadership" in departments to improve public service outcomes.<sup>19</sup> Interviewees for this paper argued the same, with Lord Willetts suggesting that, within Whitehall, officials are generally "respectful but wary of scientific expertise".

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<sup>14</sup> Government Office for Science, 'About Us', Web Page, 2023.

<sup>15</sup> Interesting, this Wednesday morning meeting of the CSA Network mirrors the Wednesday morning 'colleagues meeting' attended by departmental Permanent Secretaries from across Whitehall.

<sup>16</sup> HM Government, 'Government Science and Engineering Profession', Web Page, 2023.

<sup>17</sup> Sir Patrick Vallance, 'UK's Quest to Be a Global Science Superpower', *Civil Service Blog*, 8 February 2022.; its previous iteration was (briefly) set to be chaired the Chancellor, per: Cabinet Office, 'New National Science and Technology Council Established', Press Release, 12 October 2022.

<sup>18</sup> Oxford University, "Another War Is Coming", Kate Bingham DBE, Delivers Romanes Lecture', Press Release, 24 November 2021.

<sup>19</sup> Government Office for Science, *Realising Our Ambition through Science: A Review of Government Science Capability*, 2019.

To improve ‘science for policy’ in particular, more effective leadership is required. Which means looking closely at the role of CSAs.

## 2.2 Chief Scientific Advisers

While the role of the GCSA has endured in British government since Lord Zuckerman’s arrival back in 1964, the role of the Chief Scientific Adviser at the departmental or agency level took far longer to become established across all parts of Whitehall.

Every department now appoints a CSA, as do some executive agencies (including the Met Office and Food Standards Agency), the devolved administrations, the National Police Chiefs’ Council, and the national security function in the Cabinet Office.<sup>20</sup>

The MOD has employed a CSA since 1946, while the Department for International Development (DFID) first appointed a CSA in January 2005 – eight years after the department first came into being<sup>21</sup> – and the Foreign Office did so only in 2009.<sup>22</sup> Finally, in 2011 the Treasury became the last ministerial departmental to appoint a CSA.<sup>23</sup> In other words, CSAs have only been fully in place across government for just over a decade.

### 2.2.1 The role

The most recent official guidance for CSAs and their officials was published in January 2020 by GO-Science and sets out a detailed list of responsibilities (figure 1).

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**Figure 1: CSA responsibilities**

- Provision of advice and challenge directly to the Secretary of State, other ministers and policymakers in the department
- Performing an independent challenge function to the department, ensuring that science and engineering evidence and advice for departmental policies and decisions is robust, relevant and high quality
- Ensuring that there are mechanisms in place to ensure that policymaking and the delivery of services and operations are underpinned by science and engineering

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<sup>20</sup> HM Government, ‘Chief Scientific Advisers’, Web Page, 2023.

<sup>21</sup> House of Lords Select Committee on Science and Technology, *The Role and Functions of Departmental Chief Scientific Advisers*, HL Paper 264 (London: The Stationery Office, 2012).

<sup>22</sup> David C. Clary, ‘A Scientist in the Foreign Office’, *Science and Diplomacy*, 16 September 2013.

<sup>23</sup> House of Lords Select Committee on Science and Technology, *The Role and Functions of Departmental Chief Scientific Advisers*.

- Assuring the operation of the ‘Principles of Science Advice to Government’ to all external scientific advice to their department
- Oversight of the effective operation of departmental Scientific Advisory Committees
- Working with CSAs in other departments to share good practice across government and to identify and resolve cross-departmental science issues
- Producing a departmental R&D Strategy for the department, which also considers departmental arm’s length Public Laboratories
- Leading and engaging on relevant national and international science and engineering issues
- Management and/or oversight of departmental science and technology (S&T) budgets
- Working with the other analytical Heads of Profession and Departmental Directors of Analysis (DDAs) to ensure a robust and integrated evidence base underpins policy formulation, delivery and evaluation
- Ownership of the department’s Areas of Research Interest (ARI) document, to be developed in collaboration with the department’s Head of Policy Profession (HoPP) and Head of Analysis (HoA)

Source: Guidance for Government Chief Scientific Advisers and Their Officials, GO-Science.

In addition, the official guidance emphasises that CSAs should “usually be a distinguished external scientist or engineer, recruited externally” capable of taking on a role that “derives authority from knowledge, the ability to convene respected authoritative groups, and personal standing in the scientific world.”<sup>24</sup> This approach has been termed a “particularly British approach to expertise, which focuses on the credibility and character of the individual”.<sup>25</sup>

In simpler terms, the functions of a departmental CSA might be broken down into four parts:

- **Scientific expertise:** whether utilising expertise in their own academic specialism or synthesising cross-domain expertise of others, CSAs must be able to explain complex evidence to ministers and officials when such information is needed for decision-making. This is the most basic requirement a CSA must fulfil and is a major factor in establishing their credibility to those working at the most senior levels in departments.

<sup>24</sup> *Guidance for Government Chief Scientific Advisers and Their Officials*.

<sup>25</sup> Robert Doubleday and James Wilsdon, ‘Beyond the Great and Good’, *Nature* 485, no. 301–302 (2012).

- **Research and engagement:** CSAs are responsible for ensuring that their department is conducting appropriate and valuable scientific research, whether to meet short-term goals or aid delivery of long-term priorities. The primary way this is achieved is through publishing Areas of Research Interest (ARIs), but many CSAs also manage the departmental R&D budget. In addition, CSAs must engage with academia, private sector scientists and other international counterparts (whether institutions or individuals), so that departmental research needs – and research findings – are articulated to a wide audience of potential collaborators and customers.
- **Scientific advice:** while similar to expertise, CSAs must also focus on bringing scientific advice into their department's policymaking and operational processes. This function is more advanced than simply explaining the most relevant evidence, instead entailing efforts to embed scientific principles and practices within decision-making across the department. The balance between policy and operational science will differ from department to department, but there will always be elements of both for any CSA.
- **System leadership and/or regulation:** all ministerial departments have some scientific capabilities and the CSA functions as the respective department's Head of Profession for Science and Engineering. CSAs must support the work of scientists, raise their profile, and use whatever levers they have available to ensure the department's science system is high-functioning. Some CSAs have additional responsibility for external advisory committees or regulatory functions which, coupled with the CSA's independent status, provide a powerful 'challenge function'.

Of the four functions listed here, the last is the most variable between different CSAs. Though all will be the Head of Profession in their department, some CSAs have a far broader and more empowered system leadership role – they may be members of the departmental board or executive committee, manage and allocate many scientific (and other) staff, or control budgets that extend beyond R&D alone.

It is worth noting that the definition of science varies considerably across these four functions. For example, the GSE profession (managed by the CSA under their leadership function) typically focuses on natural sciences and engineering, whereas ARIs (under the research and engagement function) must be targeted at those working across scientific disciplines in academia. Most departmental CSAs consider themselves as representing science in its broadest sense, including the social sciences, within their departments, creating scope for a more joined-up and cross-discipline approach, but also leading to the potential for overlap with the work of analytical professions in government.

