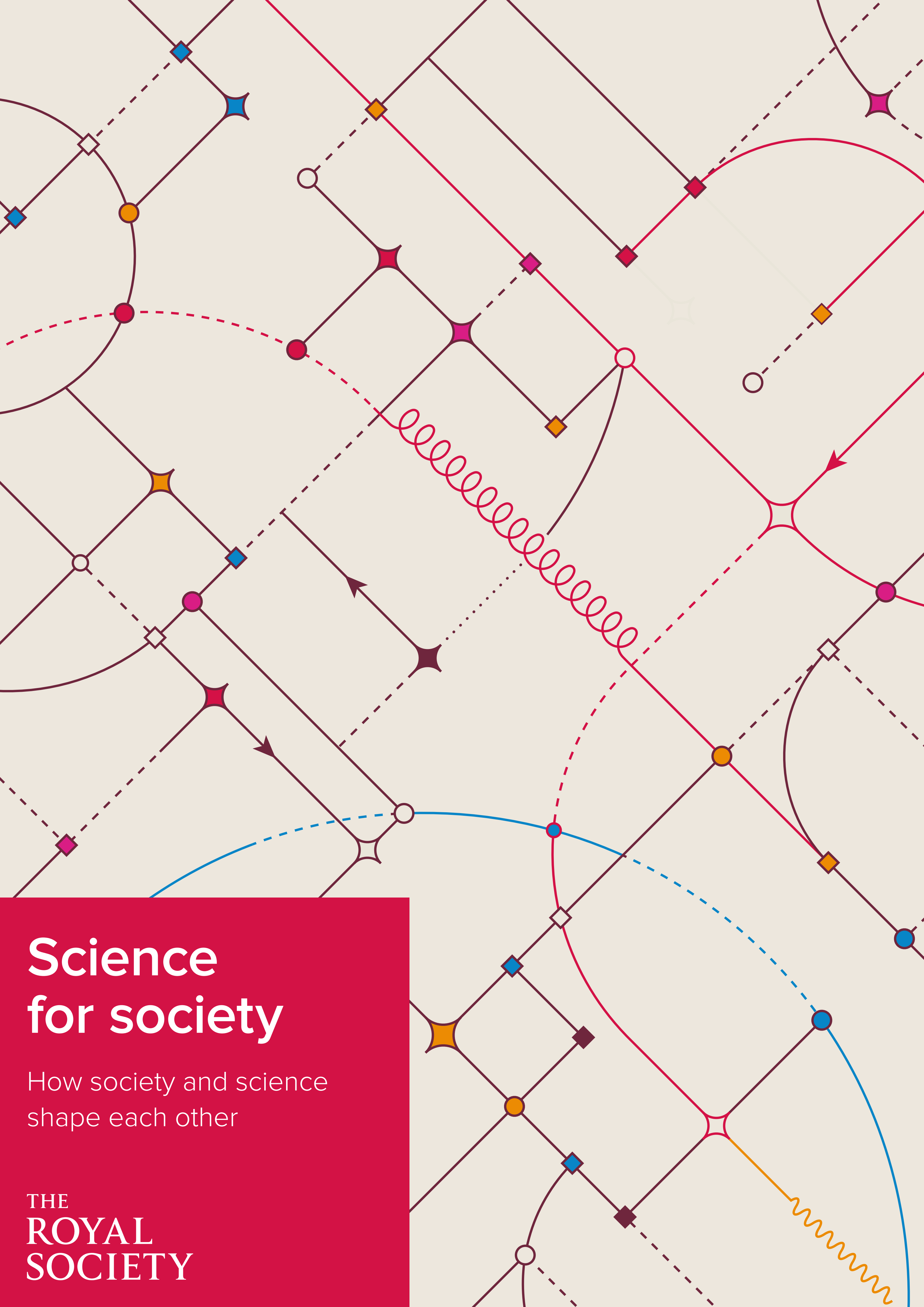

Science for society

How society and science shape each other

THE ROYAL SOCIETY

Science for society: How society and science shape each other
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Cover image: Illustration inspired by Feynman diagrams, visual representations describing the behaviour and interactions of subatomic particles in quantum field theory.

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Preface

This most welcome and timely report is aimed particularly at the scientific community, but with a strong message to government and industry of the need for their support. It is an in-depth review of how best to promote public engagement with STEM (science, technology, engineering and mathematics). This covers all aspects of science from basic discovery through technology and medicine to advanced mathematics, computing and Artificial Intelligence (AI). It comes at a time when scientific literacy is becoming more and more important for everyday life.

It is 40 years since the publication of the 1985 Royal Society report on *The public understanding of science*, which had an overall impact beyond all expectations. Following the report there was a requirement for the Research Councils to fund public understanding of science activities and a requirement for grant applications to include statements about how they would approach increasing the public understanding of science. National Science Week was inaugurated and the Royal Society introduced the Faraday lecture and science book prizes. There was also a huge increase in opportunities for training, and for engaging the public with science.

Since that time, however, there have been very substantial changes in the scientific environment, which require a major reconsideration of how to pursue the public understanding of and engagement with, science. Climate change and AI have become major new areas of scientific concern. There has been an enormous increase in the use of computers, which can be a smart phone in your hand, as well as the development of the internet and the World Wide Web, the huge impact of social media and the concern about the trustworthiness of its content, and now the sudden quite recent explosion of AI and Large Language Models (LLMs). There has also been a substantial increase in the proportion of the population having some education beyond secondary school.

School education from primary through secondary school is the ultimate basis for public understanding of, and engagement with, science and is the first major topic of the report. There is, once again, a strong recommendation to broaden the 16 – 18 secondary education for all students to include science and the humanities. Let's hope that this finally gets some traction with policy makers.

Perhaps the most important current issue is the reliability of information available on the internet in social media, and in the large data bases needed for AI and LLMs. As the report says, "trustworthiness of sources is a vital issue". The integrity of science-related data is a key topic for the Royal Society to pursue. It is always most important that politics does not interfere with scientific integrity, and the independence of the Royal Society is very important in this respect.

The report is full of useful recommendations for government actions, and of analyses showing, for example, the extent of interest in the scientific community in promoting public understanding and engagement with science, and the extent to which the public wants to understand and be engaged.

The final message to the scientific community is, as it was in 1985, that it is important to learn how to communicate and engage with the public at all levels and to consider it a duty to do so.

Sir Walter Bodmer FMedSci FRS

Foreword

The pursuit of knowledge about our world – the essence of the scientific endeavour – lies at the very heart of human civilisation. Science is not the preserve of a small group of accredited scientists; it belongs to all of humanity. Access to scientific principles and facts, and their implications, should be available to everyone. Yet even today, when virtually instantaneous communication is taken for granted and information on almost anything is readily accessible to so many, an appreciation of basic scientific realities, even those that affect everyday life and the future of our planet, such as climate change, is too often missing.

It is the responsibility of scientists and the institutions that support them to ensure that scientific knowledge is shared. The practice of public engagement with science is deeply rooted. The UK's pre-eminent scientific institution, the Royal Society, may even owe its existence to this idea since it was founded at Gresham College, the Elizabethan establishment charged with delivering free lectures to Londoners from 1597. The Royal Institution, created in 1799, took up the mantle by hosting its first public lecture in 1800. However, the notion that participation in public engagement is a desirable and legitimate concern for all practising scientists is relatively modern. The 1985 Royal Society report on *The public understanding of science*, written by a group appointed by the Royal Society Council and chaired by Sir Walter Bodmer (colloquially known as the 'Bodmer report'), marked a turning point in the general acceptance by the scientific community and others of the extensive benefits of public engagement. The Bodmer report led to public engagement becoming embedded in the Royal Society's mission and an integral component of scientists' activities in higher education institutions.

If science was key to society in 1985, it is imperative in 2026. As the Bodmer report so eloquently put it: "Science pervades our society. Most of our industry and much of our national prosperity are based on science … Science affects many, if not most, policy issues of national and international importance. It also affects a wide range of personal activities, from health and diet to holidays and sport."[1]

The world has changed since 1985. Today, science and technology underpin the dissemination of information. It is critical not only to everyone's health and comfort, but to safety and security, indeed to the future of our planet. The ability to engage with the subjects, structures, methods and outcomes of science should be a public right. With that ability to engage comes the power to make informed choices about how to live and to influence how society can and should use the tremendous capability of science for the common good.

The Bodmer report was published just before the invention that brought about the biggest societal change of recent times: the internet. The internet was introduced in the early 1980s and became user-friendly with the deployment of the World Wide Web in 1989. The internet profoundly changed society across the world: in the space of a few years, enormous amounts of information (virtually all human knowledge) became available to anyone with access to a computer, initially large mainframes, then compact laptops, and today mobile phones.

Above:
Professor Carlos Frenk CBE FRS (top) and Professor Sheila Rowan CBE FRS (bottom).

1 The Royal Society, *The public understanding of science* (1985). See: https://royalsociety.org/-/media/policy/publications/1985/10700.pdf (accessed 7 January 2026).

"Science pervades our society. Most of our industry and much of our national prosperity are based on science... Science affects many, if not most, policy issues of national and international importance. It also affects a wide range of personal activities, from health and diet to holidays and sport."

***The public understanding of science*, 1985.**

The internet created the opportunity for interested organisations, including the media, to make scientific advances accessible to non-specialists. Naturally, this has had an enormous effect on the public's engagement with science, enabling them not just to be informed and inspired but also to make their voices heard on scientific matters of public concern, a central plank of effective public engagement. But not all things internet have been beneficial. The internet also exposed serious vulnerabilities, such as cyber attacks on essential infrastructure and internet fraud. The internet has provided a vehicle for self-interested parties to spread mis- and disinformation, as demonstrated, for example, by unscientific attacks on the efficacy and safety of vaccines.

The volume of scientific research has increased dramatically since 1985. According to an analysis of Web of Science data, approximately 500,000 scientific papers were published in 1981[2], whereas, according to the National Science Foundation, approximately 3.3 million papers were published in 2023[3]. This increase reflects a commensurate increase in the number of professional science, technology, engineering and mathematics (STEM) researchers. Although accurate numbers are difficult to come by, an indication of the trend is provided by a survey that showed that the number of doctorates awarded in STEM in the UK approximately doubled between 1994 and 2008[4].

There are many more active researchers and STEM engagement professionals who participate in public engagement in science today than there were in 1985.

An area of great prominence in the 1985 report in which there has been some success in the past 40 years is in science education in schools. The Bodmer report stressed the need "to provide a broadly based science education at school for all to the age of 16", and compulsory science to age 16 was implemented in England, Wales, and Northern Ireland within a few years of the report's publication. However, the report also recommended that post-16 education should be broader and explicitly stated that students should not drop science subjects entirely after the age of 16. Despite multiple recommendations, including by the Royal Society[5], this has not yet come to pass. A welcome development is the inclusion of computing and data science in the school curriculum. The inadequate supply of qualified science teachers in schools, particularly in physics and mathematics, was already highlighted as a major problem in the Bodmer report. Sadly, this is another area where there has been no progress in 40 years[6].

2 Adams, J and Szomszor, M. *A converging global research system*, Quantitative Science Studies 3 (3): 715–731 (2022). See: https://doi.org/10.1162/qss_a_00208

3 National Science Board, National Science Foundation, *Discovery: R&D Activity and Research Publications, Science & Engineering Indicators, Executive Summary* (2025). See: https://ncses.nsf.gov/pubs/nsb20257 (accessed 6 January 2026).

4 Lee, H-f *et al*. *Career Patterns and Competences of PhDs in Science and Engineering in the Knowledge Economy: The Case of Graduates from a UK Research-based University*, Research Policy 39 (7): 869–881 (2010). See: https://doi.org/10.1016/j.respol.2010.05.001

5 The Royal Society/News and Resources/Projects, *Mathematical Futures Programme* (2024). See: https://royalsociety.org/news-resources/projects/mathematical-futures (accessed 6 January 2026).

6 STEM Learning, *Improving science teacher retention: do National STEM Learning Network professional development courses keep science teachers in the classroom?* (2019). See: https://www.stem.org.uk/resources/library/resource/418071/improving-science-teacher-retention-do-national-stem-learning (accessed 6 January 2026).

By contrast, the informal science education sector has flourished. In 1985, this sector was essentially limited to a few science museums (mostly in London) and a handful of science festivals. Today, there is a welcome proliferation of science and 'science and discovery' centres spread around the country, and many new science festivals. The Millennium Commission, set up at the turn of the century, created over a dozen new science centres, botanic gardens and aquaria across the UK. Now the challenge is to renew the 25-year-old infrastructure of these facilities and to place the entire informal education sector on a financially sustainable footing.

The central scientific and technological concerns that dominate today's attention are different from those in 1985. The Bodmer report mentions 'acid rain', nuclear waste, *in vitro* fertilisation, fluoridation of the water supply and environmental pollution. Although some current topical subjects, such as the energy supply, the ageing population and vaccines, were mentioned in the Bodmer report, the central concerns of today – climate change, the decline of biodiversity, ecological collapse, pandemics, uncontrolled artificial general intelligence – have only emerged in the past 40 years.

In recognition of the profound changes over the past 40 years and our conviction that public engagement is a critical aspect of our role as scientists, we were delighted to co-chair a group tasked with updating Sir Walter's original report. We hope that this *Science for society* report will help set the scene for public engagement with science for years to come.

Professor Carlos Frenk CBE FRS and Professor Sheila Rowan CBE FRS, Co-Chairs of the *Science for society* report Steering Committee

"It is the responsibility of scientists and the institutions that support them to ensure that scientific knowledge is shared."

Professor Carlos Frenk CBE FRS and Professor Sheila Rowan CBE FRS.

Introduction

The Society has set out to show why a public voice is essential to the development of science, and how science is fundamental to the lives of every one of us.

Our approach

This report has been inspired by the *Public understanding of science* report led by Sir Walter Bodmer FMedSci FRS in 1985 (colloquially known as the Bodmer report[7]). In revisiting this report, 40 years on, the Royal Society set out to establish what has changed, and what has not. The nature of public engagement with research has shifted dramatically to a more dialogue-driven, two-way engagement model, yet many of the problems set out in the 1985 report still feel relevant today. In producing this report, the Royal Society has, where appropriate, mirrored the chapters set out in the 1985 report; each chapter has been led by a Fellow of the Royal Society supported by a steering group of sector experts. These groups determined what they wished to cover and the specific recommendations relevant to their chapter. In that sense, this report has had many different authors, just as it has many different audiences.

In choosing to revisit the areas highlighted in the 1985 *Public understanding of science* report, we acknowledge that some areas where science and society interact are not covered. This is a far-reaching topic, and there are inevitably areas that have not been addressed in this report, or areas where only a small aspect of a much wider subject has been considered. Nevertheless, the Society has set out to show why a public voice is essential to the development of science, and how science is fundamental to the lives of every one of us.

Audiences

The primary audience for this report is the scientific community, which comprises many different groups of people, from those active in scientific research in academia, industry or the third sector. This also extends to those who enable or support science as funders, press and communications teams and the public engagement with research. As with the original Bodmer report, there are also recommendations for the Royal Society itself.

In addition, there are further audiences who are key stakeholders in any report considering the interactions between science and society. This includes those with the power to directly influence work in this area, such as government and policy makers more generally, research funders, media and other organisations, and those with whom the scientific community may seek to engage, such as local and national community groups and organisations.

All the recommendations in this report specify the audience for which they are intended.

7 The Royal Society, *The public understanding of science* (1985). See: https://royalsociety.org/-/media/policy/publications/1985/10700.pdf (accessed 7 January 2026).

Setting the context

As the Royal Society began to consider the different chapters for this report, it became clear that there were cross-cutting topics that provide context for how science and society shape one another. This introduction aims to bring together just some of the examples that were common across the individual groups looking at each chapter. Some of these are familiar from the report led by Sir Walter Bodmer FMedSci FRS in 1985, others were not even imagined 40 years ago.

At the outset of this report, the Society wants to set out why science matters and why it is important to have meaningful dialogue and engagement with the public not just about how science is involved in everyone's daily lives but also the nature of science and the role of uncertainty. Moreover, engaging with the public provides direct benefit to both researchers and their institutions, as can be seen in the academic scientific community chapter.

Science provides knowledge, innovation and solutions that support progress, including economic and societal. Beyond its economic contributions[8], it informs decision-making, inspires curiosity and equips society to tackle emerging problems – from pandemics and climate change to technological transformation. The increased spread of misinformation has reinforced the need to uphold the value of science and clearly communicate the transparency and integrity that make science trustworthy.

Public attitudes to science

Public attitudes to science are fundamental to the findings and recommendations in this report. The findings of the 2025 *Public attitudes to science* (PAS) survey, undertaken by Ipsos, in partnership with the British Science Association, on behalf of UK Research and Innovation (UKRI), are considered throughout each chapter[9].

PAS survey data show that the public continue to value the contributions of science and scientists in their daily lives, to wider society and the economy. However, three-fifths of those surveyed felt that they heard too little information about science, and they wanted greater dialogue on science issues. They also raised concerns about equity in science and believed that the opportunity to pursue science was not open to all. This concern reflects the fact that access to science is not equitable[10].

There are variances across different groups of people. The PAS survey highlights some potential warning signs for policymakers and the scientific community more generally; the Royal Society encourages readers to look at the full PAS report for more information than can be conveyed here. What is clear, however, is a wish for the public to engage more with science, but this should not be taken for granted.

8 Department for Science, Innovation and Technology, *The Value of Public R&D* (2025). See: https://www.gov.uk/government/publications/the-value-of-public-rd/the-value-of-public-rd (accessed 6 January 2026).

9 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

10 Dawson, E. *Equity, Exclusion and Everyday Science Learning: The Experiences of Minoritised Groups*. London: Routledge (2019).

Researcher attitudes towards public engagement

The capacity, aspirations, barriers and concerns of researchers with regard to public engagement is another fundamental consideration of this report. As part of the report, the Royal Society commissioned Technopolis to undertake an updated version of the *Factors affecting public engagement by UK researchers* survey[11], last undertaken in 2015. Survey responses show a clear and growing wish among academic researchers to support public engagement.

As discussed in Chapter six: Academic scientific community, researchers still face considerable barriers to undertaking meaningful public engagement activity. Public engagement is often not considered as a core activity or as an important part of career progression, which makes prioritising this activity difficult, especially when time and money are limited. The importance of public engagement to researchers is evident, as is their willingness to participate, but they need support to do so.

Changes to the public engagement sector

Public engagement with research in the UK has undergone substantial development since the late twentieth century, emerging from early efforts in science communication to become a formalised element of national research policy. A pivotal moment came with the House of Lords Science and Technology Committee's 2000 report, which criticised the 'deficit model' of science communication, where the "public was viewed as a passive recipient of" expert knowledge, and advocated for more dialogic and participatory approaches to science-society relations[12].

In the time since the 1985 *Public understanding of science* report was published, the public engagement landscape has expanded to include new facilities and organisations, including the creation of new science centres, festivals and events. The Science Media Centre was set up in 2000, and many research institutions have established public engagement, community and civic outreach, participatory research and patient involvement programmes.

The multitude of opportunities now available to connect science with public audiences are a real success story for the UK and one that we should nurture and resource; however, opportunities are not distributed equally or equitably[13], and much more needs to be done to engage underserved communities across the UK. Financial pressures across the public engagement landscape in recent years have caused many of the dedicated support roles for engagement activity to be reduced or removed completely.

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11 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

12 House of Lords, *Science and Technology: Third Report* (2000). See: https://publications.parliament.uk/pa/ld199900/ldselect/ldsctech/38/3801.htm (accessed 6 January 2026).

13 Dawson, E. *Equity, Exclusion and Everyday Science Learning: The Experiences of Minoritised Groups*. London: Routledge (2019).

Environmental and health crises

Human activity is changing the climate of our planet and destroying its biodiversity at an unprecedented rate. Climate change is increasing the risk of extreme weather and rising sea levels, harming our ability to grow food, and making it harder for biodiversity to thrive – potentially impoverishing our planet in ways that will hamper the benefits we can derive from it.

Antimicrobial resistance threatens to undermine our control of infections. While the Bodmer report was being written, awareness was rising of a new viral infection, HIV/AIDS, which has killed more than 40 million people[14] (for a further exploration of the effect this had on the relationship between scientists and the public see case study: AIDS activism in the US). COVID-19 has been the most disastrous example of a series of epidemics and pandemics over the past four decades. In the UK, the pandemic highlighted complexities in the relationship between science, policymaking, politicians and the public[15]. It raised numerous considerations, including the role of different areas of science in shaping policy during health crises, managing uncertainty while attempting to communicate clearly with the public and the public spotlight on scientific advisers.

At the same time, scientific advances to find solutions to these problems are emerging all the time, with incredible progress being made to address societal and global problems, not least the rapid development of vaccines to reduce the effects of COVID-19 by scientists working in academia and industry and collaborating across borders.

Advances in genetic technologies

While methods of deoxyribonucleic acid (DNA) sequencing to read DNA were first developed in the 1970s, new methods and rapid advancements in genetics have been transformational since the publication of the original Bodmer report. Advances have led to the complete genome sequence of humans, and many animals, plants and microorganisms.

As well as genetic technologies helping to advance healthcare, DNA is a vital part of forensic science, with DNA evidence regularly cited in courtrooms and in TV and film dramas. The Royal Society has published a primer for the courts on DNA evidence as part of its science and the law programme[16], but the potential benefits of genetic technologies must also be weighed against ethical and societal concerns about how they might be used. Effective regulation and ethical boundaries are essential.

14 HIV.gov, *The Global HIV and AIDS Epidemic* (2025). See: https://www.hiv.gov/hiv-basics/overview/data-and-trends/global-statistics (accessed 6 January 2026).

15 The British Academy, *Public Trust In Science-For-Policymaking* (2024). See: https://www.thebritishacademy.ac.uk/publications/public-trust-in-science-for-policymaking/ (accessed 6 January 2026).

16 The Royal Society *et al.*, *Forensic DNA analysis: A primer for courts (2nd edition)* (2025). See: https://royalsociety.org/-/media/about-us/programmes/science-and-law/royal-society-forensic-dna-analysis-primer-second-edition.pdf (accessed 6 January 2026).