In addition, the perception of science as a category of expertise is inconsistent among those working in government. While CSAs undoubtedly view science as its own separate discipline, with a very specific epistemology and way of thinking, it was notable that some non-scientific interviewees spoke of science as simply another form of "evidence", rather than something explicitly distinct from the various other considerations that inform policymaking. There was, however, clear consensus from interviewees that economic analysis is viewed as an entirely separate and generally much more influential form of evidence for ministers and officials alike than science usually is.



## 2.2.2 A variable model

Overall, the involvement of the CSA in each of these four scientific functions, however defined, is highly variable department by department – there is no single, accurate job description of what it means to be a departmental CSA. As former GCSA Sir Patrick Vallance told us in an interview, the “range of CSA models was large”. Dr Stu Wainwright, the former head of GO-Science, suggested much the same, saying CSAs ultimately “interpret their roles in different ways.” This is no recent trend either. A 2012 Science and Technology Committee (Lords) report on ‘The role and functions of departmental CSAs’ reached the same conclusion, describing marked variation in how these important roles are constructed across Whitehall.<sup>26</sup>

John’s experience as Home Office CSA reflected this:

“When I first arrived in government, it was noticeable just how many different models of the CSA role there were across departments. This allowed the role to be shaped depending on departmental circumstances, but also reassured me that there was no single ‘correct’ way to do it.”

That there is no uniform ‘CSA model’ is not simply the product of accident. Rather, it has been explicitly articulated as a strength. Responding to the 2012 Lords report – which, among other things<sup>27</sup>, recommended that all CSAs should be represented on departmental boards and hold the rank of Permanent Secretary or DG – the then Government rejected many of the Committee’s recommendations to standardise the role. Though its explanation varied by recommendation, the overall rationale was flexibility and the benefits of having the “best appointment for the circumstances of a particular department.”<sup>28</sup>

There is some logic to this argument. It is reasonable that, for example, the MOD’s CSA role should look different to the equivalent position in the Treasury. The former, which manages vast defence programmes involving cutting-edge military tech, will require more from its CSA than HMT, which has less than a hundredth the budget and does not manage large-scale, complex operational delivery programmes.<sup>29</sup>

Advocating for a single, uniform CSA model would therefore be neither plausible nor appropriate. Given the different sizes, structures, and responsibilities of the various Whitehall departments, a level of flexibility is beneficial. However, it should be remembered that for a CSA, or indeed any other senior official in government, their influence will be primarily defined by their ability to either control budget, direct resources, or wield soft power (or some combination of the three). Any model for a CSA needs to take into account these levers which underpin influence, and therefore impact.

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<sup>26</sup> House of Lords Select Committee on Science and Technology, *The Role and Functions of Departmental Chief Scientific Advisers*.

<sup>27</sup> One of the report’s most interesting recommendations – though not examined in detail in our paper here – is that government should appoint a Chief Social Science Adviser, alongside the GCSA, to improve how social science evidence is used in policymaking.

<sup>28</sup> HM Government, *Government Response to the House of Lords Science and Technology Committee Report: ‘The Role and Functions of Departmental Chief Scientific Advisers’*, 2012.

<sup>29</sup> HM Treasury, *Public Spending Statistics: November 2023*, 2023.

Nonetheless, while strict standardisation is not the answer, the current status quo is not tenable. As successive government reform documents and the testimonies of this paper's interviewees suggest, science expertise is still insufficiently prized within Whitehall's policymaking processes. Though some recent tweaks to recruitment into the wider civil service are useful – such as boosting STEM representation on the Fast Stream – more can be made of the CSA role. This network of distinguished scientists and engineers present in every ministerial department can have much more of an impact within Whitehall, if leveraged in the right way.

The problem, at least in part, is the natural corollary of this flexible approach to the CSA role. While departments responsible for policy areas like transport, defence, and environment do have influential and effective CSAs, this is far from the case in every ministerial department. For example, as is explored in more detail in the next chapter, this was John's experience early on in the Home Office – the CSA role was viewed as a 'nice to have' and not embedded deeply into the policymaking processes of the department, though this had changed significantly by the end of the three-year tenure.

Patrick Vallance expanded on this point, describing the range of CSA models within government during his time as GCSA as spanning from the "lone operator" to those leading "operational delivery functions". In his view, the former model he observed in government, in which the CSA has little in the way of resources, staffing or influence, "absolutely does not work", as they are "only capable of reacting or driving the odd thing" rather than meaningfully spearheading the science agenda within the department.

Though this configuration undoubtedly has some limited value – a scientific adviser who can be called in occasionally by ministers to translate extremely complex material can improve decision-making – it makes poor use of the CSA. The lone operator cannot shake up Whitehall's policymaking process, let alone give science a prominent role. Yet too many CSA roles reflect this limited model: they can provide scientific expertise, but they are not deeply embedded into the working of their respective department at the top level.

By contrast, there are configurations of the CSA role in government which are much more effective. Within government, there are broadly two effective models, both of which possess much more capability than the lone operator. Each is detailed in Chapter 3, but by way of a high-level summary:

- **The 'system leader'**. This entails a close involvement within the policymaking process and integration with the executive structures of the organisation, taking on a managerial function in the organisation. This is much more of an 'insider' approach, entailing significant control over the science system in the department. This model offers greater influence and resources, but potentially conflicts with the independent character that the CSA role demands. A system leader might manage significant numbers of staff or allocate extensive budgets related to R&D activity within the department.
- **The 'system regulator'**. This is a distinct, more complex, but equally effective variant of the CSA model. In this case, the CSA adopts much less of an insider or leadership approach, usually in the context of a department which already has a well-developed



science system. They need not necessarily manage staff directly, nor allocate budgets themselves, but instead sit deliberately separate to the day-to-day departmental processes. They provide a highly engaged and significantly beefed-up ‘challenge function’ in the department. Their role is to ensure research and evidence is identified, utilised, and communicated effectively within a department where science is already deeply embedded (meaning no ‘system leader’ is needed to raise its profile).

Flexibility remains important within this spectrum, framing the role based on departmental need. A department like the Home Office may benefit from a system leader, in a context where science has not (historically) been central to policymaking processes (explored in the following chapter). By contrast, a department like Defra – where science has long sat at the heart of the department’s work – may achieve significant benefit from a system regulator.

The goal, then, is to retain the possibility of variation within this spectrum, while recognising that any point along this continuum is a significant enhancement from the lone operator models that still exist in parts of Whitehall.

**Figure 2: CSA Models**

CSA Model	Lone operator	System leader	System regulator
Grade	Generally director	Director general or above	Director general or above
Direct reports/staff	None or few – may include a small number of support staff, as well as a Deputy CSA	Significant – may include responsibility for entire directorates and their staff	Mixed – likely to include more staff than lone operator, but not directly managing as many as ‘system leader’
Executive role in department	None or limited	Significant – with considerable control over relevant directorates or budgets	Limited – regulates system, rather than managing scientific processes, staff, budgets directly
State of science system	Usually weak and poorly embedded in department	Developing and being embedded by the ‘system leader’	Strong and well-embedded in department
Perceived independence	Independent but still part of the system	Needs to ensure there is strong independent science mechanism in place to counterbalance system involvement	Clear source of independence and fulfils ‘licenced dissident’ role
Example in government	Home Office CSA role pre-2020	Home Office CSA role from 2020	Defra CSA role in 2019

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## 3. ‘System leaders’ and ‘system regulators’

### 3.1 The ‘system leader’ model: the Home Office

Drawing on John’s insights as the Home Office CSA from September 2017 to December 2020, this section focuses on the role of scientific expertise within the Department. In doing so, it provides an insider view of serving as a CSA, from entering a department as an outsider to government, navigating the complexities of Whitehall, and handling a challenging political environment.

This section explores how the role of science changed within the Home Office, with the shift from a ‘lone operator’ to a ‘system leader’ model that offered far more impact and influence for scientific expertise in policymaking. This offers a case study for how the CSA model can function and the potential benefits, and a few risks, it can bring.

Importantly, while the chapter draws on John’s own recollections, experience and insights (often in his own words), these have been tested with other interviewees present during his tenure as CSA. This includes the Home Office’s former permanent secretary, Sir Philip Rutnam KCB and Hannah Guerin, the Senior Special Adviser to then Home Secretary Priti Patel. We have also interviewed a current senior government official. In each of these cases, John was not involved in the Home Office related part of the interview, to enable candid and honest reflections from interviewees. The result is a compelling case study, based on first-hand accounts from the official and political side, of the potential benefits of this ‘system leader’ model, and how it led to science becoming far more embedded within a major Whitehall department.

#### 3.1.1 ‘Nice to have’

The Home Office has some history of producing significant research. In interview, for example, Professor Lawrence Sherman pointed to the police research done by the Home Office Research Unit, first established in the 1960s. However, he added that the department’s in-house science arm for policing has since been “hollowed out”. GO-Science’s 2007 ‘Science Review of the Home Office and Ministry of Justice’<sup>30</sup> was critical of the department’s use of science, identifying “a lack of appreciation of the value and importance of scientific evidence among (especially senior) officials [which] has an adverse impact in many respects.”<sup>31</sup> It also noted examples “where the CSA has not been included in senior level discussions at a

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<sup>30</sup> The rationale for a joint evaluation was as follows: “The review was originally intended to cover only the Home Office but, in the early stages of the review, parts of the department were moved to form the new Ministry of Justice and, with their agreement, it was decided that we would look at both departments (albeit not those sections previously in the Department for Constitutional Affairs).”

<sup>31</sup> Government Office for Science, *Science Review of the Home Office and the Ministry of Justice*, 2007.

sufficiently early stage”, arguing that “historically, science has not been used effectively by policy makers across the department...”.<sup>32</sup>

A decade on, when John joined the department as CSA, significant gaps in the Home Office’s use of scientific evidence remained. Philip Rutnam described a very mixed picture, in which security and counterterrorism functions used evidence effectively, policing and crime policy had a good research base available, but did not realise its potential, and migration policy struggled to use the more complicated and politically fraught evidence base available. Hannah Guerin suggested science was not viewed as “as important as other factors” within the departmental hierarchy pre-pandemic. Indeed, no interviewee identified the Home Office as an exemplar in terms of leveraging scientific expertise, in obvious contrast to the likes of Defra and the Department for Transport.

In other words, the Home Office lacked a well-developed ‘science system’. The science system, a concept discussed in the 2019 review of government science capability commissioned by then GCSA Sir Patrick Vallance, encompasses a number of essential functions, including: strategic leadership, commissioning, external networking, and building and retaining in-house expertise.<sup>33</sup> In simple terms, this might be described as the maturity of the science function within a given department – both how well embedded it is in the day-to-day work of the department and its reach (externally and internally) to pull in, identify the need for, and utilise evidence. As the former GCSA told us in interview, “permanent secretaries must know that we need both CSAs and well-developed science systems” to ensure this expertise can be used effectively within departments. The crucial role of permanent secretary buy-in is discussed further below.

As a result of this reasonably immature science system, John’s role early on was itself correspondingly limited:

“When I started, the CSA role was present in all ministerial departments, but for the Home Office, it was really just a ‘nice to have’. They asked me to go and look at things and write reports about complex problems, which was all very interesting and useful. But, fundamentally, the department just didn’t seem to institutionally know how to make best use of a CSA which, in turn, made it challenging for me to navigate the role.

Oddly, this offered some advantages as a starting point, because I spent a lot of time understanding this vast department without being at the very centre of day-to-day work.”

In this context, the role of Home Office CSA was characteristic of the lone operator role described in Chapter 2. Early on, this was almost literally the case (“I had a Chief of Staff and part of a diary manager, but they didn’t actually work for me, nor did they work full-time”), as John functioned as a floating scientific expert within the department, but without the levers, resources, and position needed to meaningfully embed science within policymaking, let alone manage the existing science system in place within this complex organisation. This is a textbook example of a role that, though undoubtedly useful on some occasions when called

<sup>32</sup> Government Office for Science.

<sup>33</sup> Government Office for Science, *Realising Our Ambition through Science: A Review of Government Science Capability*.

upon, was simply not configured in the right way to drive change or have impact – squandering the potential benefits from using science effectively.

As is often the case, it was a crisis that triggered the significant shift in the role of the Home Office CSA. The Salisbury poisonings in early 2018, in which the Russian Government attempted to assassinate former Russian military official Sergei Skripal and his daughter Yulia using the poison Novichok, brought the CSA into the centre of departmental activity. Given the particular challenges that cleaning up a nerve agent in a British city (and later the nearby town of Amesbury) entailed, the Home Office began to use John more frequently:

“Science, for obvious reasons, was an important part of the response and recovery to the events in Salisbury and Amesbury. This drastically increased the visibility of science and the CSA role and, coupled with the department’s push to become more evidence-based from several senior officials, gave the opportunity to reconsider how some things should change in the structures of the department.”

However, Philip Rutnam stressed that, while the Salisbury poisonings were a “spectacular” crisis moment, this should be seen in the context of many other crises, such as terrorist attacks and the Grenfell Fire, which affected the Home Office through this period. While the CSA role was “prominent and highly valued in the department” in relation to Salisbury, crucially, the former permanent secretary argued, it was already clear that more needed to be made of scientific expertise.

In fact, a series of crises following the Salisbury poisoning – from the drone incident at Gatwick Airport in December 2018 to the challenges around creating systems for secure borders in various post-Brexit scenarios – provided further impetus to the Permanent Secretary’s existing desire to widen the scope of the CSA role.

The importance of the Permanent Secretary’s personal commitment to elevating and integrating the role of science within the Home Office’s work should not be underestimated. As the most senior official in a department, their influence and decision-making power is second only to ministers, and in terms of internal organisational structure second to none. The crises provided a burning platform for greater scientific input, but the nature of the shift that followed – overhauling structures and giving the CSA serious resource and standing – was the result of the Permanent Secretary understanding the real world value of science.

In short, the Department saw a need to find champions for evidence-based policymaking and the CSA is a natural ally for this cause. From being a lone operator when taking up the post, John was handed direct responsibility for the Department’s science capabilities in Autumn 2018. It speaks volumes that this part of the Home Office had not previously been under the control of the chief scientist.

In mid-2019, the scope of the role was expanded still further. Partly due to John’s academic background as a statistician, he took formal responsibility for the Department’s analysis functions – managing around 400 analytical staff across the Home Office. This entailed a major shift in what the CSA role involved. Rather than providing advice around specific policy or operational issues (with a staff of just 1.5 FTEs), a far greater level of executive and managerial responsibility was attached to the position. Around this time, the Department also

hired a Deputy CSA, greatly increasing the capacity of the science advice element of the CSA team.