A digital world

In 1985, 13% of UK households had a home computer[17]. The internet was two years old. The world wide web was unveiled in 1989 and went public in the mid-1990s. These inventions transformed people's access to information and their relationship with technology, particularly following the launch of smartphones. These advances provided instantaneous access to almost all human knowledge. They also revolutionised how people communicated with one another and shared information, particularly with the emergence of social media. Anyone born after 1985 (when the Bodmer report was published) has grown up immersed in a digital society. This has profound implications for where people obtain information, from whom and how they consume it[18]. With new channels of communication, opportunities for public engagement are enhanced, but science faces greatly increased competition for people's attention.

The rise of AI

The unprecedented speed and scale of progress with AI in recent years suggests society may be living through an inflection point. Platforms that can generate human-like text and image content have accelerated public interest in the field and raised flags for policymakers, who have concerns about how AI-based technologies may be integrated into wider society.

These concerns are shared by the public. The PAS survey 2025 shows that the public is very polarised about the benefits and risks of AI[19].

The potential benefits of AI include its capability to accelerate scientific discovery or to provide the means for non-experts to interact with and translate complex code, data and information. However there are also significant societal risks from a global system whose employment, financial and energy systems are becoming increasingly enmeshed with the rapid expansion of AI capacity[20].

Public trust in scientists and institutions

Despite some concerns, public trust in scientists working for universities is still very high at 87%[21], although scientists working in industry and government are less well trusted. Further, the role of science and scientists is recognised, with 83% of people stating that scientists make a valuable contribution to society.

However, trust in government ministers – and politicians generally – is low[22], suggesting an undermining of key authorities. Trust in journalists, traditionally key mediators of information to the public, is also relatively low, although nowhere near as low as trust in social media influencers. The question of trusted sources is considered in Chapter three: Mass media and misinformation.

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17 Statista, *Percentage of Households With Home Computers in the United Kingdom (UK) from 1985 to 2018* (2026). https://www.statista.com/statistics/289191/household-penetration-of-home-computers-in-the-uk/ (accessed 6 January 2026).

18 The Royal Society, *The online information environment* (2022). See: https://royalsociety.org/news-resources/projects/online-information-environment/ (accessed 6 January 2026).

19 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

20 The Royal Society, *Science in the age of AI: How artificial intelligence is changing the nature and method of scientific research* (2024). See: https://royalsociety.org/news-resources/projects/science-in-the-age-of-ai/ (accessed 6 January 2026).

21 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

22 Ipsos, *Ipsos Veracity Index 2024* (2024). See: https://www.ipsos.com/en-uk/ipsos-veracity-index-2024 (accessed 6 January 2026).

Misinformation and disinformation

The internet has transformed the way people consume, produce, and disseminate information about the world. In the online information environment, internet users can tailor unlimited content to their own needs and desires. This shift away from limited, gatekept and pre-scheduled content has democratised access to knowledge and driven societal progress.

The unlimited volume of content, however, means that capturing attention in the online information environment is difficult and highly competitive. This heightened competition for attention presents a challenge for those who wish to communicate trustworthy information to help guide important decisions. The poor navigation, or even active exploitation, of this environment by prominent public figures and political leaders has, on many occasions, led to detrimental advice being disseminated among the public. This has caused significant concern, with online misinformation content being widely discussed as a factor that affects democratic elections and incites violence. In recent years, misinformation has also interfered with how scientific topics have been perceived by the public, including vaccine safety, climate change and the rollout of 5G technology[23].

Financial constraints and public benefit

There are always financial constraints and economic considerations and governments and organisations need to make difficult decisions on where to prioritise spending. At the time of writing, there are significant concerns about the state of the UK economy following major blows such as the COVID-19 pandemic and the current geo-political situation.

As the Royal Society considers the recommendations in this report, we must be mindful of the current economic position for all key stakeholders involved in engaging the public with science and their need to prioritise spending.

Yet, it is more important than ever that the role of science be understood and discussed publicly and the value of those individuals who work in public engagement and science communication is recognised. The scientific, technological and social shifts seen over the past 40 years reinforce the key messages from the 1985 *Public understanding of science* report that science and technology are central to the future prosperity of the UK and profoundly shape people's everyday lives.

23 The Royal Society, *The online information environment: Understanding how the internet shapes people's engagement with scientific information* (2022). See: https://royalsociety.org/topics-policy/projects/online-information-environment/ (accessed 6 January 2026).

Executive summary

Public engagement is an essential part of the research lifecycle. It should be acknowledged as such, and researchers in academia, industry and the third sector should be supported, protected and rewarded for doing it well.

There are threats to science from financial pressures. Opportunities to engage, such as science centres, science festivals, and university-based engagement projects, are under threat owing to lack of resources and accurate online content is increasingly eclipsed by misinformation. Ideological agendas are being used to suppress research, threaten academic freedom, and cut funding. Scientific evidence and those who advocate for it are under attack by those who wish to undermine rational debate. Platforms that should facilitate open, transparent debate are giving free rein to harmful misinformation and ideological attacks on people and ideas. Equality is under attack and that threatens our global community of scientists. To counter these threats, science should be viewed as a vital part of how society works and be made available to everyone.

The 'public' is not one uniform group of people. It is made up of individuals and communities of which everyone is a part at one point or another in our lives. The *Public attitudes to science* (PAS) data show that the public are largely still very supportive[24], but this cannot be taken for granted. Science is impossible without a licence to operate (in political, financial and ethical terms) and needs to be done in partnership with the public.

The UK research community views public engagement positively, but is not always given the stability, time, skills, confidence, protections, support, or money to do it well. It should not be seen as an 'extra' on top of research and teaching commitments, it should be recognised as a vital part of research and pedagogical culture.

Scientists and researchers at multiple career levels can make a meaningful difference in how science and society interact by acting as individuals or as part of large research groups. While not all researchers are confident, or indeed equipped, to undertake public engagement, providing the support for those who want to engage is important. The UK government needs to invest in training and development for scientists and researchers and support them to engage meaningfully in whichever way is most appropriate for them, for the people they are working with and for their science.

As with the 'public', researchers and scientists are not a uniform group; different disciplines and different working environments mean that engagement will look different in different situations. How different engagement models fit with different 'modes' of knowledge creation needs to be considered[25].

24 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

25 Technopolis on behalf of the Royal Society (2025), *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

Why the Royal Society is making recommendations and why now?

Public engagement is an essential part of the scientific process. It should be seen as an investment for the future of the UK, and engagement practitioners should be viewed as a vital component in the scientific workforce. High quality engagement allows UK science to maintain a public mandate for science spending, builds trust in science, makes a case for the existence of universities and research institutes and provides ways for the public to access scientific information in a world of increasing misinformation. In challenging financial situations, it is all too easy to cut support for engagement activities. The Royal Society argues that this short-term solution to financial pressures could result in long-term damage to the connections between society and science. While acknowledging current economic and financial challenges, this report examines where funders of scientific research, government, media organisations and others might prioritise spending on support for high-quality public engagement with science. This report also discusses the potential benefits of developing stronger philanthropic links within the science communication and public engagement sector.

Transparency and trustworthiness are essential. The public expect and want scientists to be open and transparent about the work they do, and to engage directly with the public, especially around ethical and societal implications arising from their work. To meet this expectation, the independence of scientific advice in government must be protected, scientists in industry must be supported, and all scientists given opportunities to connect with the public in new, improved, and meaningful ways.

The UK has made great progress in building engagement opportunities, but risks taking a backstep. Since 1985, multiple sectors have collaborated to build significant infrastructure, such as science centres and festivals, and capacity for meaningful interactions between science and society. While the Society acknowledges the need to adapt and explore new models of engagement that fit current realities, losing this capacity and infrastructure is a significant risk and would cause lasting damage to both science and society.
Artificial intelligence (AI) threatens to disrupt established ways of engaging. When the original Bodmer report was published in 1985, the internet existed, but the effect it would have on how everyone communicates could not have been fully predicted. This report faces the same unknown future with AI.
The Society knows that AI will change how information is created and shared, but we do not know exactly what the future will look like. One thing we do know is that critical thinking skills, being able to question evidence, being able to create and test hypotheses and an awareness of the merits of the scientific method will continue to be essential life skills for everyone.

Science underpins innovation and technological advancement. This drives productivity, which in turn boosts wages. Science-led innovation also benefits the economy indirectly, by contributing to national security, environmental protection and public health. Public confidence in science is essential for economic growth, which (in its broadest sense) relies on positive interactions between society and science[26].

26 The Royal Society, *Science 2040: Interim report* (2025). See: https://royalsociety.org/-/media/policy/projects/science-2040/science-2040-interim-report.pdf (accessed 7 January 2026).

Recommendations

CHAPTER ONE | EDUCATION

RECOMMENDATION 1

Governments[27] should provide an education that equips all young people with the understanding and experience of how scientific knowledge is generated and refined through observation, experimentation and direct engagement in scientific enquiry. In doing so, this education lays the foundation for lifelong scientific literacy, enabling future citizens to evaluate evidence, identify trustworthy sources, use data confidently and respond to scientific and environmental challenges in everyday life.

- Strengthen the focus in science education on understanding of scientific processes, the nature of evidence, and the development of critical thinking and problem-solving skills.
- Support high-quality science education by ensuring practical work remains integral to learning, supported by the essential expertise of science technicians. This should include foundational practical skills and exposure to real research, derived through project- and enquiry-based initiatives.
- Embed sustainability as a topic throughout the school experience so that students are equipped to live well, within the planet's available resources.
- Ensure that mathematics and technology-focused education provide students with the numeracy and data interpretation skills essential for everyday life and the workplace.

27 In this chapter we have used the term 'Governments' to refer to the UK government (responsible for education in England) and the devolved governments of Scotland, Wales and Northern Ireland.

RECOMMENDATION 2

Governments should create conditions for a high-status, confident and adaptable teaching workforce equipped for future educational, scientific and technological change.

- Strengthen teachers' professional agency and provide improved support for workload management and wellbeing.
- Enhance the attractiveness of teaching through increased professional recognition alongside consideration of flexible, innovative ways of working and reforms to school timetabling.
- Accelerate the effective use of digital tools (including AI) where appropriate to improve teaching and learning and to complement the professional skills of teachers.
- Prioritise sustained investment in high-quality professional development in subject areas where the workforce keeps pace with scientific, technological, and educational change.

RECOMMENDATION 3

Governments should adopt a broader education system to age 18 that develops adaptable learners, balances academic and technical pathways, sustains core subjects, and expands chances for learners from disadvantaged backgrounds.

- Ensure that greater breadth helps to develop adaptable learners who can respond to rapidly changing jobs, technologies and industries.
- Sustain engagement with STEM alongside the humanities, arts and languages to prepare all young people to navigate the complex social, ethical and scientific issues they may face.
- Ensure that a broader post-16 offer keeps pathways open for all learners, reducing the early specialisation that disproportionately disadvantages students from less advantaged backgrounds.

CHAPTER TWO | INFORMAL ENGAGEMENT WITH SCIENCE

RECOMMENDATION 4

The UK government should improve funding opportunities to ensure a diverse network of engagement activities.

- Research funders (including UKRI and the Royal Society) should promote and fund diverse engagement methods that recognise STEM engagement opportunities as a core part of the UK's social and cultural infrastructure.
- Organisations such as the Association for Science and Discovery Centres should work with HM Treasury and government departments to ensure that informal science activities, such as science festivals and science and discovery centres, are able to benefit from the same financial incentives as the cultural sector.
- National academies should establish a national framework with government and philanthropic foundations to encourage a culture of giving towards science engagement.
- Central government should integrate science outreach as an option for demonstrating social value into procurement processes to encourage investment in informal science engagement institutions and initiatives.

RECOMMENDATION 5

Build the evidence base for engagement practices, to optimise the impact of informal public engagement with STEM activities.

- The Royal Society should convene a working group of major stakeholders (including funders, science engagement organisations and practitioners) to design and secure funding for a long-term cohort study on the enduring effects of informal science engagement alongside formal education.
- Scientific employers and funders should create opportunities for professional development and the dissemination of best practices and common tools between adjacent sectors, such as science, the arts and community engagement, to improve overall engagement quality.

CHAPTER THREE | MASS MEDIA AND MISINFORMATION

RECOMMENDATION 6

The Royal Society and others in the scientific community should convene a working group, collaborating with experts in media monitoring to analyse and respond to current trends in science media consumption across traditional and social media platforms.

- These audits of changing media consumption should be used by scientists and science communicators to support a better understanding of how to identify audiences and connect with them effectively.
- The Royal Society and others in the science community should work to ensure media platforms provide reasonable, privacy-respecting access to their data for researchers, to support public understanding of how platforms work and how their design decisions may be affecting people's engagement with online information.

RECOMMENDATION 7

Universities, funders and research organisations should value communications skills as a vital component of research culture to help counter mis- and disinformation. They should embed training and support for scientists to capitalise on opportunities to connect with audiences via social media.

- Training and support must be well-developed and well-resourced.
- The importance of engaging with the wide range of media platforms should be recognised as a valuable part of a scientist's role, with time allocated accordingly.
- Training should cover a range of skills such as an understanding of the social media environment, content production and content moderation.
- This training should include specific support for scientists to anticipate and manage the potential pitfalls of engagement – especially online harassment, trolling and encountering hostile and polarised debates.
- Guidelines and harassment policies need to be put in place, but also individuals in organisations should be assigned responsibility for supporting scientists affected by online harassment and abuse.

CHAPTER THREE | MASS MEDIA AND MISINFORMATION

RECOMMENDATION 8

The science community should recommit to working with science journalists and editors to support and champion quality science journalism, and to help ensure that credible and trustworthy reporting is reaching the widest number of people across traditional and social media channels.

- The science community should press news outlets to monitor the success of science news stories and ensure they feature prominently in editorial priorities, given the evidence of audience desire for reporting on how science can help solve some of the problems society faces.
- The scientific community should send a strong message to the news media that the way to compete most effectively on social media and win audiences back to professional journalism is not to join a race to the bottom, but to deliver the high-quality news that the British public repeatedly say they want.

RECOMMENDATION 9

The Royal Society should draw up and urge the scientific community to adopt a code of practice for scientists and research communications professionals engaging with the media to help ensure high standards are maintained.

- Modelled and adapted from the UK Statistics Authority's Code of Practice for Statistics, this code would lay down minimum standards for communicating science in a measured, accurate and transparent way with a focus on the principles of trustworthiness, quality and value.
- The science community is currently trying to improve the standards of scientific literature, with increasing focus on research integrity and reproducibility, but these efforts often take place separately from science communication – the two endeavours should be merged.

RECOMMENDATION 10

The Royal Society should set up a working group to explore the possibility, design and implementation of a new initiative that provides a stimulus to achieve more high-quality science programming content.

- The Royal Society is in a unique position to act as a convener, bringing together novel sources of funding with scientists and content producers and platforms.
- The new initiative could also develop a collective voice for more and better science programming from the science and science production communities – something that is noticeable in the arts and noticeably absent in science.

CHAPTER FOUR | INDUSTRY AND BUSINESS SECTOR

RECOMMENDATION 11

The UK government should support R&D businesses to continue to develop strong links with their local and national communities, through incentives that reward those that create auditable and costed public engagement activities.

- Engagement with schools should include engagement with the teachers. Most teachers have never worked in industry and so are unaware of some careers that are potentially available to their students. Help schools to engage their students with online career platforms providing work experience opportunities to larger student audiences.
- Reassess the potential for visitor centres and work with local governments to create innovation zones in public spaces; for example, collaborations with local informal engagement providers, to provide opportunities for employers to engage with local communities. This type of engagement could be included as a requirement for those companies that receive R&D grants from public funds.

RECOMMENDATION 12

R&D businesses working in fields of emerging science or technology should engage with the public to demystify these technologies, particularly where they might be transformative, to understand public perceptions and address concerns, and to build trusting relationships that will improve social acceptance. Currently, this is particularly important for businesses working in data-enabled technologies including AI.

- Focus on schools to habituate technology: fund schools to create access to technology such as digital technologies and AI, augmented reality, modern manufacturing (including three-dimensional printing).
- Seek opportunities to engage those outside the main cities and university towns. Engagement should not be viewed as a one-size-fits-all activity; attention should be put on tailoring messages to facilitate access to all demographics.

RECOMMENDATION 13

Employers should ensure that industry scientists are encouraged, supported and trained to speak openly about the important role of industry science, and are recognised for these efforts.

- Embed training for public engagement in the career pathways for new staff and incentives offered to the employees to encourage them to take up engagement opportunities; for example, by presenting at school open days.
- Ensure that trade bodies and industry association groups have public engagement on their agenda and take the lead on promoting best practice to their members.
- Encourage local, regional and national government to support R&D businesses in engaging with the public via their targeted inquiries and reports (developed in consultation with industry).
- Encourage scientific and business media to cover and engage with industrial R&D and innovation as part of their reporting and analysis.
- Encourage trade associations and industry representation bodies representing R&D intensive businesses to continue to build public engagement activities into their programmes.

CHAPTER FIVE | POLICY

RECOMMENDATION 14

The UK government should set the ambition to be the global leader in public transparency and systematic use of scientific evidence in policymaking. To support transparency, the UK government should publish a 'scientific evidence statement' alongside policies, which sets out explicitly how scientific evidence from research has been used in draft legislation, papers, policy strategy and consultations.

- All relevant policy statements should make explicit reference to a supporting scientific summary or synthesis ('Scientific evidence statement') in plain English.
- The UK government should ensure that all scientific advice for policymaking and Scientific Evidence Statements clearly identify areas of scientific uncertainty, in accordance with civil service policymaking guidelines in the Treasury Green Book.

RECOMMENDATION 15

The national academies should play an active role in holding the UK government to account on the quality and use of scientific evidence in policy decisions.

- As organisations independent of the UK government, the national academies should actively and publicly scrutinise the scientific evidence that is used for significant policy decisions by government, Parliament and the political parties. This is critical to ensure that the scientific facts are presented clearly and objectively, without political bias.
- National academies should work with organisations such as the Institute for Government and Sense about Science, which also play a critical role in evaluating the extent to which the government is effectively incorporating scientific evidence into its policymaking and the transparency with which it is communicated to the public.

RECOMMENDATION 16

The scientific community must proactively promote public dialogue on emerging technologies and scientific research so that ethical and policy implications are considered early.

- There is an onus on the scientific community, including the national academies, to feed into continuing, evolving dialogue with the public, politicians and the policy community and to create a receptive and supportive environment in which this can happen. This is an essential element for maintaining trust in science.
- Organisations such as the national academies, Sciencewise, Sense about Science and other expert independent facilitators are well-positioned to convene scientific expertise, public voice and government interests to coordinate such dialogues.
- Sufficient resources and support for skills among researchers must be allocated from science budgets (and other funders of research) to deliver this function. Alongside this, provision should be made to improve STEM research and analysis skills across the whole policy community, including within government and Parliament. Investing in this aspect is likely to pay back many times over in the long term through greater public trust, allowing for smoother adoption of new technologies.

CHAPTER SIX | ACADEMIC SCIENTIFIC COMMUNITY

RECOMMENDATION 17

Vice-chancellors and other academic leaders should strengthen the long-term institutional commitment to public engagement.

- Review how effectively their institution is supporting public engagement. Use the results to develop an action plan, with designated responsibility in the senior leadership team, based on an investment case that recognises the value of public engagement in local communities and beyond.
- Ensure that public engagement activities are recognised in promotions processes, reward and recognition measures, workload allocation, hiring criteria and institutional award programmes.
- Invest in staffing and infrastructure for public engagement, to enable time-constrained researchers to conduct engagement activities.
- Develop programmes that build competencies in engagement at all stages of research careers.
- Explore opportunities for regional partnering with other institutions to develop core infrastructure for public engagement.
- Develop stronger links with philanthropic bodies and local employers, schools and cultural venues to ensure support for public engagement activities.

RECOMMENDATION 18

National funding councils and responsible government departments should ensure that mechanisms of research evaluation recognise the importance of public engagement.

- Ensure all national evaluations for research and knowledge exchange facilitate benchmarking of university public engagement infrastructure, resource and strategic alignment and provide financial incentives to institutions which meet these benchmarks.
- Ensure that recognition of engagement is sustained in future national research assessment exercises.

RECOMMENDATION 19

Research funders (including the Royal Society) should ensure that public engagement is seen as core to scientific research and maximise researchers' opportunities to undertake engagement activities; they should also monitor and set annually published targets for spend on engagement as a proportion of their research-funding budgets.

- Create additional training opportunities that reflect current knowledge gaps and areas of interest (for example, policy engagement, social media engagement, ethical/inclusive research practice, design of participatory or citizen science research).
- In addition to providing public engagement funding for individual researchers through normal research grant mechanisms, provide competitively awarded ring-fenced multi-year funding for strategic public engagement projects with teams/networks of researchers and public engagement professionals rather than individuals, in order for HEIs to plan long-term engagement strategies more effectively.
- Support the sharing of best practice in public engagement, science communication and evaluation methods, capitalising on the NCCPE's Research Excellence Framework impact case study work and other independent reviews.
- Commit to repeating the *Factors affecting public engagement by UK researchers* survey on a five-year cycle.

RECOMMENDATION 20

The research community should advocate for increased institutional and funding support for public engagement, particularly early upstream engagement.

- Advocate for the importance of engagement within host institutions and externally.
- Build on the increasing emphasis on two-way engagement by embedding engagement earlier in the research cycle.

Chapter one
Education

To view the case studies highlighted within the section, scan the QR code or visit **royalsociety.org/sfsstudies**

Education

Education provides the foundation for students' later engagement with science and technology, personally and professionally. As the Bodmer report highlighted, education is therefore of fundamental importance to public engagement. This chapter primarily considers primary, secondary and further education. Higher education is considered in Chapter six: Academic science community.

In the UK, education is a devolved policy area. England, Scotland, Wales, and Northern Ireland each have separate education systems with some commonality, but differing qualification types, subject names, and compulsory subjects.

Science education across all four of these systems has the twin goals of preparing the subset of young people who will pursue careers as STEM professionals (approximately 25%[28]) while equipping all students with generally applicable scientific knowledge and skills, alongside an appreciation of its role in society. The benefits of the knowledge and skills development provided by STEM education span personal decision-making, active citizenship/societal participation and employability.

Since the focus of this report is public engagement, this chapter gives particular attention to the broader purposes of STEM education, while recognising the need to increase the number of people with scientific and technical skills for future STEM occupations and the close relationship between these aims. It considers the STEM education that students require, both to engage meaningfully with science throughout their lives and to support future participation in the STEM workforce, alongside the factors affecting the capacity of the UK education system to meet these needs.