This transformation, emerging as those in the Home Office saw more clearly the value that scientific expertise was providing in crises, and partly through the Permanent Secretary's longstanding desire to make more of evidence in policymaking, exemplifies a move away from the lone operator model. Instead of a 'nice to have', these were the first steps towards configuring the department's CSA as a true system leader.

### 3.1.2 Becoming a system leader

This shift was rapidly accelerated, as the Home Office came to face COVID-19. The pandemic had a seismic impact on the role of science in government in general. In short order, science became the news. COBRA, SAGE, the very language of 'follow the science', placed scientific advice at the heart of everything that the State was trying to do.

This created considerable pressure on limited resources. Philip Rutnam describes this as a moment that was also "deeply destabilising for the system of scientific advice", with the full implications for how science is "structured, offered, used, and developed in government" likely to emerge as the UK moves through the ongoing COVID-19 inquiry. In the Home Office itself, this period really did transform the role of departmental CSA:

"The influence of science and analysis in the Home Office was already increasing, but there was a profound acceleration in this due to COVID-19. Suddenly, science was needed everywhere within policy and operations, and often exceedingly quickly. It was also important to ensure that external scientific information was reaching and then flowing through the department as quickly as possible. The usual ways of providing advice were no longer suitable, so we reverted to some of the ways of working we'd learned from previous crises such as Salisbury."

This continued as the pandemic developed through the first lockdown and beyond:

"Science was used in advice on many issues, for example areas of immigration, where it previously hadn't been a major element. This suddenly opened possibilities for non-COVID-19 related parts of the policy and operations processes to have science and analysis involved as well. Science was gradually influencing more and more of the department's thinking and decision-making."

Others agreed with this assessment of how the Home Office CSA role changed. Hannah Guerin noted that COVID-19 ensured that science "quickly became viewed as essential" and the CSA position was moved from "zero to hero" within the departmental hierarchy. She described various ways in which the CSA rapidly began to play a vital role – partly through engaging in translation of complex scientific material (as both an attendee at SAGE and a statistician by background), but also through greater engagement in decision-making processes. She explained that, for example, the Secretary of State "insisted" that John "was present for daily gold meetings" (national policing operational update meetings) to provide advice and input.



A Whitehall department resistant to embedding science into policymaking – science “was not seen as particularly relevant to day-to-day decisions of the Home Office” pre-2020, according to Guerin – suddenly placed this discipline at the centre of its work. As one senior official we interviewed stated, it “really shifted people’s perceptions of science” in government.

If previous, smaller scale crises, combined with the personal endorsement of the Permanent Secretary, had begun the shift in the Home Office CSA role, the pandemic’s effect was sufficient in both intensity and duration to move this new model to a ‘settled system’. Science had been at the heart of the Department’s work on a daily basis for several years. One interviewee reflected that while there has been some slippage as COVID has abated, the salience of science within the Whitehall machine remains elevated post-crisis.

In the Home Office specifically, this increased salience was matched by a profound structural shift in the CSA role in terms of both grade and responsibility. Having taken responsibility for Home Office science (Autumn 2018) and analysis (mid-2019) functions, the role evolved again in January 2020 when John joined the departmental executive committee (ExCo), and then, in May 2020, John was appointed Director General and took over the Science, Technology, Analysis, Research and Strategy (STARS) directorate:

“CSA roles are, by design, fixed-term appointments, and my time was coming to an end. The process of recruitment for the next CSA was starting and it was natural to think about the grade and responsibilities of the incoming CSA, which was now deemed to be a DG level role. However, because of the pressures during COVID-19 for making better use of science and evidence, the department considered it useful to accelerate this transition as quickly as possible. On that basis, I took up the DG position until the end of my time as CSA.”

The interviews for this paper suggest that there were three factors underpinning this change within the Home Office.

First, those at the top of the department had developed a deep appreciation of the CSA and his value through the pandemic. Guerin linked the decision to appoint John as Director General for STARS to “recognising talent in the job” and emphasised the effective working relationship between him and then Secretary of State Priti Patel. This was also reflected in interview with a senior government official who shared their sense that John had developed effective relationships across the department in his time there. Both the expertise he provided, and his personal working style, were important.

While it is difficult to plan for ministerial-CSA relationships, not least due to the frequency with which ministers move, as with any advisory role, a strong working relationship is vital. John did not meet either the Home Secretary or a Home Office minister ahead of joining the department. Given the importance of the relationship, it is worth considering whether, as part of the appointment process for new CSAs, appointable candidates should be required to sit down with the person they would be advising.

Secondly, there was a clear desire, driven from the very top, to connect and unify complementary functions within the department under a single umbrella. Rutnam described exactly this, noting that the “logic was the big benefits in combining things like commissioning and the science and technology budget – with a single person overseeing all of that.” Putting

“strategic advice together with evidence-gathering” was part of this, he added. Guerin made a similar point about complementarity, suggesting that having analysis aligned with the science and technology functions was seen as a sensible approach.

Finally, this reflected an attempt to increase the salience of evidence, including scientific expertise, within how the department operated. Guerin described this development as “structurally trying to develop a more sophisticated science and technology response” in the Home Office. Rutnam talked about this as providing “greater prominence to evidence of all kinds” – something he viewed as a priority within the department during his tenure. That meant closing the gap between ‘science and engineering’ and ‘social science’, ensuring a much more holistic view of evidence to underpin decision-making. Retaining a siloed model would have failed to bridge this gap.

In other words, this move was, at least in part, an effort to enhance the science system – even if it was perceived more widely as embedding evidence generally – that was identified as crucial in the 2019 government science capability review.<sup>34</sup>

In practical terms, this hugely enhanced the scope of the CSA role and the resources allocated towards it:

“This new role allowed science and analysis to permeate into every part of the Department. This covered advice around the allocation of the overall budget to thinking about the department’s long-term strategy, with every policy area in between, in addition to all the usual scientific areas. It really felt as though science and analysis were moving toward the centre of the Department’s thinking.”

This much more integrated and influential model has since become embedded within the Department as the standard approach. As the job pack for the new CSA explained: “the CSA will also act as Director General for Science, Technology, Analysis, Research and Strategy (STARS) and have management responsibility for three directorates totalling about 700 people.”<sup>35</sup> The role has continued to evolve, with the Strategy element being pulled out as a separate unit under the Permanent Secretary, but the fundamental shift from ‘nice to have’ (akin to the lone operator model criticised by Patrick Vallance in interview) to system leader is the new normal in the Home Office.

### 3.1.3 How system leadership can elevate science

The research for this paper identifies clear benefits from this model, both in terms of improving the place of scientific expertise within the policymaking process and, in the long term, strengthening the science system within those departments which do not have a long history of using this resource effectively.

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<sup>34</sup> Government Office for Science.

<sup>35</sup> Document sourced from John Aston directly, but extended role referenced in [Beckie Smith, ‘Home Office Seeks next Chief Scientific Advisor’, *Civil Service World*, 23 June 2020].