Scientific literacy

Being scientifically literate goes beyond simply having factual knowledge and an understanding of the principles underpinning STEM subjects; it requires an understanding of how science is done and how to evaluate evidence and its sources.

In an age when young people have access to virtually unlimited information and viewpoints, they require the skills to identify credible sources and weigh evidence. From primary school onwards, science education must develop the critical thinking needed to question and evaluate sources of evidence and to appreciate the distinctive characteristics of evidence generated through scientific methods.

In 2025, the independent *Curriculum and assessment* review in England stated that the science curriculum should equip "children and young people across all key stages with the skills to evaluate scientific claims critically, assess evidence from multiple sources and understand how science operates in everyday life"[29]. A good science education should also convey the provisional nature of scientific knowledge, and why this uncertainty is essential to scientific progress, while helping young people to understand that scientific ideas may sometimes be unfairly rejected because they challenge deeply held beliefs or cultural identities.

Over the past 40 years, science education has seen shifts in emphasis between approaches that highlight debate, discussion, student engagement and understanding the nature of science, and those that place greater focus on the acquisition of technical knowledge.

28 UK Parliament POSTnote 746, *UK STEM Skills Pipeline* (2025). See: https://doi.org/10.58248/PN746 (accessed 6 January 2026).

29 GOV.UK, *Curriculum and Assessment Review Final Report* (2025). See: https://www.gov.uk/government/publications/curriculum-and-assessment-review-final-report (accessed 6 January 2026).

A significant influence in shaping more integrative perspectives was *Beyond 2000*[30], a landmark report commissioned by the Nuffield Foundation and the Wellcome Trust, which argued for a broader conception of scientific literacy. Its ideas informed both international thinking and the development of the Organisation for Economic Cooperation and Development (OECD) Programme for International Student Assessment (PISA), which assesses how effectively education systems enable students to apply scientific and mathematical understanding in real-world contexts (see case study: PISA international comparisons in educational attainment). In England, these principles were reflected in the development of *Twenty first century science*[31], a suite of curricula and qualifications adopted by around 60% of secondary schools, designed to consider how science works alongside core scientific knowledge.

Currently, the curriculum in England adopts a more traditional, knowledge-based focus, with relatively limited emphasis on structured opportunities for discussion and engagement. At the time of writing, the programmes of study for the next iteration of the science curriculum have yet to be published, and it remains to be seen how far future reforms will reflect these international trends.

Mathematical and data literacy

In an increasingly digital and data-driven world, it is vital that all young people acquire the knowledge and skills required to interpret and use data effectively[32] – 'data literacy'. Few occupations, areas of study or aspects of daily life will remain untouched by this data revolution. Data skills will be a key competency in most jobs, not just specialist technical roles. Furthermore, encouraging a foundational level of understanding of data, including probability, risk, uncertainty and data reliability, will enable citizens to make informed choices about their lives and futures.

As outlined in the Royal Society's *Mathematical futures* report, a mathematical education builds multiple skills, including problem-solving, logical thinking, abstraction and data literacy[33]. Data literacy is dependent upon foundational knowledge and skills in mathematics and statistics, but also incorporates issues such as data sources, reliability, completeness and visual representation. The mathematical and data education of the future needs to provide students with both foundational mathematical knowledge and skills, and the general quantitative literacy to apply such knowledge and skills in educational, employment and everyday contexts. In addition, the ability to engage with scientific concepts is dependent on a sound understanding of statistics and data[34].

30 Millar R, Osborne J. *Beyond 2000: science education for the future* (1998) Nuffield Foundation. See: https://www.nuffieldfoundation.org/wp-content/uploads/2015/11/Beyond-2000.pdf (accessed 19 April 2026).

31 Natalie DB. *Twenty First Century Science Has Not Had a Negative Effect on Student Progression to A Level*. (2014), Nuffield Foundation. See: https://www.nuffieldfoundation.org/news/twenty-first-century-science-has-not-had-a-negative-effect-on-student-progression-to-a-level (accessed 19 April 2026).

32 Seah WT *et al*. *Reimagining Mathematics Education for the 21st Century in the 21st Century*. Journal of Educational Research in Mathematics 31 (3): 393–404 (2021). See: https://doi.org/10.29275/jerm.2021.31.3.393 (accessed 6 January 2026).

33 The Royal Society, *A new approach to mathematical and data education* (2024). See: https://royalsociety.org/-/media/policy/projects/maths-futures/mathematical-and-data-education-policy-report.pdf (accessed 6 January 2026).

34 Watson J and Smith C. *Statistics education at a time of global disruption and crises: a growing challenge for the curriculum, classroom and beyond*. Curriculum Perspectives 42: 171–179 (2022). See: https://doi.org/10.1007/s41297-022-00167-7

AI literacy

AI has rapidly become an integral part of everyday life. AI has enormous potential to deliver societal benefits and is likely to be a tool that all young people will use throughout their lives. However, responsible use of AI tools requires an understanding of how they work and their potential limitations. Greater AI literacy will be required to ensure that young people are able to think critically about AI tools and use them appropriately: to amplify human cognition and creativity, not to replace or outsource it[35].

Sustainability education

Climate change and biodiversity loss are profound, defining challenges of the twenty first century. STEM education has a critical role to play in conveying the importance, urgency and complexity of these challenges, as well as ways of addressing them, ensuring that people are equipped with the knowledge, skills, and confidence to take meaningful action to contribute to a more sustainable future. More pragmatically, national education systems should address the UK's need for a workforce equipped with 'green skills'[36].

The opportunity to address sustainability through whole-school approaches would help students to appreciate the multidisciplinary nature of climate change and the complex social, economic, cultural and political dimensions of this global challenge.

System challenges

The UK's education systems need to address significant inequities, in both attainment and in the aspiration they engender in learners. These challenges do exist within STEM, but the problem exists across the whole system. While progress has been made in the diversity of young people choosing to study STEM subjects at school, there remains a notable difference between genders in the uptake of certain subjects, particularly physics, mathematics and computer science[37]. Highlighting the real-world relevance of these subjects, for example in health and climate change, could help to increase their appeal to a larger number of students, including more girls[38].

Social inequalities, such as those associated with gender, disadvantage, geography and ethnicity, can limit the extent to which young people see science as a viable pathway[39]. Across all age groups, students from socioeconomically advantaged families are more likely to express science aspirations. Education systems need to address widely differing 'science capital' on young people's expectations, aspirations and opportunities[40].

35 Ng DTK, Leung JKL, Chu SKW and Qiao MS. *Conceptualizing AI Literacy: An Exploratory Review*, Computers and Education: Artificial Intelligence 2: 100041 (2021). See: https://doi.org/10.1016/j.caeai.2021.100041

36 PWC, *Energy Transition Will be Constrained by Green Skills Gap of c.200,000 Workers: PwC Green Jobs Barometer* (2022). See: https://www.pwc.co.uk/press-room/press-releases/Energy-transition-constrained-by-c200000-jobs-PwC-GJB.html# (accessed 6 January 2026).

37 Department for Education, *Data set from A level and other 16 to 18 results. Time-Series: A Level Subject Entries and Grade By Gender* (2024). See: https://explore-education-statistics.service.gov.uk/data-catalogue/data-set/2f6bffba-735d-4801-8ae3-f0f058044da4 (accessed 6 January 2026).

38 The Royal Society, *The public understanding of science* (1985). See: https://royalsociety.org/-/media/policy/publications/1985/10700.pdf (accessed 7 January 2026).

39 Archer L, Moote J, MacLeod E, Francis B & DeWitt J. *ASPIRES 2: Young People's Science and Career Aspirations, Age 10–19. London: UCL Institute of Education* (2020). See: https://discovery.ucl.ac.uk/id/eprint/10092041/15/Moote_9538%20UCL%20Aspires%202%20report%20full%20online%20version.pdf (accessed 6 January 2026).

40 The Royal Society, *Science education tracker 2023* (2024). See: https://royalsociety.org/-/media/policy/projects/science-education-tracker/science-education-tracker-2023.pdf (accessed 6 January 2026).

Practical work and enquiry-based learning

Science gains its evidence through experimentation and other empirical processes, which is why practical work has traditionally been central to science education, alongside knowledge acquisition. In recent years, however, classroom practical activity has declined. The Royal Society's *Science education tracker*, a survey of young people's experiences of science education in England, shows that the proportion of 14 – 16-year-olds undertaking hands-on practical work at least once a fortnight fell from approximately 44% in 2016 to 37% in 2019, and to 26% in 2023[41].

As the Royal Society's report *Practical inquiry in secondary science education*[42] has shown, this decline is often attributed to a content-heavy curriculum, resource constraints and reduced specialist technician capacity. Assessment systems that prioritise knowledge recall can also make it difficult to recognise the wider educational value of practical learning.

For a minority of students fortunate enough to have the opportunity, engaging in enquiry-led practical science offers a different story. By working on authentic scientific problems, students experience science as a creative, collaborative process and develop a deeper understanding of how knowledge is generated. While high-quality enquiry opportunities exist, access remains uneven owing to financial pressures, curriculum demands and technical support requirements. Clear government endorsement, supported by targeted funding, would help extend access.

Established programmes demonstrate the effectiveness of these approaches. The British Science Association's CREST Awards support student-led investigation, while the Institute for Research in Schools (IRIS) enables engagement with authentic research using university and industry partnerships. The Royal Society's Partnership Grants scheme similarly supports sustained collaborations between schools and STEM professionals, strengthening links to research and innovation communities.

This work reflects a broader shift identified in the 1985 *Public understanding of science* report, which emphasised learning through real-world experience, informal learning and wider discovery. In schools, this is often delivered through 'STEM enrichment'. Some extended investigations, engineering challenges and ecological fieldwork are particularly well suited to STEM clubs, after-school programmes and partnership activities. Enrichment can spark curiosity and build motivation, confidence and other transferable skills, while often providing young people with their first meaningful engagement with the natural world and with engineering, a discipline still largely absent from the core curriculum.

41 The Royal Society, *Science education tracker 2023* (2024). See: https://royalsociety.org/-/media/policy/projects/science-education-tracker/science-education-tracker-2023.pdf (accessed 6 January 2026).

42 The Royal Society, *Practical inquiry in secondary science education: An evidence synthesis* (2024). See: https://royalsociety.org/-/media/policy/projects/science-education-tracker/practical-inquiry-in-science-education-evidence-synthesis.pdf (accessed 20 February 2026).

Broad and balanced education

UK education systems follow a broad compulsory curriculum to age 16, but subject options are significantly narrowed thereafter in comparison with many other OECD countries. In England, post-16 students typically study only three subjects, whereas learners of a similar age in many other OECD systems continue with five to seven subjects. As a result, many students specialise early in STEM subjects, while an even greater proportion discontinue the study of science and mathematics entirely at age 16. While governments in Scotland and Wales have taken steps to counter this narrowing through recent curriculum reforms, and Northern Ireland's *2025 Curriculum Review* has also argued for greater breadth and flexibility, the overall pattern across the UK remains one of early specialisation. This has implications not only for skills development and progression, but also for young people's preparation as informed citizens able to engage critically with societal issues raised by the applications of science.

The Royal Society has consistently argued that all young people should have access to a broad and balanced education to age 18, encompassing mathematics, science, humanities, languages and the creative arts[43, 44]. This breadth is increasingly important, given the changing nature of work and growing uncertainty around future labour market demands. Exposure to a wide range of disciplines helps to equip students with the knowledge, adaptability and intellectual flexibility needed to navigate a rapidly evolving economic and technological landscape, while also supporting skills development in communication, team working, and critical analysis.

Learning technology

Digital technologies continue to create new opportunities to enhance learning, with new tools emerging at a rapid pace. However, uptake remains uneven and access is not yet equitable. Where they are used effectively, such technologies have the potential to support greater inclusion, particularly for learners with special educational needs and disabilities. Emerging developments in AI may further transform learning experiences soon.

At the same time, there are growing concerns about the educational implications of these tools, including the use of large language models (LLMs) to complete conventional assessments, the potential effect on cognitive engagement when learners rely on AI rather than working directly with source material, and the challenges this poses for fair and valid assessment. The adoption of digital technologies in classrooms should therefore be guided by robust evidence of educational benefit. At present, however, there remains a limited evidence base on the effect of many of these technologies on learning and attainment outcomes for young people.

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43 The Royal Society, *Vision for science, mathematics and computing education* (2014). See: https://royalsociety.org/news-resources/projects/vision/ (accessed 19 April 2026).

44 The Royal Envision (2022). See: https://royalsociety.org/news-resources/projects/education-reform/envision/ (accessed 19 April 2026).

Technical education

Technical education continues to be an underserved area. Recruitment of specialist teachers is a long-standing challenge[45]. Employers perceive the status of technical and vocational science qualifications as lower than that of general qualifications[46]; it is too early to assess the effects of recent reforms to technical education and the proposed introduction of V-levels[47].

The Royal Society's *Science 2040* report highlights the need for well-defined routes into technical education, with an integrated approach across national and local governments, education institutions and industry partners[48].

The central role of the science teaching workforce

The quality of science teachers is a major influence on educational attainment. In the 2024 Science Teaching Survey, 43% of teachers in England reported that a lack of specialist teachers had had a detrimental effect on student learning outcomes[49]. Science teachers need a sound understanding of their subject's up-to-date teaching practices, and need to have the confidence and opportunities to use their knowledge and skills creatively in the classroom.

The supply of qualified science teachers is a long-standing problem, particularly in physics, mathematics and computing[50]. Despite successive governments' attempts to increase recruitment of specialist science teachers, lessons are too often taught by teachers without a relevant degree[51], with certain geographic areas particularly badly affected, which usually negatively affects those pupils from the lowest socioeconomic backgrounds[52].

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45 Ofsted, *Research and Analysis. T-Level Thematic Review: Final Report* (2023). See: https://www.gov.uk/government/publications/t-level-thematic-review-final-report/t-level-thematic-review-final-report (accessed 7 January 2026).

46 Ofqual, *Official Statistics. Perceptions of Vocational and Technical Qualifications – Wave 7: The Results of a Survey of Perceptions of Vocational and Technical Qualifications in England. Conducted December 2024 to January 2025* (2025). See: https://www.gov.uk/government/statistics/perceptions-of-vocational-and-technical-qualifications-wave-7 (accessed 7 January 2026).

47 Department for Education, *Post-16 Level 3 and Below Pathways: Government Consultation* (2025). See: https://consult.education.gov.uk/technical-education-and-qualifications-reform/post-16-level-3-and-below-pathways/supporting_documents/post-16-level-3-and-below-pathways-consultationpdf (accessed 7 January 2026).

48 The Royal Society, *Science 2040: Interim report* (2025). See: https://royalsociety.org/-/media/policy/projects/science-2040/science-2040-interim-report.pdf (accessed 7 January 2026).

49 IOP, *The Physics Teacher Shortage and Addressing it Through the 3Rs: Retention, Recruitment and Retraining (England)* (2025). See: https://www.iop.org/sites/default/files/2025-09/The-physics-teacher-shortage-and-addressing-it-through-the-3Rs-Retention-Recruitment-and-Retraining-England.pdf (accessed 7 January 2026).

50 The Royal Society, *Science 2040: Interim report* (2025). See: https://royalsociety.org/-/media/policy/projects/science-2040/science-2040-interim-report.pdf (accessed 7 January 2026).

51 Sibieta, L. *The Teacher Labour Market in England: Shortages, Subject Expertise and Incentives. Education Policy Institute* (2018). See: https://epi.org.uk/wp-content/uploads/2018/08/EPI-Teacher-Labour-Market_2018.pdf (accessed 7 January 2026).

52 Worth, J and Tang S. *How to Recruit 6,500 Teachers? Modelling the Potential Routes to Delivering Labour's Teacher Supply Pledge*. NFER (2024). See: https://www.nfer.ac.uk/publications/how-to-recruit-6-500-teachers-modelling-the-potential-routes-to-delivering-labour-s-teacher-supply-pledge/ (accessed 7 January 2026).

More efforts are needed to make teaching a more desirable profession. Enhancing professional agency would likely improve teacher retention[53], but AI-based strategies may also be needed to address this stubbornly intractable challenge.

Within a broad curricular framework, enabling teachers with greater agency and flexibility, regarding how they teach, can create an environment that is more stimulating for both teachers and students[54]. The high quality of science education in Estonia illustrates the efficacy of expert and empowered teaching professionals (see case study: Re-engineering STEM education in Estonia).

Strengthening science teaching through lifelong professional learning

The confidence and creativity of teachers can be strengthened through subject-specific continuing professional development (CPD), as illustrated by the Raising Aspirations in Science Education (RAiSE) initiative in Scotland (see case study: RAiSE the bar). Targeted, high-quality CPD can introduce teachers to emerging areas of science and pedagogical practice, maintain teachers' own curiosity, scientific literacy and enable them to connect curriculum learning with career opportunities[55]. It can make teachers feel empowered, valued and supported, thereby improving retention[56]. Greater retention reduces recruitment and training costs, making CPD a highly cost-effective investment[57].

An earlier initiative, the national network of Science Learning Centres (subsequently STEM Learning), established jointly by the UK government and the Wellcome Trust at the start of this century, was designed to provide rigorous professional learning for science teachers[58]. The initial £51 million investment marked a step change in the value placed on the science teaching workforce and the importance of keeping subject knowledge and pedagogy up to date.

53 Arthur, L and Bradley, S. *Teacher Retention in Challenging Schools: Please Don't Say Goodbye!*. Teachers and Teaching 29 (7–8): 753–771 (2022). See: https://doi.org/10.1080/13540602.2023.2201423

54 Menzies, L, Parameshwaran, M, Trethewey, A, Shaw, B, Baars, S and Chiong, C. *Why Teach?* (2015). See: https://doi.org/10.13140/RG.2.2.12227.86567

55 Gatsby Benchmarks. See: https://www.gatsbybenchmarks.org.uk/ (accessed 7 January 2026).

56 Allen, R and Sims, S. *Improving Science Teacher Retention: Do National STEM Learning Network Professional Development Courses Keep Science Teachers in the Classroom? Education Datalab* (2017). See: https://www.stem.org.uk/system/files/elibrary-resources/2019/10/science-teacher-retention_0.pdf

57 The Royal Society. *Science education for a research and innovation economy* (2022). See: https://royalsociety.org/-/media/policy/Publications/2022/2022-01-31-sci-uplift-DfE.pdf (accessed 7 January 2026).

58 House of Lords Science and Technology Committee (2006) Science Teaching in Schools. See: https://publications.parliament.uk/pa/ld200506/ldselect/ldsctech/257/257.pdf (accessed 19 April 2026).

Independent evaluations commissioned by government[59] and Wellcome[60] found that the Science Learning Centres contributed to teacher retention[61] through improved teachers' confidence, subject expertise and classroom practice, while also contributing to a cultural shift by normalising sustained, subject-specific professional development and raising expectations that high-quality CPD should be routine[62].

Next steps

A strong education provides the foundation for all members of society to engage meaningfully with science. Science education should not only focus on preparing those young people who will study and work in science but should also ensure that all citizens have a foundational understanding of science, including its social and ethical challenges. Changes in educational practice and policy, particularly the introduction of a broad and balanced education and a mathematics and data science curriculum, are needed if science education is to keep pace with evolving scientific, technological and societal contexts.

Change is needed to ensure that science education truly meets the needs of all young people. Addressing persistent challenges – including teacher recruitment, curriculum design and assessment – requires bold, systemic reform, informed by robust evidence. The goal must be to create a science education within a coherent system that inspires curiosity and equips students with the skills to navigate a rapidly changing world, empowering them to engage confidently with science throughout their lives.

The world is changing rapidly, shaped by sustainability challenges, digital technologies and AI. Because education is a complex, interconnected system, real improvement means looking beyond small adjustments to rethink how the whole system works. After decades of minor tweaks, it is time for the bold changes learners need now and in the future.

59 Clarke C, Thom G. *Evaluation of the Science Learning Centre Network* (2011) Department for Education. See: https://assets.publishing.service.gov.uk/media/5a7c1186e5274a0706e519b3/DFE-RR257.pdf (accessed 19 April 2026).

60 Matterson C, Holman J. *Informal Science Learning Review: Reflections from the Wellcome Trust* (2012) Wellcome Trust. See: https://iiif.wellcomecollection.org/file/b21248047_Informal%20Science%20Learning%20Review%20reflections.pdf (accessed 19 April 2026).

61 STEM Learning, *STEM Learning CPD saves £58.5m in teacher training costs* (2019). See: https://assets.ctfassets.net/pc40tpn1u6ef/72BGt1nbKiAX8mtX1CJKq3/01b1a9221498685c6c2f4a9d58ae776a/teacher_retention_1p_040520_0.pdf (accessed 19 April 2026).

62 Lawton R, Dallas E, Talwar R *et al*. *Valuing the impact of science CPD* (2021) STEM Learning. See: https://assets.ctfassets.net/pc40tpn1u6ef/5bSkZ0BCNxqYQJzEnJ79Q8/dfcc440e39a96a83cfcd16e301b22859/ValuingImpactOfScienceCPD.pdf (accessed 19 April 2026).

RECOMMENDATION 1

Governments[63] should provide an education that equips all young people with the understanding and experience of how scientific knowledge is generated and refined through observation, experimentation and direct engagement in scientific enquiry. In doing so, this education lays the foundation for lifelong scientific literacy, enabling future citizens to evaluate evidence, identify trustworthy sources, use data confidently and respond to scientific and environmental challenges in everyday life.

- Strengthen the focus in science education on understanding of scientific processes, the nature of evidence and the development of critical thinking and problem-solving skills.
- Support high-quality science education by ensuring practical work remains integral to learning, supported by the essential expertise of science technicians. This should include foundational practical skills and exposure to real research, derived through project- and enquiry-based initiatives.
- Embed sustainability as a topic throughout the school experience so that students are equipped to live well, within the planet's available resources.
- Ensure that mathematics and technology-focused education provide students with the numeracy and data interpretation skills essential for everyday life and the workplace.
- Secure long-term government and charitable investment in the *Science education tracker* to continue to monitor young people's experience and perceptions of science.

63 In this chapter we have used the term 'Governments' to refer to the UK government (responsible for education in England) and the devolved governments of Scotland, Wales and Northern Ireland.

RECOMMENDATION 2

Governments should create conditions for a high-status, confident and adaptable teaching workforce equipped for future educational, scientific and technological change.