### 3.1.3.1 Flexibility and preparation

There are, however, some limiting factors to consider. As the government argued in its response to the 2012 Lords committee report on CSAs, different departments have long operated a variety of CSA models, reflecting their different duties, cultures, and configurations.<sup>36</sup> A CSA model that thrives in one department may not easily cross over into another, and therefore a degree of flexibility is essential.

Additionally, as is well documented, joining Whitehall without previous civil service experience can be challenging, and the government machine does not always respond well (as the Baxendale review of 2015 found, and, almost a decade later, interviews for *Reform*'s 'Breaking down the barriers' confirmed).<sup>37</sup> Indeed, several interviewees noted that some CSAs struggle to adapt to the challenges involved in navigating complex political environments – the political laws and incentives that, as Roger Pielke Jr. once quipped are “every bit as firm, perhaps even more firm, than the laws of physics”.<sup>38</sup>

The process of recruitment is also painfully slow (for John “the time from being conditionally offered the job to the time it was formally confirmed was around six months”), and Vallance argued that Whitehall should “get up to the speed of industry or faster”. However, this delay does allow for some acclimatisation:

“I was very lucky that the Home Office – despite the vetting still being completed – encouraged me to come into the department and engage with some of the scientific and science advisory work that was going on. This was potentially easier as the CSA role was vacant for some time before my starting. This time allowed me to get up to speed on some issues well before I arrived, and made the transition into the Home Office much easier when I did start. This, of course, was only possible because of a very understanding employer (University of Cambridge) – a luxury others taking on the role may not have enjoyed.”

This process should be formalised so that the benefits of hiring external expertise are not lost to the time-consuming process of adjusting to the relatively unique context of government. In other words, in this instance, the glacial pace of Whitehall recruitment could be turned into an asset if that time were used to effectively prepare and induct incoming CSAs. This should be focused on enabling them to play a more systemic role. Recommendations relating to this are in Chapter 4.

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<sup>36</sup> House of Lords Select Committee on Science and Technology, *The Role and Functions of Departmental Chief Scientific Advisers*.

<sup>37</sup> Catherine Baxendale, *How to Best Attract, Induct and Retain Talent Recruited into the Senior Civil Service* (Civil Service, 2015); Charlotte Pickles and James Sweetland, *Breaking down the Barriers: Why Whitehall Is so Hard to Reform*.

<sup>38</sup> Roger A. Pielke, Jr., 'Lessons from 50 Years of Science Advice to the US President', *Wissenschaftliche Politikberatung Im Praxistest*, 2015.



### 3.1.3.2 The benefits of system leadership

Despite these caveats, the system leader model offered a substantial opportunity to improve the state of the science system within the Home Office and strengthen the capabilities and resources held under the CSA in this department. Reimagining the CSA role – by moving from being a pure adviser and technical expert towards a much more executive approach as the head of the science system – delivered a number of significant benefits.

As discussed above, it equipped the CSA with a far more significant set of resources – when John first joined the department he lacked the resources and budget to make any meaningful impact beyond providing specific, targeted advice.

By contrast, as DG for STARS, John was managing around 900 staff across a range of different functions, from strategy officers and data analysts to social scientists and private office staff. This allowed for proactive work and capability-building, providing the resources to scope out areas in the department which could benefit from scientific input, order specific research and evidence-gathering activities on particular topics of interest, and focus on long-term projects which may be costly upfront, but deliver future benefits. It also provided clear routes to ministers to ensure that science and analysis were a tangible part of the decision-making process.

Wainwright (former Director of GO-Science) agreed with this assessment – arguing that having autonomy over a budget is essential to CSA effectiveness. At the same time, as a senior government official interviewed stated, the advantage of this approach is that the state of science in a department is not entirely dependent on the personal activity of the CSA. Instead, with these resources, the science system in the department can continue operating even without the conductor of the “orchestra” in place – they can “continue playing even when the CSA is not there.”

Establishing the CSA as a DG position also lent the role status within the departmental hierarchy. The 2012 Lords committee report found CSAs employed at a range of levels, varying from SCS2 to SCS4. *Reform* analysis shows current departmental CSAs are a mixture of directors and directors general, for example CSAs in FCDO, DLUHC and DWP are directors while CSAs in HO, Defence and Defra are directors general.<sup>39</sup>

According to Wainwright, CSAs should operate at (at least) DG level, to ensure they have sufficient standing and authority in Whitehall to be viewed as influential. This is all the more important in departments where science has lacked status. To quote Vallance, “the tragedy is that it shouldn’t matter [what grade the CSA sits at], but it does... Whitehall is remarkably hierarchical about these things.” A CSA at DG level can have the additional influence needed to inform decisions that can strengthen a department’s science system.

Finally, and perhaps most crucially, the new Home Office model didn’t simply elevate the CSA role to the DG level, it reconfigured it to provide oversight and control over complementary

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<sup>39</sup> House of Lords Select Committee on Science and Technology, *The Role and Functions of Departmental Chief Scientific Advisers*.

and influential business areas. It was this which provided the opportunity to drive cross-departmental change.

In the case of the Home Office, this approach was rather remarkable. As well as managing areas that might be expected to sit under the CSA as standard (science, analysis and research), the CSA also now had responsibility for the strategy directorate. This entailed overseeing private office teams (the officials who act as facilitators for ministers), managing the departmental board, and leading on departmental budget allocations. As John explains:

“Science and analysis have the potential to be really influential in policymaking and operational work, but only if the scientists and analysis are actually engaged in these endeavours and are perceived to be important by those working in the system. The central functions of the department – such as strategy and private office – are often the most important customers to drive the influence of science and analysis, as well as the biggest champions of such work, when it is of genuine use to the department.”

This specific approach enabled science to be plugged into the work of the Department; especially important in the context of a Whitehall system that does not have “a cultural instinct to approach problems from the scientific angle in general”, as Guerin argues.

However, even the more limited version of this approach – where a CSA manages science, analysis and research – enables a greater overview across a department and should therefore make it easier to identify where science can be usefully deployed. Both models offer far greater scope to connect up resources in different functional areas than the lone operator approach, and enable a strengthening of the science system within a department.

In this sense, the system leader model is much closer to the idea of a Chief Scientific Officer (CSO) than a CSA – a far more embedded, ‘insider’ approach which usually entails both resources and executive functions. As Lawrence Sherman, the Metropolitan Police’s current CSO argued in interview, the CSO position enables you to take “much more responsibility” within an organisation, be “very involved in the pathway of policy decisions”, and “push facts to the forefront of the conversation.”

There is, of course, a trade-off involved in becoming much more of an ‘insider’. It is worth recalling that the 2020 civil service guidance for CSAs and their officials states that: “the role of the CSA includes that of a ‘licensed dissident’, providing challenge and leadership at the centre of the department.”<sup>40</sup>

This itself highlights the implicit balance involved in the chief scientist role. CSAs are meant to retain some level of genuine independence to offer rigorous scientific input (hence “dissident”), but can often only be influential if they are embedded within decision-making processes at the “centre of the department”. Influence and independence in this context are, to some extent, in competition with each other.

For a CSA operating as a system leader, retaining independence requires conscious attention. This is also, however, where the (usually) temporary nature of the CSA appointments is important – even in a more ‘insider’ role, the CSA is recognised as a unique position, and the

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<sup>40</sup> *Guidance for Government Chief Scientific Advisers and Their Officials.*

temporary nature can enable them to be more challenging, and operate in a more wide ranging way, than a full, permanent civil servant is able to.

The argument is not, therefore, that John's developed role as CSA worked perfectly – indeed, as a senior government official explained, the Home Office science system still required significant development after John left the Department – nor that the system leader model is guaranteed to work in every department. However, if the goal is to strengthen the role of science within government, then the current approach to the CSA role requires reform. Lone operators are underpowered when it comes to transforming the sluggish Whitehall system – they simply lack the levers needed to achieve meaningful change.

In departments where the science system is comparatively weak, an embedded system leader approach offers hope of changing this, leading to more informed, and therefore higher quality, decision-making. With stronger levers, more resources and higher standing in the Department, the CSA model which evolved in the Home Office began to spur the development of a much improved science system. This same approach could offer significant benefits if deployed in departments with similarly immature science capabilities.

### 3.2 The 'system regulator' model: Defra

Drawing strongly on the experience of Professor Sir Ian Boyd, Defra's Chief Scientific Adviser from 2012 to 2019, this section examines the 'system regulator' model – its defining characteristics, its differences from the lone operator and system leader approaches, and the potential benefits and risks it offers.

As discussed, there are some departments where science is deeply embedded into the wider policymaking processes – DfT, the MOD and Defra, referenced several times, are the obvious examples. It is the latter that provides a case study for the system regulator model discussed in this chapter.

In Defra, Wainwright explained, "science is embedded much more into policy teams" than is the case in other departments, with plenty of "cross-evidence teams – covering science, economics, and social science" in place too. Boyd described a similar picture of science being intrinsic to the work of the department during his time as CSA. Indeed Guerin, while arguing that Whitehall does not have "a cultural instinct to approach problems from the scientific angle in general", also noted: "Defra is different".

This is perhaps to be expected. A Department whose priorities include preventing "flooding and coastal erosion", reducing "greenhouse gas emissions", and "improv[ing] the environment through cleaner air and water" could not function without significant scientific insight and expertise.<sup>41</sup> Wainwright reflected that this is reinforced by the "good number of scientific bodies attached to Defra" – from executive bodies like the Animal and Plant Health Agency and the Veterinary Medicines Directorate, to non-departmental public bodies like the Environment Agency, Natural England, and the Office for Environmental Protection.<sup>42</sup> In some cases,

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<sup>41</sup> Department for Environment, Food and Rural Affairs, 'About Us', Web Page, 2023.

<sup>42</sup> HM Government, 'Departments, Agencies and Public Bodies', Web Page, 2023.

scientific findings from these agencies create statutory obligations on the Department. As a result, in contrast to some social policy departments, making the case for science is unnecessary – this is a case study of a department where the science system is highly developed.

There are still limitations, however. Boyd suggested that, even though science is viewed as important in Defra some parts of the workforce remained unclear what its role was meant to be in their work. The 2019 review of government science capability offered a nuanced finding: while Defra’s development of formal ARIs (areas of research interest) was praised, the same report described insufficient spending available for research in some key strategic areas.<sup>43</sup>

Yet, while accepting that the Department’s science system is not perfect, the model is well ahead of most of the rest of government. In this context, the CSA’s role is different too – they are the most senior scientist in a department which prizes that form of expertise.

Boyd describes a rather different approach to that of the system leader or lone operator. He explained that his predecessor in the role was “a signed-up member of the department’s executive committee” but without “responsibility for managing Defra’s science and evidence budgets.” When Boyd inherited this configuration, he described it as akin to being a “minister without portfolio”, an insider but with few levers to drive change. This meant he deliberately sought to “step back” and “sit outside, challenge inwards and try to get people thinking in a different way”. This is the ‘regulator’ role.

Similar to the system leader, the ‘system regulator’ is a much more influential role than the lone operator. Where the lone operator is, fundamentally, limited in their ability to shape the behaviour of the department – they are not central to the policymaking process and usually lack the resources to work proactively – the system regulator operates in departments where science is deeply embedded in policymaking and the science system is high functioning. They also possess significant resources. The commonality with the lone operator is their retained independence, but whereas the lone operator acts this from a position of weakness, the regulator does so from a position of strength.

Unlike the system leader, the system regulator is defined by much more of a hands-off and outsider bearing. The system leader operates in a department where the science system is still reliant on their activity and where there is a need for visible ownership from the CSA to continue growing its influence and impact across the wider department. They play an important advocate role promoting the importance of science within the organisation.

The system regulator is operating in a department with a well-established science system and where science’s importance is accepted, the CSA does not need to act as an insider advocate. Rather than allocating budgets or managing large teams of staff, they can trust that the day-to-day business of science in the department will continue without their direction. They can afford to be more hands-off, performing the ‘licensed dissident’ part of the CSA role and providing robust challenge to how things work.

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<sup>43</sup> Government Office for Science, *Realising Our Ambition through Science: A Review of Government Science Capability*.

In practical terms, the system regulator is likely to be at a senior grade and have some level of resources and staffing for their office. Though they may not allocate budgets, they need sufficient resources to be able to commission their own evaluations of departmental practice, examine strategic or long-term opportunities, and have visibility of work going on across the organisation. They may sit on departmental boards, but their role is closer to that of a highly involved non-executive director, rather than an executive member of the organisation's leadership hierarchy.

There are several benefits to adopting the 'system regulator' approach. First, it affords the CSA greater agility, letting them identify and focus on areas where they can add the most value across the department. This was backed up by former GCSA Vallance, who in interview cautioned that a CSA should "avoid doing appraisals galore" and "becoming part of the furniture of the department". The regulator model helps avoid this. By remaining separate from day-to-day managerial functions, the CSA can focus on applying their scientific expertise in emerging, complex or contentious areas that few others in the system can contribute to as effectively.

Secondly, this model enables CSAs to apply a more long-term and strategic mindset. By consciously removing themselves from the everyday workings of their department – by retaining greater independence – the chief scientist can prioritise examining and challenging how the science system as a whole operates, seeking to provide advice on how science can be better used systematically and helping to embed a culture of continuous improvement.

A third advantage is that a system regulator may have greater capacity to develop external networks and connections. Rather than having to focus on managing people, budgets and projects internally, they can spend more time identifying and building working relationships with academic or private sector experts – expertise which is often underutilised in Whitehall. The system regulator can help to source innovative scientific knowledge and aid those involved in its development to access – and navigate – the machine. However it should be noted that this is still possible within the system leader model, and indeed should be a key benefit of both models.

At the same time, there are obvious risks to adopting the system regulator role at the expense of the other models identified. While they can be a regular source of scientific insight and support to an interested minister, there is a danger that, by stepping away from the day-to-day, their influence within policymaking is diminished. Boyd, however, gave detailed examples of how he kept this direct line to ministers. In fact, he argued that his status somewhat outside the machine enabled him to have "no holds barred" discussions with receptive politicians.

In addition, because the regulator model is based on the science system in the department being strong enough not to require day-to-day system leadership and hands-on management, there is a risk that this assumption is mistaken. There is also a risk that the science system gradually degrades through lack of proactive system leader management, even with the regulator seeking to provide regular, constructive challenge.