- Strengthen teachers' professional agency and provide improved support for workload management and wellbeing.
- Enhance the attractiveness of teaching through increased professional recognition alongside consideration of flexible, innovative ways of working and reforms to school timetabling.
- Accelerate the effective use of digital tools (including AI) where appropriate, to improve teaching and learning and to complement the professional skills of teachers.
- Prioritise sustained investment in high-quality professional development in subject areas where the workforce keeps pace with scientific, technological and educational change.

RECOMMENDATION 3

Governments should adopt a broader education system to age 18 that develops adaptable learners, balances academic and technical pathways, sustains core subjects and expands chances for learners from disadvantaged backgrounds.

- Ensure that greater breadth helps to develop adaptable learners who can respond to rapidly changing jobs, technologies and industries.
- Sustain engagement with STEM alongside the humanities, arts and languages to prepare all young people to navigate the complex social, ethical and scientific issues they may face.
- Ensure that a broader post-16 offer keeps pathways open for all learners, reducing the early specialisation that disproportionately disadvantages students from less advantaged backgrounds.

Chapter two
Informal engagement with science

To view the case studies highlighted within the section, scan the QR code or visit **royalsociety.org/sfsstudies**

Informal engagement with science

The past 40 years have seen a significant increase in opportunities for audiences of all ages to engage with Science, technology, engineering and mathematics (STEM) across the UK. The "public lectures, children's activities, museums and libraries" described in the 1985 *Public understanding of science* report[64] are now supplemented by science and discovery centres[65] and festivals[66], dedicated science engagement events, and STEM being prominently showcased in cultural and nature-based events and locations such as music festivals, zoos, nature parks and gardens.

However, this varied and vibrant sector is under threat. Reductions in income, rising operating costs, and reductions in support (both in-kind and financial) from partner organisations have created an existential threat to the sector.

Opportunities to engage are not distributed equally or equitably across the UK, with significant work still to do to develop national, accessible, equitable engagement opportunities. Uptake of opportunities, both in terms of who visits STEM-related attractions and who takes part in engagement projects, and in terms of who is able to build a career in this sector, is also uneven and often limited to those with high levels of 'science capital'[67].

Defining 'informal engagement with science'

Some of the activity discussed in this chapter can be described as 'informal science learning', supplementing formal education in non-classroom settings and providing lifelong learning opportunities. However, in this report the Royal Society has chosen to also include activities that do not have learning and educational outcomes as their primary motivation.

Establishing what is and is not part of the 'informal engagement with science' sector is difficult. While the Royal Society was able to identify some shared motivations for activity in this space, methods, operating environments and infrastructure varied dramatically. The diversity of engagement opportunities available across the UK is a strength, but it also makes it difficult for organisations and individuals working in this area to identify themselves as part of a 'sector'. This variability in mission, job role and priorities makes sharing best practice, collaboration and collective action difficult.

64 The Royal Society, *The public understanding of science* (1985). See: https://royalsociety.org/-/media/policy/publications/1985/10700.pdf (accessed 7 January 2026).

65 Fidler, P (2025) *The funding of UK science and discovery centres*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/the-funding-of-uk-science-and-discovery-centres-by-dr-penny-fidler.pdf (accessed 19 April 2026).

66 Fidler, P (2025) *The funding of UK science festivals*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/the-funding-of-uk-science-festivals-by-dr-penny-fidler.pdf (accessed 19 April 2026).

67 Association for Science and Discovery Centres, *Science Capital: An Introduction* (2026). See: https://www.sciencecentres.org.uk/resources/science-capital/science-capital-introduction/ (accessed 13 January 2026).

Recent years have seen a significant shift towards more collaborative, community-focused, place-based, 'two-way' engagement[68]. This includes citizen science initiatives such as the Big Butterfly Count and the Perception Census (see case studies 'Big Butterfly Count' and 'Dreamachine and the Perception Census'), as well as embedding science engagement activities within existing organisations and local settings, such as Girlguiding and Scout-led activities, forest schools, library groups or after-school clubs.

Community-led projects can connect people to STEM subjects in ways that are socially and locally relevant. This was highlighted by the Building Bridges research project[69], and initiatives such as Science Learning +[70] and Curiosity[71], and exemplified by projects made possible by the Ideas Fund[72]. Access to high-quality STEM engagement opportunities is not equally distributed across the UK, often clustered around institutions which offer engagement opportunities linked to physical locations (such as Jodrell Bank and the Francis Crick Institute); locally relevant and inclusive programmes are essential if science is to be made accessible to everyone.

New technologies and digital engagement platforms also allow people to engage with STEM content via mobile phone or computer: watching social media or accessing other digital content such as YouTube, podcasts or gaming; taking online courses and module-based learning; participating in citizen science projects via platforms such as Zooniverse[73]; or even making use of remote access to scientific lab equipment via The Open University[74]. Geographically rooted institutions such as local science centres and museums (see Figure 1) also offer extensive online engagement programmes in addition to in-person engagement opportunities.

68 British Science Association, *Community Engagement* (2024). See: https://www.britishscienceassociation.org/community-engagement (accessed 7 January 2026).

69 Haywood, N and Moussouri, T. *The Building Bridges Research Project at the London Science Museum: Using an Ethnographic Approach with Under-Represented Visitor Groups*. Archaeology International 20 (1): 69–73 (2017). See: https://doi.org/10.5334/ai-356

70 National Co-ordinating Centre for Public Engagement, *Collections: SL+ Equity in Informal Science Learning* (2024). See: https://www.publicengagement.ac.uk/resources/collections/sl-equity-informal-science-learning (accessed 7 January 2026).

71 Wellcome and BBC Children in Need, *The Role of Informal Science in Youth Work: Findings from Curiosity Round One* (2019). See: https://wellcome.org/sites/default/files/role-informal-science-learning-youth-work.pdf (accessed 7 January 2026).

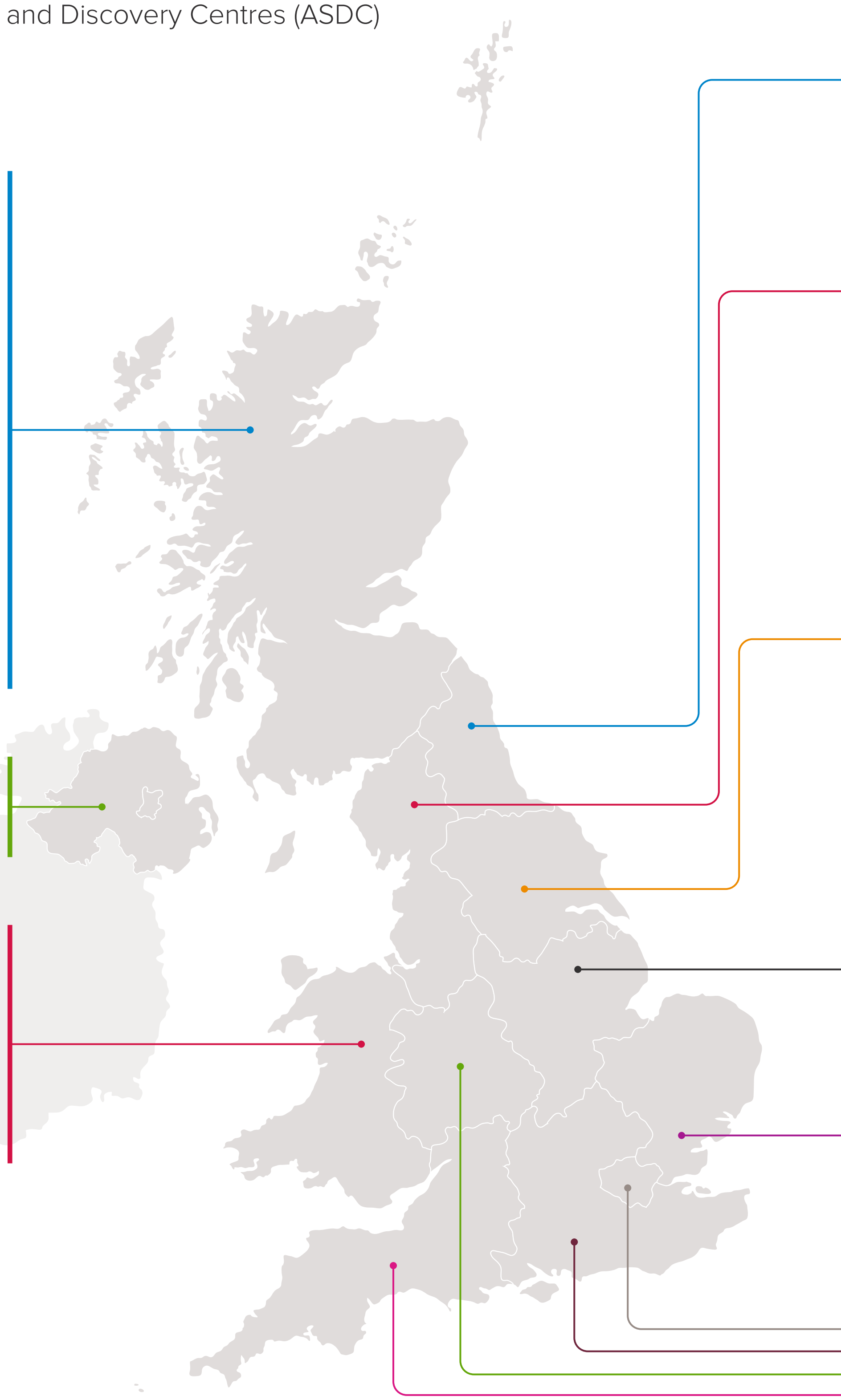
72 The Ideas Fund, *Tap into the Power of "If"* (2026). See: https://theideasfund.org/ (accessed 7 January 2026).

73 Zooniverse. See: https://www.zooniverse.org/ (accessed 7 January 2026).

74 Open University, *OpenSTEM Labs* (2026). See: https://learn5.open.ac.uk/ (accessed 19 April 2026).

FIGURE 1

UK distribution of science and discovery centres and science-based visitor attractions, developed from Association for Science and Discovery Centres (ASDC) network membership.



SCOTLAND

Aberdeen Science Centre, 1988
Aero Space Kinross, 2015 (Pop-up/Outreach)
The Big Idea, Millenium Centre,
opened 2000, closed 2003
Dundee Science Centre, 2000
Dynamic Earth, 1999
Glasgow Science Centre, 2001
Kirkcudbright Dark Space Planetarium, 2021
Lost Shore Surf Resort, 2024
Ocean Explorer Centre, 2014
Scottish Seabird Centre, 2000
Royal Botanic Garden Edinburgh, 1820
Royal Observatory Edinburgh, 1896
Science Skills Academy (Newton Rooms), 2019

NORTHERN IRELAND

Armagh Observatory & Planetarium, 1968
W5, 2001

WALES

Centre for Alternative Technology, opened 1975,
partial closure of centre to day visitors, 2023
Oriel Science, 2016
Science Made Simple, 2002 (Pop-up/Outreach)
Techniquest, 1986
Xplore!, 2003

North East

International Centre for Life, 2000
Kielder Observatory, 2008
Locomotion, 2004

North West

Catalyst Science Discovery Centre, 1987
Eureka! Science + Discovery, 2022
Jodrell Bank, 2011
Lakeland Wildlife Oasis, 1992
Science and Industry Museum, 1969

Yorkshire and the Humber

The Deep, 2002
The Earth Centre, Millenium Centre, opened 1999, closed 2004
Eureka! The National Children's Museum, 1992
MAGNA, 2001
MathsCity, 2021
National Centre for Popular Music, Millenium Centre of music/science/technology, opened 1999, closed 2000
National Railway Museum, 1975
Science and Media Museum, 1983

East Midlands

Sherwood Observatory Planetarium and Science Centre, 2025
National Space Centre, 2001
National Stone Centre, 1990

East of England

Cambridge Science Centre, 2013
Inspire Discovery Centre, opened 1995, closed 2011
STEM Discovery Centre, 2017
Wellcome Trust Sanger Institute, 1993

London

Centre of the Cell, 2009
Francis Crick Institute, 2011
Institute of Physics, 2018
Kew Gardens, 1840
MathsWorld, 2025
Natural History Museum, 1881
Science Museum, 1857
Royal Institution (Ri), 1799
Royal Museums Greenwich, 1937
Wellcome Collection, 2007

South East

The Living Rainforest, 1993
Look Out Discovery Centre, 1991
Observatory Science Centre, 1995
Oxford Trust (Science Oxford), 2019
Oxford University Museum of Natural History, 1860
Winchester Science Centre, 2002

West Midlands

Thinktank, 2001

South West

@Bristol, opened 2000, closed 2007
Eden Project, 2001
Exeter Science Centre, 2020 (Pop-up/Community)
The Exploratory, opened 1987, closed 1999
Explorer Dome, 1998 (Pop-up/Outreach)
We The Curious, 2000

Motivations for organisations to engage the public with science

The Royal Society has found that five main motivations unite activity in this area:

1. **Fostering wellbeing, curiosity and enjoyment**
   Enjoyment, community, or personal interest are powerful motivators. Organisations may focus on creating inclusive spaces for quiet contemplation and places to meet with friends and family, offering engaging experiences that spark curiosity and dialogue, and promoting the concept of science as a continuous journey of discovery.

2. **Enabling informed lifestyle choices and creating new knowledge**
   This might include fostering critical thinking, helping people to navigate health, nutrition and other ethical debates in science, such as online behaviour, consumer choices and environmental impact. In turn, providing spaces for researchers to engage with the public's aspirations, concerns and new ideas.

3. **Convening collective action**
   In both physical spaces and digital platforms, activities such as citizen science projects move people from passive learners to active contributors. These activities can improve confidence, build a sense of agency, and empower groups and individuals to act.

4. **Empowering careers, skills and lifelong learning**
   Improving access to science careers for the broadest possible range of the population, and supporting people to develop new skills and to continue learning beyond a formal education setting, including initiatives such as youth programmes and panels, and lifelong learning opportunities[75].

5. **Harnessing financial models**
   The majority of projects and organisations mentioned in this chapter are not-for-profit, where any income from sources such as ticket sales or car parks is used to subsidise charitable activity. However, STEM content can also be commercialised, with profit being an additional motivator for commissioning of some developing projects.

75 Zhao, M, Mathews, CJ, Mulvey, KL, *et al*. *Promoting Diverse Youth's Career Development Through Informal Science Learning: The Role of Inclusivity and Belonging*. Journal of Youth Adolescence 52, 331–343 (2023). See: https://doi.org/10.1007/s10964-022-01694-2

Public motivations for engaging with science

For 25 years, the *Public attitudes to science* (PAS) studies have been the UK's most high-profile surveys on public perceptions of science. They provide data on how informed and engaged people in the UK feel when it comes to science. The latest survey (undertaken in 2025), by Ipsos, in partnership with the British Science Association, on behalf of UK Research and Innovation (UKRI), found that three-fifths of those surveyed felt they saw or heard too little information about science (62%, up from 47% in the previous survey done in 2019). And just 12% felt that the public was sufficiently involved in decisions about science and technology (having consistently fallen from 21% since 2008)[76].

The 2025 PAS survey results also show continued interest from the public in visiting science-related venues (see Figure 2).

FIGURE 2

The 2025 PAS survey results show a desire from the public to engage with scientific information, as illustrated by the summary published by the Association of Science and Discovery Centres (ASDC)[77].

In the last 12 months:

33% of those surveyed had visited a science museum

42% visited zoos or aquaria

24% visited a science and discovery centre (statistically significant increase from 2019 data of 19%)

17% visited a science-related talk or lecture outside of school, college or work

13% visited a planetarium

7% visited a science festival

76 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

77 https://www.sciencecentres.org.uk/news/public-attitudes-to-science-survey-2025-insights-for-the-informal-science-engagement-sector/#:~:text=Cultural%20engagement%20with%20science%20(visitors,7%25%20visited%20a%20science%20festival (accessed 19 April 2026).

A diverse landscape of engagement opportunities

The diverse landscape of engagement activities is something the UK can be proud of and should seek to protect. Trends visible in the PAS survey results and project-specific evaluation reports show the value of this work[78]. A blend of permanent infrastructure, supportive organisations, live event formats and informal spaces can come together to create programmes that respond to regionally relevant STEM topics[79]. A significant reduction in variety, geographical spread and availability of locally and socially relevant opportunities to engage with STEM risks further excluding some communities from science[80].

A broader landscape of engagement opportunities is necessary to ensure activities can be tailored to different community needs and audience interests. Larger organisations, such as science and discovery centres and museums, can and do act as hubs that support wider networks within their regions. This model helps to ensure that STEM engagement opportunities can be woven into locally and socially relevant activities across the UK[81], and that organisations are not just engaging with self-selecting audiences which may already be described as having 'high science capital'[82].

The goal is a future where informal engagement with science activities is recognised as an essential part of the social and cultural infrastructure that is necessary for thriving communities[83].

Funding

Some informal STEM engagement activities are run as commercial enterprises, with ticket and book sales and other revenue sources acting as a powerful motivation for activity. More often, activities are 'not-for-profit', potentially subsidised by research or other institutions, or utilising income-generating activities to subsidise charitable programmes. In all cases, long-term strategic investment is essential. While ticket sales and fundraising can support individual activities, they generally do not cover the operational, staffing and infrastructure costs.

Organisations running smaller-scale, local, volunteer-dependent activities are often community- or charity-led. Funding from local government has suffered since the COVID-19 lockdowns[84]. Larger organisations, including the science and discovery centres and museums, face financial problems, especially around infrastructure costs to maintain buildings and key systems[85]. In addition, science discovery centres often fall between government departments making advocacy challenging.

78 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

79 Falk, J, Dierking, LD, Osborne, J, Wenger, M, Dawson, E and Wong, B. *Analyzing Science Education in the United Kingdom: Taking a System-Wide Approach*. Science Education 99 (1): 145–173 (2015)

80 The Royal Society, *Science under threat* (2015). See: https://royalsociety.org/news/2025/02/science-under-threat/ (accessed 7 January 2026).

81 Dawson, E. *Equity, Exclusion and Everyday Science Learning: The Experiences of Minoritised Groups*. London: Routledge (2019)

82 Dawson E, Dierking L, Archer L, Calabrese Barton A, Greenberg D and Seakins A. *Research and Practice Agenda: Equity Pathways in Informal STEM Learning*. (2015) King's College London 2015.

83 The British Academy, *Social and Cultural Infrastructure* (2026). See: https://www.thebritishacademy.ac.uk/programmes/social-infrastructure/ (accessed 7 January 2026).

84 NCVO, *The Road Ahead 2025* (2025). See: https://www.ncvo.org.uk/news-and-insights/news-index/the-road-ahead-2025 (accessed 7 January 2026).

85 Association for Science and Discovery Centres, *Science Centres for Our Future Open Letter 2025* (2025) https://www.sciencecentres.org.uk/openletter2025/ (accessed 7 January 2026).

Festivals and one-off events can sometimes be more flexible and responsive, owing to their nature, but also face significant funding challenges. While visitor numbers across major attractions have recovered to pre-COVID-19 lockdown levels in some cases, financial pressures associated with the current cost of living crisis, especially for family groups and those aged 35 to 54[86], mean that raising money via ticket sales is increasingly challenging.

The recent trend of universities focusing their public engagement activity towards participatory research and community engagement is also having a financial effect on this sector[87]. While this focus has been positive in many ways, and is beneficial for festivals and events near to a university or similar organisation, researchers and academics may now be less likely to be supported by their host institution to take part in more 'generic' STEM engagement activities, especially those not directly linked to specific research projects. This means it can be more difficult to access funding, speakers and 'in-kind' support, or to form collaborations and partnerships. This is discussed further in Chapter six: Academic scientific community.

Much of the growth in recent years was made possible due to investment in the UK science engagement sector by the Wellcome Trust, a UK based global charitable foundation. Their responsive funding model included a mix of individual arts-led project funding, engagement fellowships and support for the Millennium Science Centres, as well as its own in-house programme at the Wellcome Collection. Its support for the wider informal learning sector was further boosted by match-funding from the partners this investment helped to attract.

While Wellcome continues to support some UK engagement activities, including the Wellcome Collection and the Ideas Fund, their recent focus on international community engagement and participatory research activities means that there is not the same level of funding for the UK sector as in previous years. While some parts of the sector were potentially over reliant on Wellcome funding, this reduction in investment has had a huge effect across informal engagement with science.

Funding from government, administered predominantly through UKRI, faces significant pressures. Trusts and foundations are often bound by financial rules that dictate the types of initiatives or organisations they could support across this sector, which can limit their involvement. There are potential opportunities to explore with public–private partnerships driven by the Cabinet Office's 'National procurement policy statement'[88], wherein government contracts use the social value model to account for at least 10% of tendering processes. This is discussed further in Chapter four: Industry and business sector.

86 ALVA, *Policy: Latest Wave of ALVA Public Sentiment Research, Undertaken by Decisions House Published, Showing Greater Consumer Confidence and Appetite to Visit Attractions* (2023). See: https://www.alva.org.uk/details.cfm?p=43&codeid=870 (accessed 7 January 2026).

87 DeWitt, J and Leverment, S. *Prioritising Community Over Content: Value Shifts in Science Centres*. Journal of Science Communication 23 (03): N02 (2014). See: https://doi.org/10.22323/2.23030802

88 Government Commercial Function, *Guidance: National Procurement Policy Statement* (2025). See: https://www.gov.uk/government/publications/national-procurement-policy-statement (accessed 7 January 2026).

Alongside Wellcome, there are many other trusts and foundations which continue to support engagement with science. Recognition of their valuable contributions is seen in museums or galleries, particularly to support the establishment of new exhibitions, which highlight important aspects of science. The Royal Society recognises the value of charitable organisations that play such a vital part of the sector.

Nonetheless, the UK does not have as much of a tradition or expectation of philanthropic giving as in the US, and ranks only 17th in the world for philanthropic donations, compared with other OECD economies: Canada (4th), New Zealand (10th), Australia (14th)[89]. However, there is no doubt that philanthropic funding has the potential to add significant value across the informal engagement with science landscape.

Evaluating informal science learning

To provide a robust business case for investment, those working in informal engagement with science need to be able to provide evidence for their work's effect. While a diverse sector is a strength, it also poses challenges in terms of monitoring audience need, long-term evaluation of interventions over time, and the sharing of best practice. In a diverse landscape, organisations find themselves designing projects without benefiting from the experience of others or the use of freely accessible tools. While individual interactions can undoubtedly have a profound effect on people, a combination of positive encounters with STEM content over a lifetime in both formal and informal settings is more likely to have a significant cumulative effect and lead to more expansive outcomes, but will be almost impossible for one organisation to measure alone.