Again, flexibility is key. The system regulator model might not be the permanent approach: if the science system needs greater hands-on attention, the CSA (whether during their term or

after the next is appointed) could return to a system leader model and take a more insider role.

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## 4. A new model for empowered and effective CSAs

The chapter presents key recommendations for the future of the CSA role. This aim is to enable the leadership needed in every department to supercharge the science system across government, while embedding scientific advice more deeply into policymaking.

At the root of this paper has been a recognition of two interlinked problems within Whitehall. One, usefully illustrated by David Willetts observing that, during the Coalition, while “some CSAs were known and trusted advisers, for others, I wasn’t sure if the departmental Secretary of State knew who they were”, is lack of awareness. This may have improved since COVID, but there was a clear consensus in interviews that while the variability in CSA roles is partly about a rational emphasis on flexibility, it is also evidence of the weakness of the CSA role in some departments. The second problem is that this variability reflects and entrenches the variability of science systems across government – in some departments, systems are strong and well-developed, in others, they are weak and uninfluential.

The CSAs in place across departments offer the potential to add real value to the work of Whitehall, and therefore the ability of government to achieve the outcomes it seeks. Scientific advisers can inform more effective policymaking processes, facilitate greater flow of information across the system, and, crucially, act as powerful forces to build the scientific infrastructure within government departments. Government needs to make better use of this resource – and to capitalise on the post-pandemic ‘halo effect’ for scientific expertise.

### 4.1 Preparing for impact

In order to move away from a lone operator model, and towards one in which CSAs play a more systemic role in the work of their departments, greater effort is required to prepare new appointees for the role – as highlighted in section 3.1.3.1. Ideally, where appropriate, some informal induction should occur during the period between an individual being appointed and them taking up the post, which is likely to be some time. GO-Science guidance states that CSA’s will “normally” be required to obtain DV clearance,<sup>44</sup> and a recent National Audit Office report found that this high-level vetting takes an average of 171 days – almost 6 months – to complete.<sup>45</sup> It is particularly important to use this time well given that CSAs are often in post for just a few years.

At a minimum this should include teach-ins on how the department operates, the political context and ministerial priorities, how Parliament and legislation works, and current and future scheduled scientific activity within the department (subject to any vetting sensitivities), as well as introductory meetings with key personnel. It could also involve a ‘buddy system’, in which

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<sup>44</sup> *Guidance for Government Chief Scientific Advisers and Their Officials*.

<sup>45</sup> National Audit Office, *Civil Service Workforce: Recruitment, Pay and Performance Management*, 2023.



a current CSA is paired with an incoming CSA to provide informal advice and guidance. As far as possible, an incoming CSA should be able to hit the ground running.

An effective formal onboarding process is also essential once a CSA is in post – something interviewees suggested is lacking at present: according to Wainwright, “much better onboarding would help, as it’s extremely variable across departments.” This may partly be because onboarding can fall between GO-Science (who provide some induction into the CSA role) and departments (who provide limited training on how to function as a civil servant). A more standardised approach, including a formalised induction process that brings GO-Science and the department together, is needed.

**Recommendation 1:** Incoming CSAs should be provided with an informal induction during the period between being appointed and taking up the post. Subject to vetting sensitivities, this should include insights into current departmental, political and scientific activity and priorities. A ‘buddy system’ should be introduced, with a current CSA providing informal guidance and support to the incoming CSA to help them understand how the role works in the unique environment of Whitehall.

Once in post, CSAs should receive a standardised, formal induction from both GO-Science and their department. In addition, GO-Science and the department should agree a bespoke induction addressing the set of cross-cutting scientific issues that need to be understood by that particular incoming CSA.

## 4.2 Embedding the science

Throughout this paper, the need for flexibility in the design of CSA roles based on departmental need has been recognised. As such, a single model, with a uniform approach to staffing or control over scientific budgets in the department is not the answer. However, in a Whitehall system that has long been recognised as rigidly hierarchical, CSAs must be appointed at a sufficiently high grade to have meaningful influence and impact.

While most CSAs are appointed as directors general, some remain as directors – for example DSIT is currently advertising for their CSA at SCS Pay Band 2 – a considerable difference in the Whitehall machine.<sup>46</sup> A decade ago, the Lords Committee called for all CSAs to be appointed above director level,<sup>47</sup> and this recommendation should be immediately implemented. In addition, all CSAs should be members of their department’s executive team, ensuring they are present for key meetings and able to input where appropriate. Membership of the executive team should not prevent a CSA from performing the role of system regulator, or require them to oversee significant staff or budget.

<sup>46</sup> UK Civil Service, *Chief Scientific Advisor DSIT Job*, 2023.

<sup>47</sup> House of Lords Select Committee on Science and Technology, *The Role and Functions of Departmental Chief Scientific Advisers*.



**Recommendation 2:** All CSAs should be appointed at the rank of director general (or departmental equivalent) or above. They should also be members of the department's executive team.

There have been a number of efforts to evaluate the state of government science in the past two decades. The 2019 'Government Science Capability Review', commissioned by then GCSA Patrick Vallance, examined capability across the whole system.<sup>48</sup> GO-Science's rolling programme of departmental reviews in the late 2000s – covering the Home Office, Defra, DCMS and others – offered a series of deeper dives into specific parts of government.<sup>49</sup>

Both of these are now outdated. GO-Science's rolling reviews are around 15 years old, and while the Capability Review was just four years ago, much has changed in that time due to the impact of COVID-19 and the fast-paced evolution of cutting-edge technologies. In his foreword to the Review, Vallance argued: "There is an opportunity to recharge and redefine science capability in government to improve the evidence base for decisions and create opportunities for innovation and growth", that is even truer now.

Again, with science significantly higher on the government agenda, there is an opportunity to take stock, post-pandemic, and review how science capability has changed across the whole of government. A review of the current state of individual departments' science systems could identify areas of strength and structural weaknesses, giving existing CSAs a better understanding of where to prioritise their work, and, crucially, informing what CSA model should be adopted within a given department.

**Recommendation 3:** The Government should commit to implementing the findings of the 2019 'Government Science Capability Review' within the next 12 months.

In the meantime, the Government Chief Scientific Adviser should commission an update to the 2019 Review to capture the post-COVID state of science across the entirety of Whitehall. This should be led by GO-Science and conducted as a rapid review to be published by the end of 2024.

Crucially, a refresh of the Capability Review should be just that, an *update* on the 2019 Review. The Government should commit to delivering against, within the next 12 months, the findings of the 2019 Review, and the refresh should refine or supplement those findings based on the current context.

It is vital that the specific departmental reviews are as efficient as possible. GO-Science should therefore develop a standardised approach to be used for all departments.

<sup>48</sup> Government Office for Science, *Realising Our Ambition through Science: A Review of Government Science Capability*.

<sup>49</sup> Government Office for Science, *Science Review of the Home Office and the Ministry of Justice*.

**Recommendation 4:** GO-Science should work with departments to generate a full round of in-depth departmental science reviews, akin to those conducted in the 2000s.

Government should resource GO-Science to conduct and publish these evaluations by the end of 2025. These should identify strengths and weaknesses in the respective science system, integration with the department's wider policymaking and delivery processes, and examine how the CSA is perceived and utilised in the department.