There are excellent examples of individual project and programme evaluation practice (see Table 1) and multiple models that characterise theories of change relating to engagement with STEM[90, 91] including Generic Learning Outcomes[92].

89 Charities Aid Foundation, *Unlocking Giving: How Does the UK Compare?* (2023). See: https://www.cafonline.org/docs/default-source/policy-documents/2024/comparative_philanthropy_report_2023_v5-1.pdf (accessed 7 January 2026).

90 British Science Association, *Our Audience Model and Evaluation* (2024). See: https://www.britishscienceassociation.org/our-audience-model (accessed 7 January 2026).

91 Association for Science and Discovery Centres, *Valuing Inclusion Theory of Change* (2026). See: https://inclusion.sciencecentres.org.uk/resources/inclusion-theory-of-change/ (accessed 7 January 2026).

92 Dodd, J. *The Generic Learning Outcomes: Measuring Learning Impact in Museums. University of Leicester and RCMG* (2024). See: https://gem.org.uk/wp-content/uploads/2024/06/GLOs-measuring-learning-impact-in-museums-1.pdf (accessed 7 January 2026).

TABLE 1

Examples of individual project and programme evaluation practice.

Type of evaluation	Example(s)
Programme/project level	Dippy on tour (see case study)[93]
National public sentiment	*Science education tracker*[94] PAS survey[95] Discovery Decade tracker[96] Wellcome global monitor[97]
Regional assessment	Economic impact of the City of Culture programme[98] Measuring social and cultural infrastructure[99]
Cohort trial	ASPIRES programme[100] Born in Bradford – Age of Wonder[101]

93 Natural History Museum, *Celebrating the successes of Dippy on tour* (2022). See: https://www.nhm.ac.uk/about-us/national-impact/the-successes-of-dippy-on-tour.html (accessed 19 April 2026).

94 The Royal Society *et al*., *Science education tracker 2023* (2024). See: https://royalsociety.org/-/media/policy/projects/science-education-tracker/science-education-tracker-2023.pdf (accessed 6 January 2026).

95 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

96 CaSE, *Our Public Opinion Journey So Far* (2026). See: https://www.sciencecampaign.org.uk/what-we-do/public-opinion/journey-so-far/ (accessed 7 January 2026).

97 Wellcome, *Wellcome Global Monitor* (2020). See: https://wellcome.org/engagement-and-advocacy/engaging-people/wellcome-global-monitor (accessed 7 January 2026).

98 Coventry City of Culture 2021, *Examining the Impact on Coventry* (2025). See: https://coventry21evaluation.info/ (accessed 7 January 2026).

99 The British Academy and Bennett Institute for Public Policy, *Measuring Social and Cultural Infrastructure* (2025) https://www.thebritishacademy.ac.uk/documents/5805/Measuring_social_and_cultural_infrastructure.pdf (accessed 7 January 2026).

100 Association for Science and Discovery Centres, *ASPIRES Research: Longitudinal Research Project Studying Young People's Science and Career Aspirations* (2025). See: https://www.sciencecentres.org.uk/resources/promoting-diversity-and-inclusion-stem-engagement/aspires-research-longitudinal-research-project-studying-young-peoples-science-and-career-aspirations/ (accessed 7 January 2026).

101 Born in Bradford, *Study: Age of Wonder* (2024). See: https://borninbradford.nhs.uk/what-we-do/studies/age-of-wonder/ (accessed 7 January 2026).

Cohort studies that have assessed individuals' levels of science capital over time and across multiple engagements and interventions provide an invaluable understanding of the factors that ultimately affect science identity[102]. This model can and should be replicated for new generations, given the changing landscape of education, engagement opportunities and societal attitudes.

Conclusions

Maintaining the UK's informal engagement with science and building on successes over the past few decades, is essential if society is to ensure that STEM engagement activities are recognised as a fundamental part of the UK's social and cultural infrastructure. To do this, long-term, strategic funding opportunities must be made available to scientists and researchers.

The breadth of the sector is a strength, but also creates challenges around long-term evaluation and shared practice, which will need to be tackled collectively. With increased collaboration, strategic long-term funding opportunities and innovative use of digital technologies, the UK's informal engagement with science has the potential to not only remain something the UK should be proud of but be recognised as an essential part of our vibrant social infrastructure too.

RECOMMENDATION 4

The UK government should improve funding opportunities to ensure a diverse network of engagement activities.

- Research funders (including UKRI and the Royal Society) should promote and fund diverse engagement methods that recognise STEM engagement opportunities as a core part of the UK's social and cultural infrastructure.
- Organisations such as the Association for Science and Discovery Centres should work with HM Treasury and government departments to ensure that informal science activities, such as science festivals and science and discovery centres, are able to benefit from the same financial incentives as the cultural sector.
- National academies should establish a national framework with government and philanthropic foundations to encourage a culture of giving towards science engagement.
- The UK government should integrate science outreach as an option for demonstrating social value into procurement processes to encourage investment in informal science engagement institutions and initiatives.

102 ASPIRES Research | UCL Institute of Education. See: https://www.ucl.ac.uk/ioe/departments-and-centres/education-practice-and-society/research/aspires-research (accessed 19 April 2026).

RECOMMENDATION 5

Build the evidence base for engagement practices, to optimise the impact of informal public engagement with STEM activities.

- The Royal Society should convene a working group of major stakeholders (including funders, science engagement organisations and practitioners) to design and secure funding for a long-term cohort study on the enduring effects of informal science engagement alongside formal education.
- Scientific employers and funders should create opportunities for professional development and the dissemination of best practices and common tools between adjacent sectors, such as science, the arts and community engagement, to improve overall engagement quality.

Chapter three
Mass media and misinformation

To view the case studies highlighted within the section, scan the QR code or visit **royalsociety.org/sfsstudies**

Mass media and misinformation

We live in times of great political, technological and environmental change and the values that have driven science for the benefit of humanity are under serious threat.

New and old media, while offering new opportunities to discuss scientific advances, are also being used to spread misinformation. In that context it has never been more important for the wider public to have access to trusted and reliable scientific voices and trusted and reliable media.

Traditional media and its challenges

Traditional media continue to be an important source for the public to gain access to science-related content, but patterns are shifting, with new media playing an increasing role, particularly in younger age groups[103]. Scientists have had a long history of engaging with the media in the UK, supported by communications professionals within universities, research institutions, funding agencies and government bodies. The UK has a robust science media environment with many specialist journalists, although in the UK and elsewhere this is under threat.

The UK also established the Science Media Centre in 2002. Case studies on genetic modification and mitochondrial donation published alongside this report highlight how the media portrayal of science can influence debate (see case studies: Genetically modified organisms and Mitochondrial donation).

Over the past two decades, the media environment has changed profoundly. News audiences for television and print have fallen dramatically[104]. The traditional media model has been transformed by two related trends: fragmentation of the traditional media landscape, and the rise of new and social media.

New media and its challenges

Consumers now have a far greater choice of media products – on television (owing to the rise of streaming services), video streaming sites, podcasts, and the growth of other online channels and content (see Figure 3). In particular, young people are now obtaining much of their news via social media channels rather than traditional media sources, although it is of note that the BBC, across all its channels, remains the top news source for 12 – 15 year olds[105].

These changes, however, are complex and fluid. Much social media content, for example, is generated by mainstream media organisations, which have an increased focus on driving their journalism onto social media platforms. Legacy news media often continue to set the agenda for societal debates and drive discussions on social media[106]. While engagement with traditional media sources continues to fall[107], young people are still gaining access to content from trusted news sources via social media[108].

103 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

104 Newman, N *et al*. *Reuters Institute Digital News Report 2025*. Reuters Institute for the Study of Journalism, University of Oxford (2025). See: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2025-06/Digital_News-Report_2025.pdf (accessed 8 January 2026).

105 Ofcom, *News consumption in the UK – Research findings* (2025). See: https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/online-research/adult-and-teen-news-consumption-survey/news-consumption-in-the-uk-2025-research-findings.pdf?v=400636 (accessed 15 April 2026).

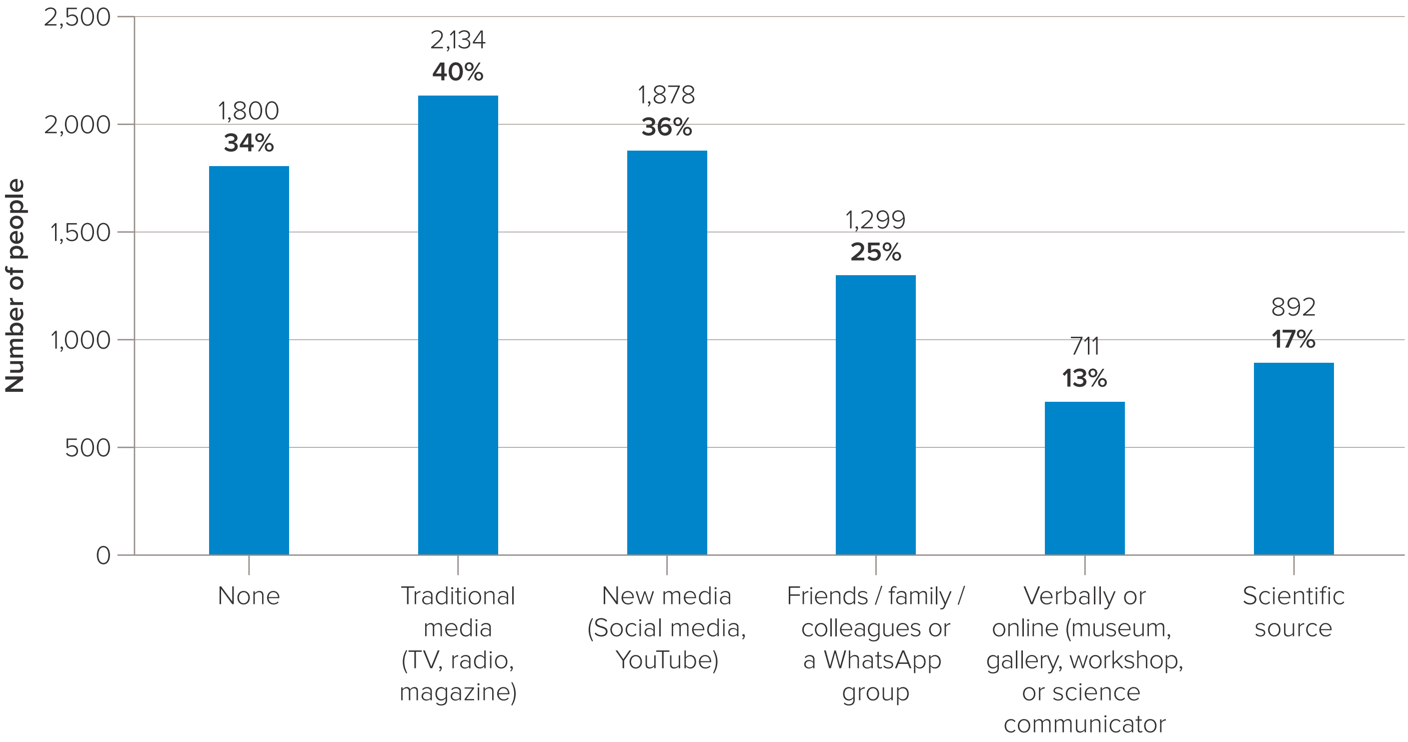
106 Department for Science, Innovation and Technology, *Public attitudes to science* (2025). See: https://www.gov.uk/government/collections/public-attitudes-to-science (accessed 20 February 2026).

107 Overview and Key Findings of the 2025 Digital News Report, Reuters Institute. See: https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2025/dnr-executive-summary (accessed 19 April 2026).

108 Science Media Centre, Summary Report – *Ipsos Survey on Science and the Media* (2022). See: https://www.sciencemediacentre.org/wp-content/uploads/2023/11/PDF-summary-report.pdf (accessed 8 January 2026).

FIGURE 3

As part of the 2025 *Public attitudes to science* (PAS) survey 5,281 UK adults (aged 16 or over) were asked: "Over the last 2 weeks, did you actively seek out any science-related information from any of the following? Please exclude anything that was for your job or your studies."[109]



109 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

Social media offers exciting new opportunities for science to engage a wide variety of public audiences, and there are many examples of great content reaching large audiences; there are many influencers, podcasts, blogs and other types of content producing high-quality science communications. These activities are largely driven by a desire among scientists to inform others (see Chapter six: Academic scientific community). The new opportunities, however, come with the challenge of ensuring that trusted voices are reaching people and challenging misinformation, and that they are accurately communicating the science with its uncertainties.

Although scientists are extensive users of social media, the online experience can be a major disincentive to engagement. Challenges include the risks associated with posting in potentially contentious areas and the potential for social media trolling and harassment, including threats of physical harm, which can lead to disengagement from social media platforms.

Polarisation of politics, culture wars and attacks by some politicians on mainstream news also mean that facts and truth are increasingly contested. Evidence shows that in the UK, primarily among a small minority of highly partisan individuals, some people are opting in to 'echo chambers' where they seek out information which confirms their beliefs; however, care should be taken in asserting the extent of these trends. Evidence suggests this is not true of most people, but these individuals may have a disproportionate effect on news[110].

Furthermore, now that audiences have much greater ability to select their preferred sources of information, economic and ideological incentives may drive commercial and other media providers to generate content that appeals to specific target groups. It can be difficult for scientists to make their voice heard when neither audiences nor information providers have an interest in objectivity.

The focus of this chapter is the mainstream media and social media. While we acknowledge the importance of popular science books (see case study: Popular science writing) and weaving science into entertainment media such as films, television and gaming, we do not focus on these.

Misinformation threats

Scientific misinformation is not a new phenomenon, but changes in the media landscape mean that inaccurate, misleading and false information can now be shared in large volumes and at speed. False information has to some extent fuelled mistrust in vaccines and confused discussions about tackling climate change. This can result in harm to individuals and to society. The Royal Society's *Online information environment* report[111] sets out a range of recommendations to tackle misinformation with a focus on understanding the prevalence and impact of misinformation, ensuring accurate information is made widely available, and supporting people with the skills to be able to effectively evaluate information presented in the media. This later point is a key focus of Chapter one: Education.

110 The Royal Society, *The online information environment: Understanding how the internet shapes people's engagement with scientific information* (2022). See: https://royalsociety.org/topics-policy/projects/online-information-environment/ (accessed 6 January 2026).

111 The Royal Society, *The online information environment: Understanding how the internet shapes people's engagement with scientific information* (2022). See: https://royalsociety.org/topics-policy/projects/online-information-environment/ (accessed 6 January 2026).

A further challenge is the increasing demand being placed on communications professionals in higher education institutions and other scientific organisations, particularly given the financial stresses in this sector[112]. Such professionals typically face multiple competing priorities, including crisis and reputational risk management, internal communications and institutional marketing activities. Institutional leaders may also have concerns that scientists engaging in controversial areas could increase institutional workloads and damage institutional reputation.

Positive signs

There is, however, plenty of good news: there still appears to be a strong public appetite for science-related content. In audience surveys for the BBC, more than six in ten people say they are interested in science and, when prompted with a list of scientific topics, 92% said they were interested in at least one of them[113]. In addition, three-quarters of people state that it is important to have an understanding of science[114]. There is also a continued demand for high standards of journalism – notably "impartiality, accuracy, transparency and original reporting are what the public expects".

This public support for more information about science is reinforced in the PAS survey, where 62% of respondents said that they saw or heard too little information about science[115].

The public express a desire for more positive, 'solutions-focused' news, and news that will educate and inform[116]. Authoritative sources consistently identify news avoidance as linked to negativity and despair when what those people want from news are solutions and hope[117]. Science is especially well placed to deliver these kinds of stories to news media. Support for the BBC and its Reithian principles remains high, and the public professes a desire for high-quality trusted news[118]. In an average week, 2.2 million UK unique browsers visit science news content on BBC News Online, and this can peak at nearly 5 million.

As public audiences have an interest in the reliability of information they access, the trustworthiness of sources is a vital issue. Just under half of people agree that there is so much conflicting information about science, that it is difficult to know what to believe. Two in five people agree that the information they heard about science was "generally true". That is down from over half in 2014. Just under one in ten disagree that what they see is generally true, leaving nearly half not sure[119].

112 Jamison, H. *The Changing Role of Science Press Officers* (2022). See: https://www.sciencemediacentre.org/wp-content/uploads/2022/07/The-Changing-Role-of-Science-Press-Officers-Science-Media-Centre-Report-July-2022.pdf (accessed 8 January 2026).

113 BBC Marketing and Audiences, Science survey, March 2025. See: https://royalsociety.org/-/media/policy/projects/science-for-society/science-survey-bbc-mar-25-royal-society.pdf (accessed 19 April 2026).

114 *Ibid*.

115 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

116 Majid, A. *Solutions Journalism: Could it be the Antidote to News Avoidance?*. Press Gazette (2022) https://pressgazette.co.uk/publishers/digital-journalism/solutions-journalism-news-avoidance/ (accessed 8 January 2026).

117 Newman, N. *Overview and Key Findings of the 2025 Digital News Report* (2025). See: https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2025/dnr-executive-summary (accessed 8 January 2026).

118 Nielsen, RK. *Irrelevant and Unloved: How the Press Lost its Touch*. Propect (2025). See: https://www.prospectmagazine.co.uk/ideas/media/69427/irrelevant-unloved-press-lost-touch (accessed 8 January 2026).

119 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

Around one in three people in the UK trust 'traditional' media, though trust is even lower in social media sources[120]. Personal social contacts are often a key source of information because they are trusted. It is striking to note, however, that scientists are, in general, consistently coming out as very well trusted in public trust surveys, often with trust levels in excess of 80%[121], and this perceived trustworthiness is an important asset that needs to be both capitalised on and protected, while also noting that there is a difference in scientists working in academia, industry and the public sector[122].

Next steps

It is vital that scientists maintain a commitment to communicating with public audiences, in ways that reflect the changing media landscape. A deeper understanding of how the public consumes science-related content, and how this affects attitudes and behaviours, would help to support more evidence-based communications practices.

However, many platforms are now changing their terms of service, placing content behind paywalls and significantly increasing the costs associated with application programming interface (API) access to their data. As a result, it is now more difficult to fully understand how platforms work and how their design decisions may be affecting people's engagement with online information.

As highlighted in the original Bodmer report[123], it remains important for researchers to develop their own media literacy, to ensure productive engagement with media professionals. Some researchers still see journalists as a simple channel to reach public audiences, or do not appreciate the demands on media professionals. Scientists also need to be aware of the increasing body of knowledge being generated on the effective use of social media.

Scientists should be supported to make full use of opportunities to engage with different media channels through high-quality training on how the media works, how to engage with different media stakeholders, how to generate engaging and accessible content and how to counter misinformation. It is important that funders and institutions value and support these efforts. It should not be seen as an 'extra' on top of research and teaching commitments, it should be recognised as a vital part of research and pedagogical culture. Communications officers will continue to have an important role in supporting scientists' communications activities and strengthening the relationship between the scientific and media communities.

Science has a major advantage, as new knowledge provides a constant supply of stories in areas known to be of public interest. Individual science organisations are developing an increasing amount of content, but funding and coordination are problems.

120 Edelman Trust Institute, 2025 Edelman Trust Barometer. *Global Report: Trust and the Crisis of Grievance* (2025). See: https://www.edelman.com/sites/g/files/aatuss191/files/2025-01/2025%20Edelman%20Trust%20Barometer%20Global%20Report_01.23.25.pdf (accessed 8 January 2026).

121 Ipsos, *Veracity Index* (2025). See: https://www.ipsos.com/en-uk/ipsos-veracity-index-2025 (accessed 14 April 2026).

122 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

123 The Royal Society, *The public understanding of science* (1985). See: https://royalsociety.org/-/media/policy/publications/1985/10700.pdf (accessed 7 January 2026).

Beyond news, there are opportunities to strengthen relationships with key media stakeholders, such as editors, commissioners and producers; there are concerns about a decline in science programming across mainstream media. There are also pressures on funding across the sector, which can be addressed in part through co-funding and co-production.

Multiple examples exist of co-production of science-related programmes based on partnerships between scientific organisations and broadcasters, with spin-out content on social media (for example, the BBC's *Wild isles*, which was partly funded by the Royal Society for the Protection of Birds, the World Wide Fund for Nature and The Open University). In these partnerships, it is important that editorial control remains with broadcasters. The scientific community could learn from the arts world, which is more effective at making the case for these kinds of co-productions, and there are more opportunities for science to be interwoven in history, drama, biography and other genres.

AI is disrupting the ways scientists and science press officers communicate with media channels and changing the way news is created and disseminated. AI is also having a major effect on internet search functions, and the internet is a key source of information for many, including politicians (see Chapter five: Policy). There are opportunities here for scientists and science communicators to be the people who retain scientific authority in a wild west of AI-created content. This is a rapidly emerging field and will have to be monitored closely, and the views of the public must be considered.

Like all changes in the science-media environment, this can be a good or bad thing, and a key challenge for the scientific community is to understand and navigate these changes to maximise the positive potential. A key issue will be ensuring that AI training and the outputs generated by AI tools are based on accurate scientific information. Benefits of AI can include deep research, improved tailoring of content to audiences, summarisation, democratising access to knowledge, and spotting inaccuracies in data that humans miss. Problems include oversimplification, data breaches, lack of oversight and hallucinations. The central question in an AI-based media environment will be: How does up-to date journalistic content about science get into the emerging AI tools?

Trustworthiness is fundamental to communication and is easily lost. This applies to both the science and the media communities. Characteristics of trustworthy communication include seeking to inform rather than persuade, being balanced, acknowledging uncertainty and limitations of the evidence, and pre-empting misunderstandings. It is also important to acknowledge and correct where mistakes are made. Independence is a critical aspect of science, and transparency is required to address any possible accusations of bias, particularly when commercial interests are involved (see Chapter four: Industry and business sector).

Misleading statements in news stories may originate in press releases rather than being due to misguided reporting[124]. The temptation to oversell scientific findings should be resisted, and science communication should be incorporated into wider initiatives to improve research integrity[125]. It is also important to ensure that the public understands that new findings are provisional and that replications and evidence syntheses are critical to building scientific consensus. The competitive nature of science also creates an incentive to maximise the potential impact of findings[126]. Expectations of scientists could be codified to support the ongoing adoption of good practice, building on models such as the UK Statistics Authority's Code of Practice for Statistics[127].

Scientists should not shy away from acknowledging limitations and uncertainties, which does not appear to confuse or deter readers, and may actually increase trust[128]. As discussed in Chapter one: Education, enhancing scientific literacy will help members of the public appreciate the nuances of scientific evidence generation.

RECOMMENDATION 6

The Royal Society and others in the scientific community should convene a working group, collaborating with experts in media monitoring to analyse and respond to current trends in science media consumption across traditional and social media platforms.

- These audits of changing media consumption should be used by scientists and science communicators to support a better understanding of how to identify audiences and connect with them effectively.
- The Royal Society and others in the science community should work to ensure media platforms provide reasonable, privacy-respecting access to their data for researchers, to support public understanding of how platforms work and how their design decisions may be affecting people's engagement with online information.

124 Sumner P, *et al*. *The Association Between Exaggeration in Health Related Science News and Academic Press Releases: Retrospective Observational Study*. BMJ Dec 9: 349:g7015 (2014). See: https://doi.org/10.1136/bmj.g7015 (Erratum in: BMJ 2014: 349:g7666)

125 *Science Communication Will Benefit From Research Integrity Standards*. Nature 635, 8 (2024). See: https://www.nature.com/articles/d41586-024-03586-w (accessed 8 January 2026). https://doi.org/10.1038/d41586-024-03586-w

126 West JD and Bergstrom CT. *Misinformation In and About Science*. Proceedings of the National Academy of Sciences USA 118 (15): e1912444117 (2021). See: https://doi.org/10.1073/pnas.1912444117 (Correction in: PNAS 121 (32): e2413513121 (2024). See: https://doi.org/10.1073/pnas.2413513121)

127 UK Statistics Authority, *Code of Practice for Statistics 3.0* (2026). See: https://code.statisticsauthority.gov.uk/ (accessed 8 January 2026).

128 Kerr JR, *et al*. *Transparent Communication of Evidence Does Not Undermine Public Trust in Evidence*. PNAS Nexus 1 (5): pgac280 (2022). See: https://doi.org/10.1093/pnasnexus/pgac280

RECOMMENDATION 7

Universities, funders and research organisations should value communications skills as a vital component of research culture to help counter mis- and disinformation. They should embed training and support for scientists to capitalise on opportunities to connect with audiences via social media.

- Training and support must be well-developed and well-resourced.
- The importance of engaging with the wide range of media platforms should be recognised as a valuable part of a scientist's role, with time allocated accordingly.
- Training should cover a range of skills such as an understanding of the social media environment, content production and content moderation.
- This training should include specific support for scientists to anticipate and manage the potential pitfalls of engagement – especially online harassment, trolling and encountering hostile and polarised debates.
- Guidelines and harassment policies need to be put in place, but also individuals in organisations should be assigned responsibility for supporting scientists affected by online harassment and abuse.

RECOMMENDATION 8

The science community should recommit to working with science journalists and editors to support and champion quality science journalism, and to help ensure that credible and trustworthy reporting is reaching the widest number of people across traditional and social media channels.

- The science community should press news outlets to monitor the success of science news stories and ensure they feature prominently in editorial priorities, given the evidence of audience desire for reporting on how science can help solve some of the problems society faces.
- The scientific community should send a strong message to the news media that the way to compete most effectively on social media and win audiences back to professional journalism is not to join a race to the bottom, but to deliver the high-quality news that the British public repeatedly say they want.

RECOMMENDATION 9

The Royal Society should draw up and urge the scientific community to adopt a code of practice for scientists and research communications professionals engaging with the media to help ensure high standards are maintained.

- Modelled and adapted from the UK Statistics Authority's Code of Practice for Statistics, this code would lay down minimum standards for communicating science in a measured, accurate and transparent way with a focus on the principles of trustworthiness, quality and value.
- The science community is currently trying to improve the standards of scientific literature, with increasing focus on research integrity and reproducibility, but these efforts often take place separately from science communication – the two endeavours should be merged.

RECOMMENDATION 10

The Royal Society should set up a working group to explore the possibility, design and implementation of a new initiative that provides a stimulus to achieve more high-quality science programming content.

- The Royal Society is in a unique position to act as a convener, bringing together novel sources of funding with scientists and content producers and platforms.
- The new initiative could also develop a collective voice for more and better science programming from the science and science-production communities – something that is noticeable in the arts and noticeably absent in science.

Chapter four
Industry and business sector

To view the case studies highlighted within the section, scan the QR code or visit **royalsociety.org/sfsstudies**

Industry and business sector

Industry is central to the UK's innovation system and critical to the translation of discovery to public benefit. This is done through the efforts of both large corporations and high-tech small and medium-sized enterprises – often founded by academics. The science and technology sector plays a key role in wealth creation, delivering economic benefits through multiple routes[129].

More than two-thirds of research and innovation is carried out by the business sector[130], which makes the links between researchers working in industry and public engagement stakeholders extremely important. Despite the size and importance of industrial innovation to the UK economy, the public is currently disconnected from these benefits in terms of research and development's (R&D) role in their highest priority issues[131].

Diversity of sector and motivations

It is important to recognise that industrial employers have many motivations for engaging with external audiences, including the broader public. These vary depending on the specific sector or whether the business is engaging directly with consumers or engaging indirectly through another businesses or delivery partners such as the NHS. Multi-national companies would obviously need to consider engagement on the global scale, which adds another dimension of complexity whether it is a UK company operating abroad, or an overseas company working within the UK.

Those businesses that sell their products directly to consumers will naturally have stronger levels of engagement and seek public views on the viability or appeal of those products. For business-to-business organisations, the motivations to engage with the broader public may be less clear and depend on their size or their sector. Some scientists, such as those in the pharmaceutical sector, are not allowed to directly engage the consumer, and Association of the British Pharmaceutical Industry guidelines control what employees can even communicate on their own social media channels[132]. This creates an uneven landscape for those non-UK companies which are not subject to the same guidelines.

Large employers are likely to have strong links to their communities and may be actively engaged in education and support of skills development with a view to their future workforce or other public facing activities (see case study: Siemens mobility). More broadly, this might take the form of apprenticeships, internships, industrial placements and funded PhD or postdoctoral programmes.

There are many big businesses in the UK which have well-established public engagement programmes with their local communities or more widely across the UK. As an example, many of the UK's largest engineering businesses take part in the Big Bang Fair organised by Engineering UK every year[133]. For smaller companies or those just starting out, it is important to recognise that they may not have the resources of time or money to focus on wider public engagement.

129 The Royal Society, *Science and the economy: Policy briefing – part of Science 2040* (2024). See: https://royalsociety.org/-/media/policy/publications/2024/science-2040-economic-value-of-science.pdf (accessed 8 January 2026).

130 Office for National Statistics, *Research and Development Expenditure* (2026). See: https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure (accessed 8 January 2026).

131 CaSE, *Public Attitudes to R&D 2025* (2025). See: https://www.sciencecampaign.org.uk/analysis-and-publications/detail/public-attitudes-to-rd-2025/ (accessed 8 January 2026).

132 Taylor P. *ABPI Code Updated With First Social Media Guidance* (2023). See: https://pharmaphorum.com/news/abpi-code-updated-with-first-social-media-guidance (accessed 8 January 2026).

133 The Big Bang. See: https://www.thebigbang.org.uk/ (accessed 8 January 2026).

It is impossible within the scope of this report to consider all the implications for public engagement and industry given the variances in sector, size and motivation; however, there are some general observations and recommendations that the Royal Society hopes will be helpful.

Corporate and social responsibility

Much industry-led public engagement is framed in terms of corporate and social responsibility. The *National procurement policy statement*[134] may inspire further actions by businesses delivering public contracts. Recent policy changes give statutory guidance that social value[135] must account for 10% of total scores available at the final stage of the procurement process[136]. These policies align most closely with the broader goals of public engagement with science with the strategic objectives to break down barriers to opportunity, including by addressing skills gaps and facilitating access to training and by removing barriers to young people and underrepresented groups.

Organisations from the informal engagement with science sector (see Chapter two: Informal engagement with science) provide a potential avenue for partnerships for such social value goals – often being well equipped to link in with local communities and possessing matured, professionalised structures and methods for engagement.

Historical problems

There are high-profile cases where lack of effective engagement or poor practice in engagement has led to suspicion, distrust and ultimately rejection by the public. Attempts to introduce genetically modified foods in Europe (see case study: Genetically modified organisms) illustrates how inadequate public engagement can have disastrous consequences for industry.

Bad actors have caused reputational damage or suspicion beyond their own sector. The well-documented behaviours of the tobacco industry, for example in covering up the damage caused by their products to their consumers, has fuelled suspicion that the industrial profit motive so outweighs any other, that public concerns are not considered.

This has contributed to broader concerns that the public will view work done by researchers in industry to be biased towards the industry's own agenda, irrespective of the evidence they have gathered. Trust in scientists working for private companies has declined from 57% in 2019 to 47% in 2025. By comparison, trust in scientists working in universities stands at 87% in 2025[137].

134 Cabinet Office, *National Procurement Policy Statement* (2025). See: https://assets.publishing.service.gov.uk/media/67ab330e1a116437c7ed88da/E03274856_National_Procurement_Policy_Statement_Elay.pdf (accessed 8 January 2026).

135 Government Commercial Function, *The Social Value Model* (2020). See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940826/Social-Value-Model-Edn-1.1-3-Dec-20.pdf (accessed 8 January 2026).

136 Cabinet Office, *Guidance: PPN 002 Guide to Using the Social Value Model (HTML)* (2025). See: https://www.gov.uk/government/publications/ppn-002-taking-account-of-social-value-in-the-award-of-contracts/ppn-002-guide-to-using-the-social-value-model-html (accessed 8 January 2026).

137 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

Overcoming barriers to engage

Outside of valid reasons such as commercial confidentiality and time pressures, it is understandable why some industries and industrial researchers may be reluctant to engage more with public audiences. For individual researchers working in industry, there are the same levels of concern as for researchers working in the academic sector, including the potential for backlash on social media or elsewhere by those who disagree with their work.

It is extremely valuable for industry and industrial researchers to be open and transparent about their work and how it will contribute to public life, and there are reasons to be optimistic.

In their Discovery Decade study[138], the Campaign for Science and Engineering showed that the public recognises the significant role that businesses play in UK R&D and that, despite concerns about bias, private R&D is not always seen negatively, with 53% stating that R&D was no better or worse when funded by private companies for profit versus by government and charities[139]. Further, businesses can generate a sense of local pride and support in the public.

Researchers working in industry have the potential to explain their work to public audiences, including how they undertake it and how they collect evidence. However, there needs to be a clear recognition that this is not easy. There is anecdotal evidence that suggests some companies support their researchers when they communicate with the public, but this does not appear to be widespread. Employers need to ensure that their researchers receive at least the same levels of support that are that are recommended elsewhere in this report, in both Chapter three: Mass media and misinformation, and in Chapter six: Academic scientific community.

Many companies, and the organisations that represent them, have recognised the need to build public trust and have taken steps to address questionable practices. For example, trade associations and industry bodies have developed wide-ranging codes of conduct for the pharmaceutical industry[140].

138 https://www.sciencecampaign.org.uk/what-we-do/public-opinion/journey-so-far/ (accessed 19 April 2026).

139 Discovery Decade – Public Attitudes to R&D 2025 – Campaign for Science and Engineering (accessed 19 April 2026).

140 ABPI, *ABPI 2024 Code of Practice* (2024). See: https://www.abpi.org.uk/reputation/abpi-2024-code-of-practice/ (accessed 8 January 2026).

Examples of industry engagement

The nuclear industry

In the face of public opposition, the nuclear industry's public engagement strategy emphasised the need for clarity, trust, dialogue and consultation to build public support[141]. Over the past decade, there has been a small increase in public support for nuclear power and a decrease in opposition[142] – although less support for local nuclear power plants[143].

The life sciences

While public engagement in health-related science has historically centred around ethics and transparency, there is a growing focus on embedding patient voices across the R&D lifecycle – from early priority setting through to clinical trials and regulatory dialogue – and a significant shift towards patient-centred research.

An example is AstraZeneca's Patient Centricity framework[144]. This framework emphasises co-creation with patients throughout clinical trials, ensuring their perspectives shape drug development. Efforts like the National Institute for Health and Care Research's national standards for patient and public involvement further enhance how patients are integrated into research, making their voices an essential part of study design[145].

Transport and infrastructure

Transport and infrastructure projects are increasingly prioritising community consultation to ensure public involvement in local initiatives. These efforts are exemplified through a range of approaches and case studies, which aim to involve local communities in shaping systems that meet their needs. Lessons can be learned from these projects to inform good practice across all development and infrastructure schemes that have a basis in science, such as autonomous vehicles, wind and solar farms, nuclear energy, communications infrastructure or modernisation of the power grid.

Effective community engagement is vital in development schemes, particularly those requiring planning consent. The Planning Aid's *Guide to public engagement in development schemes* outlines a structured approach to engagement. An example from this guide is the Docklands Light Railway project, which employed 'local ambassadors' to liaise with the community and promote station use[146].

141 Nuclear Industry Council, *In the Public Eye: Nuclear Energy and Society* (2014). See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/360669/In_the_Public_Eye_-_Nuclear_Energy_and_Society_-_NICJuly2014.pdf (accessed 8 January 2026).

142 Statista, *From What You Know, or Have Heard About Using Nuclear Energy for Generating Electricity in the UK, Do You Support or Oppose its Use?* (2024). See: https://www.statista.com/statistics/426157/united-kingdom-uk-attitudes-towards-nuclear-energy/ (accessed 8 January 2026).

143 Department for Energy Security & Net Zero, *Official Statistics. DESNZ Public Attitudes Tracker: Energy Infrastructure and Energy Security, Spring 2024, UK* (2024). See: https://www.statista.com/statistics/426157/united-kingdom-uk-attitudes-towards-nuclear-energy/ (accessed 8 January 2026).

144 World Pharma News, *First Collaborative Definition of Patient Centricity* (2017). See: https://www.worldpharmanews.com/index.php?option=com_content&view=article&id=3886:first-collaborative-definition-of-patient-centricity&catid=28:astrazeneca (accessed 8 January 2026).

145 National Institute for Health and Care Research, *News: NIHR Announces New Standards for Public Involvement in Research* (2019). See: https://www.nihr.ac.uk/news/nihr-announces-new-standards-public-involvement-research (accessed 8 January 2026).

146 Camden Community Empowerment Network, *Good Practice Guide to Public Engagement in Development Schemes* (2010) http://www.camdencen.org.uk/Resources/Planning/Communities/Good%20Practice%20Guide%20to%20Public%20Engagement%20Development%20Schemes.pdf (accessed 8 January 2026).

Emerging technologies

The benefits that new and emerging technologies can bring to society may not be immediately apparent, and businesses working in these sectors may not have sufficient resources to engage the public. Many university spin-out companies are led by the original inventor of the technology, who may not have the time necessary to add a public engagement role to their workload. A report by Sciencewise[147], on behalf of UKRI, found that three common social and ethical issues arise with any new technology: Who governs the technology? Who benefits from it? Is the technology safe and secure?

Openness to new technologies is driven by many demographic factors; for example, geographic location plays a significant role, with greater opportunities for the public to engage being predominantly in large cities where there is a significant and long-standing science infrastructure linked to the location of higher education institutions, STEM based enterprises, science museums and more highly educated populations[148]. Furthermore, there are differences in the trust of new innovations related to factors including gender, age, social position and interests[149].

Data-enabled technologies and how they will transform lives

While the Royal Society encourages public engagement across all R&D sectors where possible and practicable, we do want to highlight the current and future role of organisations working in the data-enabled technology economy.

AI and data-enabled technologies have huge potential to transform lives and society as a whole. Ensuring they are used safely and effectively is essential for the UK's wellbeing, security and economic growth.

Data are being used to develop digital technologies that can help us. Training AI-powered image recognition on medical scans and digital images has yielded results that suggest these could help with the diagnosis of several diseases. Image recognition, speech-to-text transcription, virtual assistants, and obstacle navigation can help people with vision, hearing, mobility and learning difficulties.

147 UKRI, Sciencewise and British Science Association, *Tomorrow's Tech, Today: What the Public Think About Five Emerging Technologies, and Opportunities for Future Engagement* (2022). See: https://sciencewise.org.uk/wp-content/uploads/2022/05/Social-Intelligence-on-Emerging-Technologies-Report_FullReport.pdf (accessed 8 January 2026).

148 British Science Association and London Economics, *Mapping and Analysis of Science Engagement and Inequity in the UK: Final Report for the British Science Association* (2022). See: https://www.britishscienceassociation.org/Handlers/Download.ashx?IDMF=e9f99e45-c55a-4c59-b626-99d2977761eb (accessed 8 January 2026).

149 Nesta, *Innovation Population: The UK's Views on Innovation* (2014). See: https://media.nesta.org.uk/documents/innovation_population_wv.pdf (accessed 8 January 2026).

Any use of data, however, comes with problems relating to privacy and security. Everyone has the right for their data to be stored safely and used responsibly. Breaches in cybersecurity can have devastating effects on companies and individuals, either through loss of operational production[150] or the ability to conduct transactions online combined with the theft of customer data[151].

When using personal data, it is important to ensure that flaws and biases within the data do not accentuate inequalities in society. Failing to do so could undermine public confidence in the technologies that use data.

AI is already viewed with suspicion by the public, with only 33% of those surveyed in the PAS survey believing that the benefits of AI outweigh the risks. This compares with 80% when people are asked the same question about vaccination[152]. Some public participation activities to understand the 'citizen voice' have been conducted in the past few years: Google DeepMind collaborated with the Royal Society of Arts in 2018 to host an ethical AI citizens' jury and OpenAI organised a funding scheme as part of its *Democratic inputs to AI* programme (see case study: DeepMind). In general, though, efforts tend to be organised on an ad hoc basis and are not used consistently to inform industry practice or take significant account of public views[153]. Given the critical importance of these technologies, the Royal Society would ask organisations working in AI to engage actively with public audiences to seek their views and build them into their thinking for future developments.

150 Businesstech Weekly, *Jaguar Land Rover Cyber Attack: Impact on Manufacturing Cybersecurity and Business Continuity* (2025). See: https://www.businesstechweekly.com/technology-news/jaguar-land-rover-cyber-attack-impact-on-manufacturing-cybersecurity-and-business-continuity/ (accessed 8 January 2026).

151 Masud F. *M&S Profits Almost Wiped Out After Cyber Hack Hit Sales* BBC (2025). See: https://www.bbc.co.uk/news/articles/c93x16zkl9do (accessed 8 January 2026).

152 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

153 Groves, I. *Going Public: Exploring Public Participation in Commercial AI Labs*, Ada Lovelace Institute (2023). See: https://www.adalovelaceinstitute.org/report/going-public-participation-ai/ (accessed 8 January 2026).

Third sector

The third sector is made up of organisations that are not part of the government or the private sector. They include charities, voluntary and community groups, social enterprises, co-operatives and other non-governmental organisations (NGOs). They are largely mission driven and, for many of them, engaging with public audiences is an integral part of their strategy and activities, whether for fundraising or volunteering purposes, consultation on key issues, involvement in research or advocacy.

Given the essential need of third-sector organisations relying on public support to engage with public audiences, they have extensive experience and expertise in many forms of public engagement and can provide helpful examples for other sectors.

It is impossible, given the diverse nature of the third sector, to consider all the ways that third-sector organisations involve the public in their work, but a few examples are set out below.

Medical research charities

The 148 members of the Association of Medical Research Charities invested £1.6 billion in research in 2024/25, supporting more than 25,000 researchers[154]. Moreover, many organisations with a human health focus actively engage specific groups of patient and carer communities to better understand their lived experience and support their specific needs. The Cancer Research UK case study shows how important these interactions are for both the organisation and the patients and carers involved.

154 AMRC, *2025: Our Sector's Footprint* (2025). See: https://www.amrc.org.uk/2025-our-sectors-footprint (accessed 8 January 2026).

Conservation organisations

Organisations such as the National Trust, Royal Society for the Protection of Birds and the Canal and River Trust are extensive landowners and play a key role in land management and conservation research. Many of them have large memberships, which they also engage to support their aims. As an example, the National Trust has more than 5 million members. They are well placed to mobilise their memberships and the wider public to get involved in citizen science research, such as the Big Garden Birdwatch or the Big Butterfly Count (see case study: Big Butterfly Count). These forms of citizen science projects are wonderful examples of how engaging the public in data collection can be transformational in providing the evidence to support behaviour change or policy development.

Advocacy groups

There are many NGOs whose focus is to campaign for policy change to support their mission. Many of these organisations will commission their own research or cite other scientific research to support their case. Sometimes there are opposing views quoting different research sources, all of which may be accurate but, which may address the topic from different perspectives. As addressed elsewhere in this report, the important requirement is to enable public audiences to be able to understand the whole picture, highlighting again the importance of scientific and data literacy from early years education onwards.

RECOMMENDATION 11

The UK government should support R&D businesses to continue to develop strong links with their local and national communities, through incentives that reward those that create auditable and costed public engagement activities.

- Engagement with schools should include engagement with the teachers. Most teachers have never worked in industry and so are unaware of some careers that are potentially available to their students. Help schools to engage their students with online career platforms providing work experience opportunities to larger student audiences.
- Reassess the potential for visitor centres and work with local governments to create innovation zones in public spaces; for example, collaborations with local informal engagement providers, to provide opportunities for employers to engage with local communities. This type of engagement could be included as a requirement for those companies that receive R&D grants from public funds.

RECOMMENDATION 12

R&D businesses working in fields of emerging science or technology should engage with the public to demystify these technologies, particularly where they might be transformative, to understand public perceptions and address concerns, and to build trusting relationships that will improve social acceptance. Currently, this is particularly important for businesses working in data-enabled technologies including AI.

- Focus on schools to habituate technology: fund schools to create access to technology such as digital technologies and AI, augmented reality, modern manufacturing (including three-dimensional printing).
- Seek opportunities to engage those outside the main cities and university towns. Engagement should not be viewed as a one-size-fits-all activity; attention should be put on tailoring messages to facilitate access to all demographics.

RECOMMENDATION 13

Employers should ensure that industry scientists are encouraged, supported, and trained to speak openly about the important role of industry science, and are recognised for these efforts.