The departmental reviews should recommend adoption or continuation of either the 'system leader' or 'system regulator' approach, depending on the state of the department's wider science system.

Departmental reviews, published by GO-Science, should then be used to directly evaluate the CSA model in operation and ensure, by working with departments, that the CSA is at the right position on the spectrum from 'system leader' to 'system regulator'.

Government should prioritise dealing with marginalised CSAs within Whitehall – those working in the lone operator model. The departmental reviews proposed will determine which model is best, but in the interim, and in the absence of a strong case otherwise, new CSAs should be installed as system leaders. Where system regulator style models currently exist, these should continue.

To help ensure these shifts in status and role are meaningful, and mitigate against any department sidelining – or failing to properly engage – their CSA, every department's CSA should be required to produce an annual report to be submitted to, and scrutinised by, the House of Commons Science, Innovation and Technology Committee. This should cover the functioning of the science system within their department, activities undertaken during the year, and a forward look of activities for the coming year. This should be published, with the Committee calling a scrutiny session off the back of any report they feel is a cause for concern in terms of how a department is using science generally and its CSA specifically.

As with the GO-Science departmental reviews, these should be produced as efficiently as possible. GO-Science should provide a simple template for all CSA's to follow. These should be designed to be deliverable quickly, taking a robust but light-touch approach so as not to divert significant resource.

**Recommendation 5:** CSAs should be required to produce an annual report on the state of the science system in their department, activities undertaken during the year and a forward look to the coming year. This should be based on a simple template and published and submitted to the House of Commons Science, Innovation and Technology Committee for scrutiny.

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## 5. Conclusion

Whitehall has long been criticised for its failure to properly embed and make use of expert or specialist capabilities, and scientific expertise is no exception. There has, however, been notable progress, with the establishment of CSAs in every ministerial department by 2011, and a big shift towards recruiting more STEM graduates to staff Whitehall.

Yet, as the pandemic made clear, there remains more to do to ensure that science is embedded within Whitehall, and decisions are made based on the best possible evidence. As the most senior scientists in government, CSAs must be driving this. That means addressing the weaknesses in the CSA model and standardising their system-level role.

John's experience as Home Office CSA provides an instructive case study of how to achieve this shift. Entering as a 'nice to have' lone operator in 2017, he ended his tenure as a 'system leader', with significant resources, manpower, and standing. This role has persisted in the Home Office today, with the current CSA fulfilling the position of Director General for STAR. It shows one model for significantly improving, at a relatively rapid pace, how science is used within a department.

One risk of this approach is that it fully embeds the CSA as a departmental 'insider'. The 'licensed dissident' function is an important aspect of the role, providing constructive challenge in a system that is often insular and defensive.

However, science has remained on the sideline for far too long in Whitehall, and the risk that this poses – especially in a world of heightened risk and rapid technological change – outweighs the risk of a CSA being somewhat less independent. The fundamental problem in government is not the risk of an overly cosy relationship between ministers or senior officials and their scientific advisers, but rather that scientists are not even in the room.

As former GCSA Patrick Vallance explained, CSAs need to be equipped and empowered within much stronger departmental science systems. While in some departments, the science systems are well developed, in others, particularly social policy departments, that is not the case. Changing this means moving from seeing CSAs as interesting but uninfluential advisers, recruited from outside, poorly onboarded, and with limited levers to develop science systems, to integral and senior leaders central to departmental decision-making. Importantly, that does not mean a single, uniform model, but retaining flexibility within a more impactful and properly resourced structure.

To really put science at the heart of policymaking, the presence of CSAs in every department must be capitalised on. Empowered system leaders or system regulators offer much greater value than lone operators, helping science to flourish within the Whitehall machine, and in turn making the machine more effective.

# Bibliography

- Baxendale, Catherine. *How to Best Attract, Induct and Retain Talent Recruited into the Senior Civil Service*. Civil Service, 2015.
- Cabinet Office. *Declaration on Government Reform*, 2021.
- . ‘New National Science and Technology Council Established’. Press Release, 12 October 2022.
- Charlotte Pickles and James Sweetland. *Breaking down the Barriers: Why Whitehall Is so Hard to Reform*. Reform, 2023.
- David C. Clary. ‘A Scientist in the Foreign Office’. *Science and Diplomacy*, 16 September 2013.
- Department for Environment, Food and Rural Affairs. ‘About Us’. Web Page, 2023.
- Fulton, Lord. *The Civil Service Vol. 1 Report of the Committee 1966-68*. London: The Stationery Office, 1968.
- Government Office for Science. ‘About Us’. Web Page, 2023.
- . *Guidance for Government Chief Scientific Advisers and Their Officials*, 2020.
- . *Realising Our Ambition through Science: A Review of Government Science Capability*, 2019.
- . *Science Review of the Home Office and the Ministry of Justice*, 2007.
- GOV.UK. ‘Civil Service Fast Stream Exceeds Target to Boost STEM Expertise across Government’. Web Page, 25 October 2023.
- GOV.UK. ‘Plan to Forge a Better Britain through Science and Technology Unveiled’. Press Release, 6 March 2023.
- HM Government. ‘Chief Scientific Advisers’. Web Page, 2023.
- . ‘Departments, Agencies and Public Bodies’. Web Page, 2023.
- . *Government Response to the House of Lords Science and Technology Committee Report: ‘The Role and Functions of Departmental Chief Scientific Advisers’*, 2012.
- . ‘Government Science and Engineering Profession’. Web Page, 2023.
- . *The Civil Service Reform Plan*, 2012.
- HM Treasury. *Public Spending Statistics: November 2023*, 2023.
- House of Lords Select Committee on Science and Technology. *The Role and Functions of Departmental Chief Scientific Advisers*. HL Paper 264. London: The Stationery Office, 2012.
- Institute for Government. ‘Government Chief Scientific Adviser’. Web Page, 2020.
- Kaye, Simon. *Reimagining Whitehall: An Essay*. Reform, 2022.
- National Audit Office. *Civil Service Workforce: Recruitment, Pay and Performance Management*, 2023.
- Oxford University. ‘“Another War Is Coming”, Kate Bingham DBE, Delivers Romanes Lecture’. Press Release, 24 November 2021.
- Pielke, Jr., Roger A. ‘Lessons from 50 Years of Science Advice to the US President’. *Wissenschaftliche Politikberatung Im Praxistest*, 2015.
- Public Administration and Constitutional Affairs Committee. *Oral Evidence: Civil Service Human Resources*. HC 1399. London: The Stationery Office, 2023.
- Robert Doubleday and James Wilsdon. ‘Beyond the Great and Good’. *Nature* 485, no. 301–302 (2012).
- Sir Patrick Vallance. ‘UK’s Quest to Be a Global Science Superpower’. *Civil Service Blog*, 8 February 2022.
- Smith, Beckie. ‘Home Office Seeks next Chief Scientific Advisor’. *Civil Service World*, 23 June 2020.
- UK Civil Service. *Chief Scientific Advisor DSIT Job*, 2023.
- Zuckerman, Lord. ‘Science Advisers and Scientific Advisers’. *American Philosophical Society* 1244 (8 November 1979).

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