- Embed training for public engagement in the career pathways for new staff and incentives offered to the employees to encourage them to take up engagement opportunities; for example, by presenting at school open days.
- Ensure that trade bodies and industry association groups have public engagement on their agenda and take the lead on promoting best practice to their members.
- Encourage local, regional and national government to support R&D businesses in engaging with the public via their targeted inquiries and reports (developed in consultation with industry).
- Encourage scientific and business media to cover and engage with industrial R&D and innovation as part of their reporting and analysis.
- Encourage trade associations and industry representation bodies representing R&D intensive businesses to continue to build public engagement activities into their programmes.

Chapter five
Policy

To view the case studies highlighted within the section, scan the QR code or visit **royalsociety.org/sfsstudies**

Policy

The UK faces multiple societal challenges and opportunities where public policy must be supported by progress in science. Examples include decarbonisation, bolstering our defence, adapting to an ageing population, and growing microbial resistance to current medicines. Scientific breakthroughs have always shaped society, from pharmaceutical contraception in the 1950s to weight loss drugs or the rise of AI today, but science also supports many day-to-day functions such as predicting the weather, monitoring pests or ensuring that the measurement of time is sufficiently accurate to support navigation or financial trading. There is a wide-ranging interconnectedness of science with society and therefore with the policies debated in parliaments, enacted by governments, and applied within judicial and regulatory systems. The interrelationship between science, the judiciary and the public is considered separately in the case study: Scientific evidence in the courtroom.

This chapter briefly summarises the mechanisms developed over the past 50 years to better integrate science and policy – specifically as it relates to public engagement and trust – and identifies six problems that could be addressed to make the mechanisms more effective and robust for the issues society is now facing. While not within the scope of this chapter, science and policymaking is also crucial for international science diplomacy, which is considered separately and in depth in the Royal Society's report *Science diplomacy in an era of disruption*[155].

The current mechanism for integration of science into government

The main sources of scientific research and advice for UK government policy are the chief scientific advisors (CSAs) and civil service scientists. These work alongside institutional structures within the public service, sometimes also known as public sector research establishments (PSREs), arm's length bodies, universities and third-sector research institutions; all of which are referred to collectively as the research market. As with Parliament, the government may also use thinktanks as an evidence source for policymaking.

PSREs[156] (such as the Met Office or National Physical Laboratory) are often designed specifically to provide the ongoing research necessary to support policy functions. For example, fisheries research is designed to enable government to set annual quotas for the industry.

In 1971, a report by Lord Rothschild[157] set the tone for how government would access the research it needed, moving to a 'market-based' approach: government would move from being its own supplier to being a procurer of research from the research sector. It set in motion a process of reducing investment in PSREs and using investments in the research sector (predominantly in higher education institutions or independent research organisations) to generate the scientific research and advice needed for policy.

155 The Royal Society and AAAS, *Science diplomacy in an era of disruption* (2025). See: https://royalsociety.org/-/media/about-us/international/science-diplomacy/science-diplomacy-in-an-era-of-disruption.pdf (accessed 8 January 2026).

156 UKRI, *List of Public Sector Research Establishments* (2026). See: https://www.ukri.org/publications/organisation-eligibility/research-organisations-eligible-for-ukri-funding/#section-public-sector-research-establishments (accessed 15 April 2026).

157 Parker, M. *The Rothschild Report (1971) and the Purpose of Government-funded R&D: A Personal Account*. Palgrave Communications 2, 16053 (2016). See: https://doi.org/10.1057/palcomms.2016.53

As part of this move, government needed to be an intelligent customer of research, and this brought about the gradual appearance of CSAs operating at senior levels within government departments. The intention was that they would gather evidence and procure research needed by departments while also providing scientific advice. It has taken about 50 years to achieve this objective, and CSAs are now a key source of scientific advice for senior officials and ministers.

Since 2013, some government departments have published areas of research interest (ARIs)[158] to align the activities of the research market to the needs of government. These ARIs are overseen by department CSAs. The activity of CSAs is coordinated by the Government Office for Science (GO-Science), created in 2007, under the Government Chief Scientific Adviser. GO-Science has a budget to produce reports summarising the science on topical issues of the day as well as foresight reports taking a longer look at emerging trends and issues. National academies, including the Royal Society, have also become increasingly active at producing reports about the current state of scientific knowledge in areas of national interest.

In addition to CSAs, government has a Chief Medical Officer and a National Technology Adviser, and most departments of government have science-based advisory committees to provide specific advice on topics relevant to policy. These are populated mainly by non-governmental researchers who have requisite expertise. Across government, initiatives to improve the use of scientific information include the updating of the Treasury *Green book*[159] and the creation of the Government Evaluation Task Force[160].

Finally, an additional mechanism exists for delivering scientific advice during emergencies. Within 30 minutes of an emergency being declared, a Scientific Advisory Group for Emergencies (SAGE) committee can be established as a sub-committee of Cabinet Office Briefing Room (COBR), the government response coordinating group. SAGE committees are unique to each emergency because they accrete the specific expertise needed.

In parallel with these mechanisms within the executive structure of government, the UK Parliament and the devolved legislatures have developed scientific advice. The Parliamentary Office of Science and Technology (POST) provides advisory notes to both Houses of Parliament on significant topics[161]. Select committees in both Houses of Parliament have expert advisers and gather evidence from the scientific community via inquiries into topics that have a high level of scientific content.

158 Government Office for Science and Cabinet Office, *Areas of Research Interest* (2025). See: https://www.gov.uk/government/collections/areas-of-research-interest (accessed 8 January 2026).

159 HM Treasury *The Green Book* (2026). See: https://www.gov.uk/government/collections/the-green-book-and-accompanying-guidance-and-documents (accessed 19 April 2026).

160 Government Evaluation Task Force (2025). See: https://www.gov.uk/government/organisations/evaluation-task-force (accessed 19 April 2026).

161 UK Parliament, *POSTnote* (2026). See: https://post.parliament.uk/type/postnote/ (accessed 8 January 2026).

Challenges presented by the current system

The UK's current system for integrating scientific information and advice into policy is internationally regarded, but has grown in an ad hoc manner over decades. There is an important opportunity to build on its strengths and further improve and systematise the use of science to inform policymaking and improve policy outcomes. The Royal Society has identified some key challenges and areas of future focus.

MPs' use of reliable scientific sources

It is important that Parliamentarians have easy access to authoritative sources of scientific advice and evidence. However, within Parliament, surveys suggest that authoritative sources are infrequently used by MPs to access scientific information. A poll of MPs carried out for this report found general agreement that scientific information is important, but indicated that MPs often accessed this information from third party sources that may have bias. Thinktanks and advocacy groups were cited as the main sources of scientific information (55%), followed by universities or academics (48%) and third-sector organisations (45%). Some of these sources are not designed to provide objective knowledge assessments, and some may present evidence designed to support a particular policy goal.

A minority of the 2024 cohort of new MPs used authoritative sources. Only 22% cited POST as a source and only 12% cited national academy reports. Nearly half (47%) used the internet as a main source of scientific information, with just 5% of Parliamentarians stating that they used AI. Given the recent rapid proliferation of AI use within search engine results, this percentage is likely to be both underestimated and increase with time. It was not clear how Parliamentarians made a judgement about how reliable this information was. These statistics do not take into account how their staff use sources, but suggest that MPs do not routinely access independent, authoritative sources of scientific knowledge.

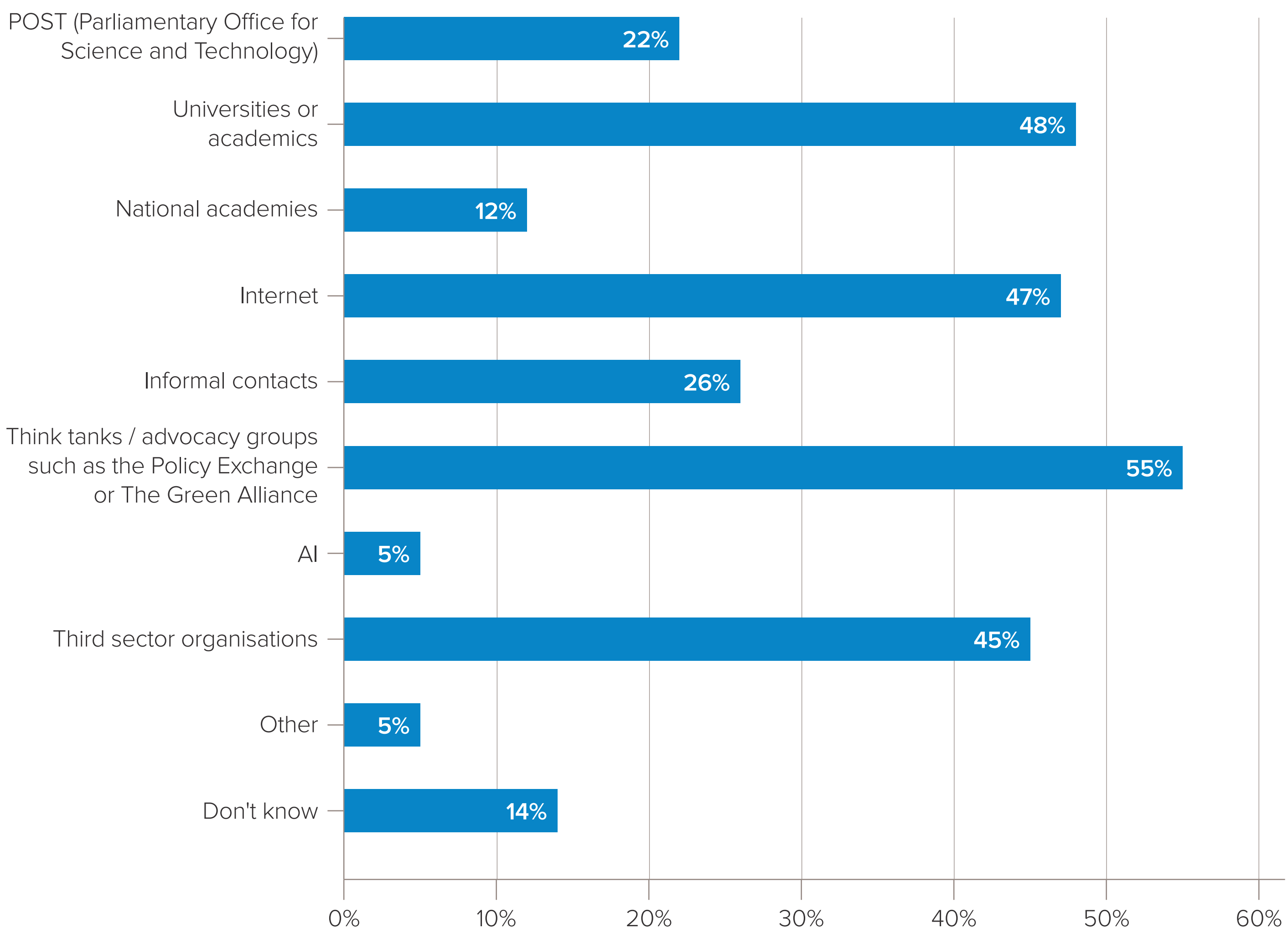
Procurement of scientific information

A gradual shift over decades towards a market-based procurement of science by government has probably improved resilience and diversity in the sources of scientific information, but in key areas it means government can struggle to access the scientific support for critical operational policy needs.

While it is beyond the scope of this report to review the constitution and functionality of the research system (including PSREs), the sustainability of many institutions is a long-term issue. There is generally a low level of understanding within government of what it takes to sustain high-quality scientific capability in areas of key national interest, in terms of both skills and infrastructure. This poses risks for understanding the implications of significant contractions in the UK's scientific capability.

FIGURE 4

In April 2025 the Royal Society commissioned YouGov to poll 108 MPs, asking: "Which of the following, if any, are your main sources of scientific information in your role as an MP? Please select all that apply."



The changing role of CSAs

Scientific advice should play a critical and central role in an effective policymaking process. It should be independent of political bias, with scientific findings shared freely within government, even where it may be politically inconvenient or may not fit the political narrative of the day. CSAs are often in the position of having to be both within the tent of government and able to challenge how well government uses scientific information.

The CSA network has been extended across government over the past 25 years, supported by more senior roles in analysis and evaluation. This has opened space for more diverse relationships between science and policy, such as helping departments and agencies to develop scientific questions for consultation. If CSAs are to fulfil the original intent – the oversight of the 'intelligent customer' and independent advisor role in government – they must be accountable both to government itself and to ensure that their advice is impartial and objective irrespective of the politics of the moment. There is an emerging risk, as seen through recent developments in the US, that CSAs could find themselves pressured where the scientific evidence conflicts with political narratives, or the ways in which they are recruited and managed may systematically promote alignment with policies, ultimately undermining their purpose. They need to be free to operate and speak freely within government, but also in public when appropriate.

The same could be said for others who provide scientific advice to government, including members of advisory committees. The potential for such biases needs to be kept under review. The national academies have the potential to convene expertise to serve this role.

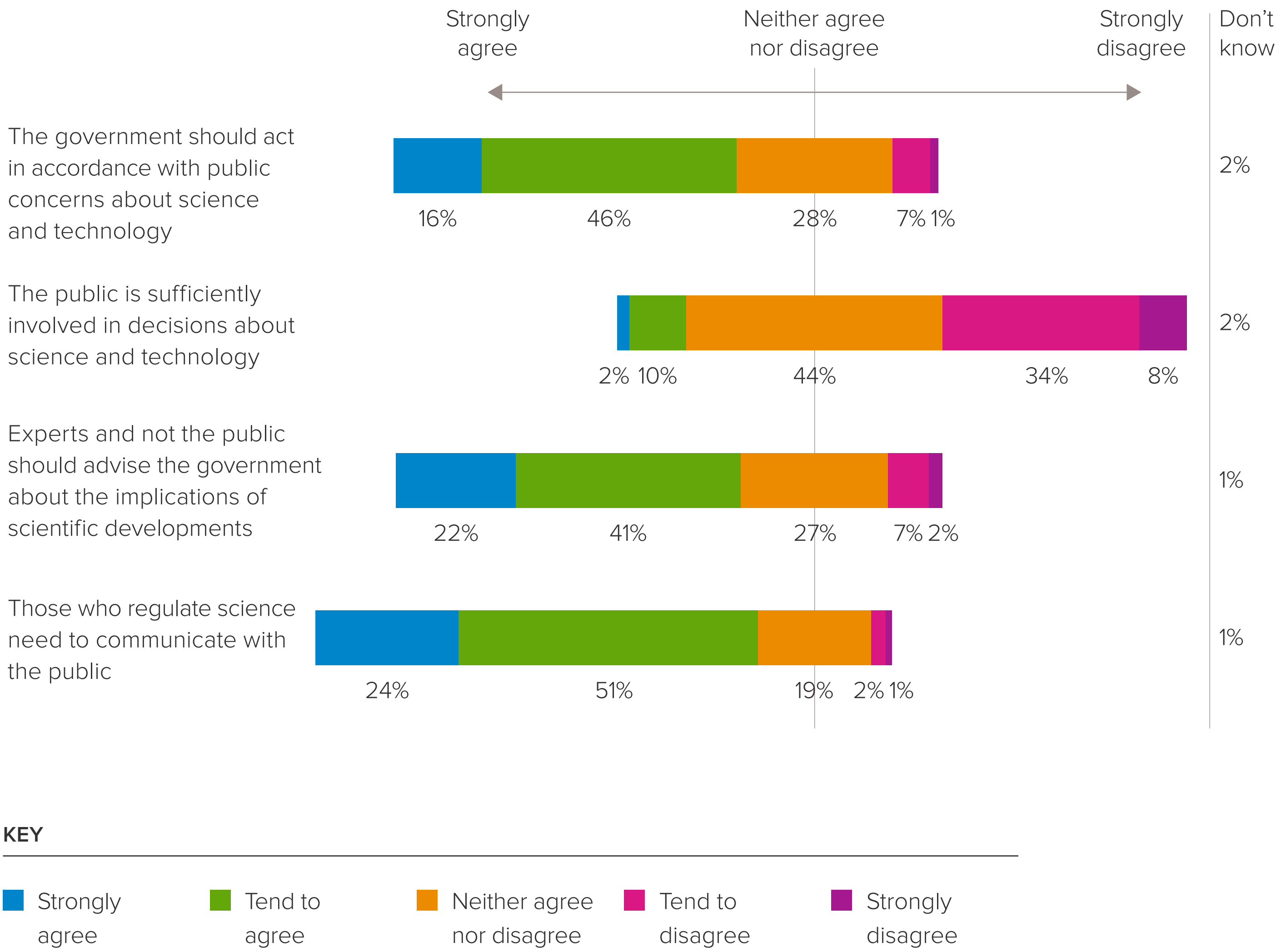
The independence of scientists from government

The dividing lines between scientists who work for government and are subject to rules of procedure and those who advise and can operate outside those rules is not always clear.

There have been several instances in the past decade of confusion within the scientific community and the civil service about who is subject to civil service restrictions such as the pre-election period rules. It is important that scientists can provide impartial commentary, even during election campaigns. In addition, researchers working for government research agencies are sometimes the only experts available in particular subjects and it is essential that the advice they provide to government is available to the public.

FIGURE 5

As part of the 2025 *Public attitudes to science* (PAS) survey, respondents were asked: "How much do you agree or disagree with each of the following statements:"[162]



162 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

Transparency of how science informs policy

How scientific information has been used within policy decisions is frequently not made explicit, which undermines public confidence in the extent to which government policies are aligned with scientific evidence. It is understandable that ministers will take decisions based on a wide variety of factors beyond just the scientific evidence, including social, political and economic factors. Nevertheless, evidence has shown that, when politicians claim to 'follow the science', decisions may be based on other factors, undermining public trust in science. Therefore, how scientific evidence has been considered and used in a decision, alongside other factors, should be clearly communicated to the public.

The case for evidence transparency has been well made in the past 5 – 10 years, resulting in changes to the Treasury *Green Book* and other guidance for policy development[163]. Despite this, there remain few instances when scientific evidence is published alongside policies. Even in cases where evidence has been published, it is often difficult to understand how it has been used to derive particular policy decisions. Greater effort is needed to explicitly link policies to scientific evidence and its uncertainties to reduce the chances of 'post-normal problems' (when the stakes are high, there is high scientific uncertainty and high demand for scientific information) becoming increasingly intractable. For example, it is important not only to be honest about scientific uncertainty, but to explain when relevant scientific information is not used, to avoid selecting only the scientific evidence to suit the policy.

Public dialogue on science

Scientific discovery and innovation are increasingly shaping society; science can engender trust by communicating how this is happening or might happen soon.

Until now, the scientific community has generally taken a responsive approach to communicating science to policymakers and politicians. While there have been examples of effective engagement with the public on science, such as through the Independent Scientific Advisory Group for Emergencies (Independent SAGE) which convened during the COVID-19 pandemic[164], better methods are needed to proactively inform policy and society about developments in technologies, such as AI or synthetic biology, so that their consequences can be influenced and managed.

This includes the need for the scientific community to listen and respond to concerns, so that they assist the public/policy discussion and promote a co-evolving dialogue between the scientific community, the public, politicians and the policy community.

The PAS survey 2025[165] highlights a clear majority that wants public views to be reflected in science policy, with 62% of those surveyed agreeing that the government should act in accordance with public concerns about science, but only 12% perceiving that the public is sufficiently involved in decisions about science and technology. The public largely placed responsibility for this on the government, with 76% saying the government was not making very much effort, or no effort at all, to consult the public on science.

163 HM Treasury *The Green Book* (2026). See: https://www.gov.uk/government/collections/the-green-book-and-accompanying-guidance-and-documents (accessed 19 April 2026).

164 Greenhalgh T, Costello A, Cruickshank S *et al*. *Independent SAGE as an example of effective public dialogue on scientific research*. Nat Protoc 20, 1103–1113 (2025). See: https://doi.org/10.1038/s41596-024-01089-6

165 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

The survey findings suggest that the public places less emphasis on scientists being the ones to undertake this consultation, with 51% agreeing with this viewpoint, while 13% disagreed.

Both government and the scientific community need to develop more effective methods of understanding and responding to public attitudes to new developments in science. This includes communicating scientific developments and their potential implications from early stages, and listening to public views about what science is most important. In an age of mass communication, where there has never been a richer set of technologies to create effective communication between the public and scientists, the scientific community itself needs to mobilise those technologies to improve communication.

RECOMMENDATION 14

The UK government should set the ambition to be the global leader in public transparency and systematic use of scientific evidence in policymaking. To support transparency, the UK government should publish a 'scientific evidence statement' alongside policies, which sets out explicitly how scientific evidence from research has been used in draft legislation, papers, policy strategy and consultations.

- All relevant policy statements should make explicit reference to a supporting scientific summary or synthesis ('Scientific evidence statement') in plain English.
- The UK government should ensure that all scientific advice for policymaking and Scientific Evidence Statements clearly identify areas of scientific uncertainty, in accordance with civil service policymaking guidelines in the Treasury Green Book.

RECOMMENDATION 15

The national academies should play an active role in holding the UK government to account on the quality and use of scientific evidence in policy decisions.

- As organisations independent of the UK government, the national academies should actively and publicly scrutinise the scientific evidence that is used for significant policy decisions by government, Parliament and the political parties. This is critical to ensure that the scientific facts are presented clearly and objectively, without political bias.
- National academies should work with organisations such as the Institute for Government and Sense about Science, which also play a critical role in evaluating the extent to which the government is effectively incorporating scientific evidence into its policymaking and the transparency with which it is communicated to the public.

RECOMMENDATION 16

The scientific community must proactively promote public dialogue on emerging technologies and scientific research so that ethical and policy implications are considered early.

- There is an onus on the scientific community, including the national academies, to feed into continuing, evolving dialogue with the public, politicians and the policy community and to create a receptive and supportive environment in which this can happen. This is an essential element for maintaining trust in science.
- Organisations such as the national academies, Sciencewise, Sense about Science and other expert independent facilitators are well-positioned to convene scientific expertise, public voice and government interests to coordinate such dialogues.
- Sufficient resources and support for skills among researchers must be allocated from science budgets (and other funders of research) to deliver this function. Alongside this, provision should be made to improve STEM research and analysis skills across the whole policy community, including within government and Parliament. Investing in this aspect is likely to pay back many times over in the long term through greater public trust, allowing for smoother adoption of new technologies.

Chapter six
Academic scientific community

To view the case studies highlighted within the section, scan the QR code or visit **royalsociety.org/sfsstudies**

Academic scientific community

Public engagement is dependent on the willingness and capacity of scientists to undertake engagement activities. This requires a culture in science in which scientists and other members of the academic community feel confident to engage with different communities, policymakers, the media and the private and third sectors, and are given the encouragement and opportunities to pursue such activities with the support of their employers.

Many researchers in the UK have embraced public engagement, taking part in innovative periodic or one-off initiatives (see Chapter two: Informal engagement with science). The goals of engagement vary, and the approaches adopted have been increasingly diverse. They include social media, podcasts, blogposts, popular science writing and engaging face to face with the public. A variety of initiatives have emerged, such as Pint of Science (pintofscience.co.uk), Café Scientifique (cafescientifique.org/uk), Soapbox science (soapboxscience.org), and I'm a Scientist Get Me Out of Here (imascientist.org.uk), all of which provide researchers with a platform to engage the public. Within certain fields of research (such as medical or social sciences) there has been a growth of 'upstream' engagement and involvement, including co-creation of research projects and citizen science projects (see case study: Dreamachine and the perception census).

As well as multiple social and economic benefits for the public, the research councils[166] have also identified ways in which individual academic researchers can benefit from public engagement:

- **Academic**
  Public engagement can lead to better science by helping to build multidisciplinary networks. Engaging with industry, specialist communities and experts by experience can provide key inputs into scientific endeavour (see case study: Cancer Research UK's patient and public involvement).
- **Financial**
  For certain fields of research, success in securing research funding can depend on research teams having appropriate skills and experience in public engagement and robust public engagement plans.
- **Moral and ethical**
  Scientists in receipt of public money have a moral duty to explain their research to the public and to share their findings, and to listen to feedback from the public.
- **Morale and enjoyment**
  Public engagement and science communication activities can be rewarding experiences. Scientists can develop a better understanding of (and motivation for) their own work, through participating in engagement activities.
- **Skills development**
  Engagement activities can strengthen communication, interpersonal and other skills – with many of these skills being useful in research contexts.

166 Research Councils UK, *What's In It For Me? The Benefits of Public Engagement for Researchers* (2020). See: https://web.archive.org/web/20120119121847/http://www.rcuk.ac.uk/documents/scisoc/RCUKBenefitsofPE.pdf (accessed 8 January 2026).

It is important to note that, in parallel with the motivations for individual researchers, institutions have their own motivations for engaging the public – often framed at an institutional level as widening participation, outreach, civic engagement, student recruitment or public relations. Public engagement in this sense is essential to maintain a 'licence to operate'. It can play an essential role in the creation of new knowledge and pave the way for public acceptance of new technologies and medical therapeutics.

To understand the motivations for how individual researchers and higher education institutions (HEIs) currently frame public engagement, the Royal Society commissioned a survey of the UK research community to understand the trends in attitudes towards public engagement[167]. Similar *Factors affecting public engagement by UK researchers* surveys were conducted in 2006[168] and 2015[169]. In parallel, roundtable discussions with senior leaders from across the HEI sector were convened to understand the organisational strategic priorities.

167 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

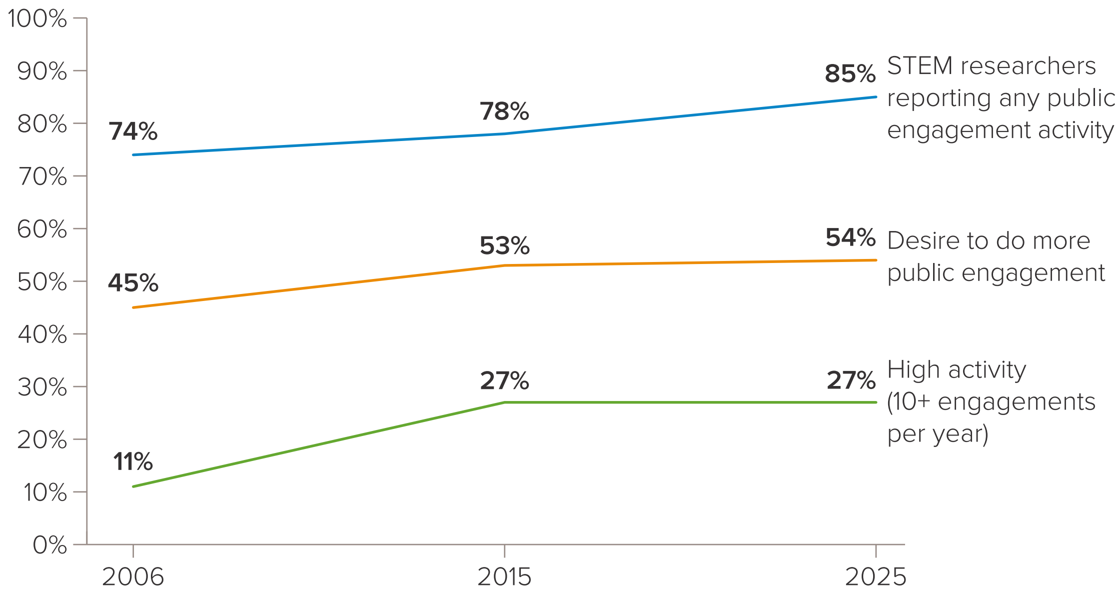
168 The Royal Society, *Science communication: Excellence in science* (2006). See: https://royalsociety.org/-/media/policy/publications/2006/1111111395.pdf (accessed 8 January 2026).

169 TNS BMRB and Policy Studies Institute, *Factors Affecting Public Engagement by Researchers: A Study on Behalf of a Consortium of UK Public Research Funders* (2015). See: https://cms.wellcome.org/sites/default/files/wtp060033_0.pdf (accessed 8 January 2026).

Participation in public engagement
Over the past two decades, around three-quarters of the scientific researchers surveyed have undertaken public engagement activities. The proportion undertaking high levels of engagement has increased markedly since 2006 and around half would like to do more public engagement (see Figure 6).

FIGURE 6

Participation in public engagement[170].



170 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

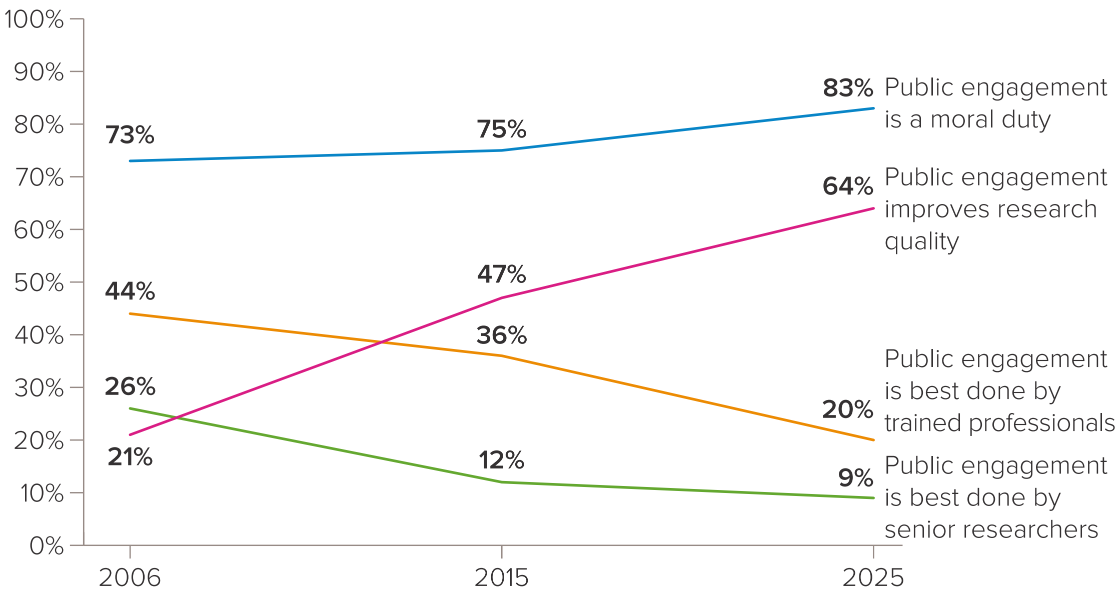
Attitudes toward public engagement

Public engagement is seen as a moral duty, but researchers are also driven to engage by a desire to share their passion about their research. Increasingly, engagement is seen as beneficial personally, to broader society and to their research – with a growing (while still relatively low) fraction seeing it as potentially advancing their careers.

Fewer researchers believe that engagement is best done by senior researchers or trained professionals, suggesting that members of the research community are increasingly confident about undertaking public engagement (see Figure 7).

FIGURE 7

Attitudes toward public engagement[171].



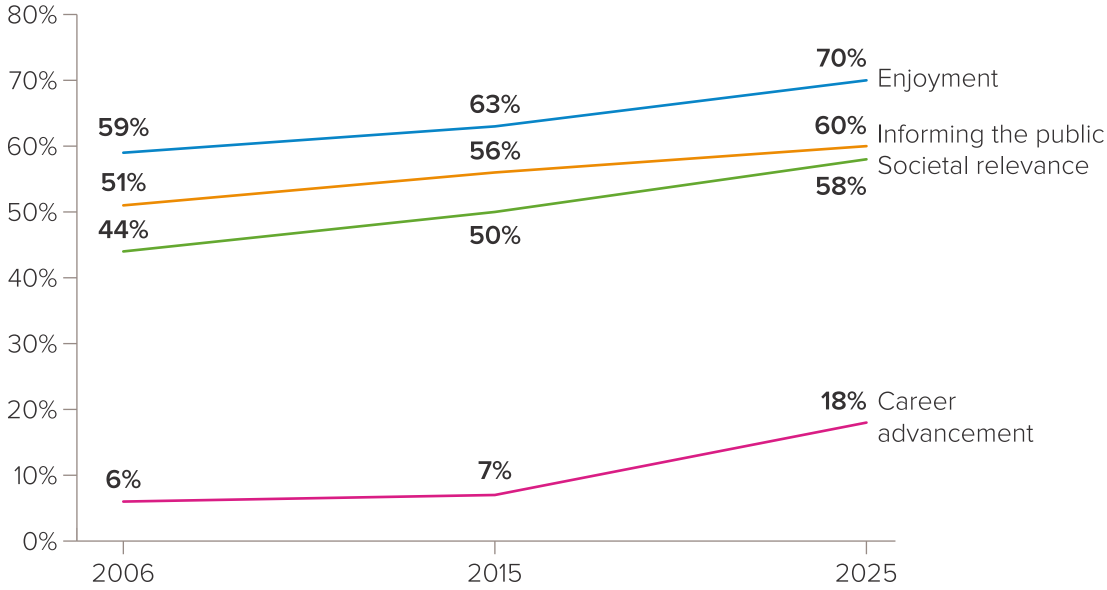
171 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

Motivations for engagement

Public engagement covers a range of approaches, from sharing knowledge to dialogue and listening. The survey suggests that 'informing' methods still dominate, although some researchers are involved in consultation (for example through interviews, surveys and community listening exercises) and collaborative activities such as co-production of research programmes, capacity-building community engagement and participatory research and citizen science (see Figure 8).

FIGURE 8

Motivations for engagement[172].



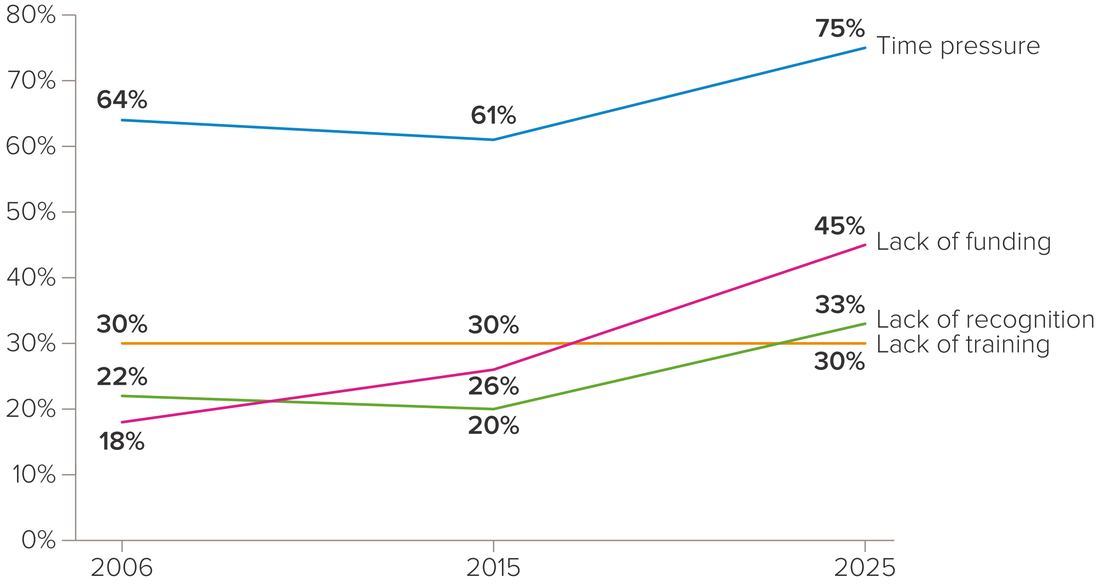
172 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

Barriers to engagement

The major barrier to engagement cited by researchers is lack of time. Although public engagement is now more encouraged, this challenge is intensifying. Lack of funding is also a growing issue (see Figure 9).

FIGURE 9

Barriers to engagement[173].



173 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

Institutional support

Respondents noted some improvement in support from institutions for engagement, through investment in professional support teams for public engagement, provision of training, consideration in promotions exercises and other recognition (such as awards). However, this remains variable and comparatively low on average across the whole community; for example, there remains little evidence for incorporation of public engagement in research staff job descriptions (see Figure 10).

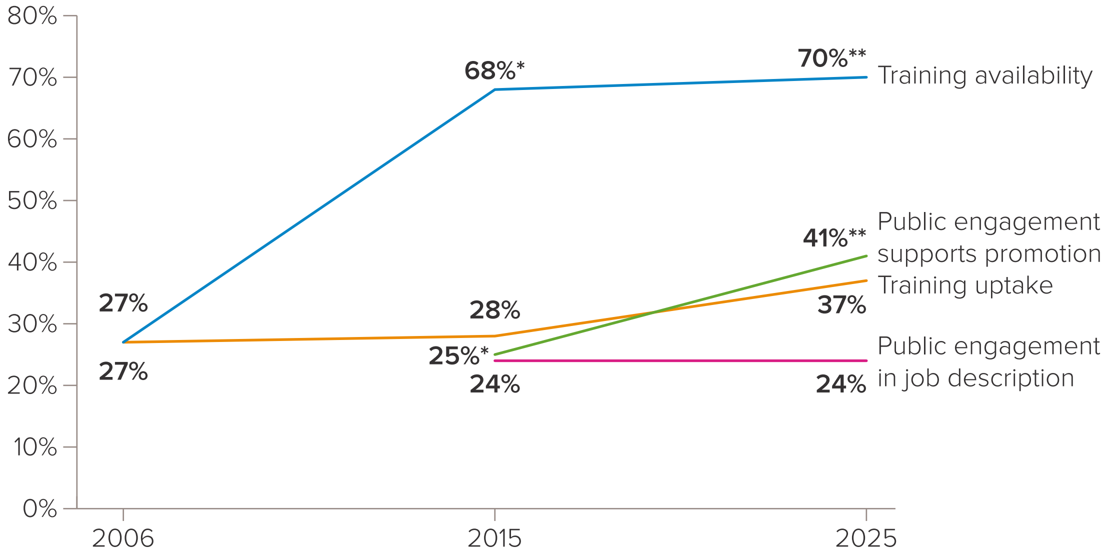
One-third of respondents still believed that engagement was undervalued in their institutions. The NCCPE supports institutions and researchers to enhance their public engagement and provides benchmarking to recognise where improvement has been made through their Watermark awards[174].

This provides a useful tool for researchers and public engagement professionals to advocate for reward and recognition for public engagement within their institution.

As highlighted in previous chapters, researchers should be supported to engage via the channels that have relevance to their work that ultimately motivate them and play to their strengths. This may be through media or digital engagement, providing policy advice, or supporting public dialogue, working with schools, or collaborating with museums, galleries, or other informal learning initiatives. Working through each of these engagement methods requires training, plus the backing of researchers' institutions and line managers.

FIGURE 10

Institutional support[159].



* as reported by public engagement support staff. ** as reported by researchers.

174 National Co-ordinating Centre for Public Engagement, *Assess Your Institutional Culture: Introducing the EDGE Tool* (2023). See: https://www.publicengagement.ac.uk/resources/guide/assess-your-institutional-culture-introducing-edge-tool (accessed 8 January 2026).

175 Technopolis on behalf of the Royal Society (2025) *Factors affecting public engagement by UK researchers 2025*. See: https://royalsociety.org/-/media/policy/projects/science-for-society/factors-affecting-public-engagement-by-uk-researchers-2025.pdf (accessed 19 April 2026).

Challenges in the HEI public engagement sector

The trends shown by the latest survey results highlight the critical importance of HEIs and research funders. A commitment to public engagement from these key stakeholders is crucial to enable researchers to conduct the engagement activities that they believe are needed.

One strength of the UK's HEI sector is its diversity – with universities providing value at civic, regional, national and global levels, while also specialising in different fields of research. There is a comparable diversity of public engagement methods that can be deployed in these different localities and research topics.

HEIs generally state their support for public engagement, but the degree of practical and financial support provided varies markedly across the full spectrum of institutions. Some have established large-scale outreach initiatives, such as the Science Gallery at King's College London, the Exchange in Birmingham, Imperial College London's Invention Rooms and exhibition space at the Francis Crick Institute in London. Others offer awards that recognise excellence in outreach and public engagement. For many institutions, outreach by scientists is part of a programme based on strengthening relationships with local communities and key stakeholders.

At the roundtable organised by the Royal Society, senior HEI leaders recognised the importance of public engagement and stated their commitment to it, especially as part of their regional or civic responsibilities. However, they also acknowledged that, in the face of financial pressures, it was difficult to justify increasing or even sustaining investment in public engagement versus other core activities such as education and research. Nevertheless, HEIs could consider more the opportunities to integrate public engagement training into other areas of core commitment, such as making it a core part of PhD programmes, postgraduate training, human resources-run personal development courses and general communications training.

Research funders

Many funding agencies in the UK expect or encourage researchers to carry out public engagement activities. Depending on the field and scheme, funders may also specify that non-specialist audiences or communities are actively involved ‘upstream’ in the development of research plans and funding proposals. There has been a shift in emphasis away from ‘add-on’ engagement activities to more integrated engagement and involvement. The medical sciences in particular, including research-funding charities and the public sector, have strongly embraced public engagement and involvement (see case study: Cancer Research UK’s patient and public involvement). However, the dispersal of resources for public engagement through individual grants does not encourage or enable long-term commitment from research institutions.

In addition, research evaluation mechanisms, such as the Research Excellence Framework (REF) and Knowledge Exchange Framework (KEF), play a key role in benchmarking research and knowledge-exchange activities and in determining allocation of funding to HEIs. The degree to which such frameworks recognise and reward public engagement will influence the willingness of institutions to invest in and support such activities.

Public engagement can often be hard to quantify, partly because the communities and individuals that researchers engage with may be diverse and widely dispersed and the outcomes may only be measurable over long timescales, as engagement often takes time to build trusting relationships. Moreover, the impact of individual projects may be unexpected or cumulative, and the focus on ‘impact’ may draw resources and support away from early-stage engagement activities of, say, early-career researchers or online activities such as TED talks, which reach extremely large and broad audiences with direct impacts being hard to evidence. It is important that the narrative elements of the REF should give opportunities for HEIs to highlight these types of engagement.

Effect of the Research Excellence Framework on public engagement

The REF recognises that public engagement can be a route to research impact and may act as an impetus for investment in public engagement, but it requires further fine-tuning to ensure that public engagement is appropriately valued and supported.

The REF (introduced in the UK in 2014) and its predecessor, the Research Assessment Exercise (introduced 1986), have influenced the distribution of core research funding to UK academic institutions and helped to enhance the quality and impact of research.

These assessments, held every 5 – 7 years, have included mechanisms to recognise public engagement with research. The REF introduced 'Impact Cases', and many examples of high-quality and effective public engagement have been evidenced in case studies[176]. For the 2014 and 2021 REF exercises, approximately 50% of impact case studies referenced public engagement, but with higher proportions in the social sciences and humanities compared with the science, engineering and medicine sectors[177].

These case studies show that public engagement has been an important pathway to diverse forms of success, including healthcare advances, economic benefits, policymaking, education, social and cultural enhancement and improved technologies. Public engagement has often gone hand in hand with engagement with external organisations, such as healthcare providers, businesses, or industry.

The Royal Society convened meetings with the REF panel and sub-panel chairs in 2020 and 2022, and with representatives of 58 universities in 2022, to reflect on whether public engagement was appropriately recognised and rewarded through the REF.

Points emerging at these meetings:

- Public engagement impact case studies were welcomed and valued by REF panel chairs and robustly evaluated.
- Demonstrating the impact of public engagement activities can be challenging owing to the wide variety and subtle nature of the changes affected. This discouraged some academic institutions from submitting such case studies.
- Funding to universities is significantly affected by highly rated impact case studies, providing an argument for investment in public engagement activities. However, investment was felt to be lower than that relating to other types of impact, such as commercialisation and innovation, with academic institutions varying markedly in their support for public engagement. A lack of coherence in funding policy was also noted.
- There was a widespread view that REF exercises did not sufficiently capture or reward the broad picture of public engagement with research across the UK, including grass-roots engagement driven by individual researchers. It was felt that more needed to be done to highlight the role of public engagement as a pathway to positive results.
- The important role of leadership in academic institutions in advocating for public engagement was emphasised, together with the need for more mechanisms to reward it; for example, through its inclusion in promotion criteria.

Since these meetings, the REF 2029 exercise has been reformed to strengthen the role of engagement. The new framework includes a dedicated 'Engagement and Impact' profile with specific encouragement to institutions to include evidence and strategies for engagement in the impact case studies, a requirement to describe those strategies in the 'Strategy, People and Research Environment' section, and the expectation that the headcount of engagement professionals will be recorded as part of the research community data.

176 REF Case Study Search. See: https://impact.ref.ac.uk/casestudies/. (accessed 23 February 2026).

177 Review of the 2014 REF impact case studies | NCCPE; Review of the REF 2021 Impact Case studies | NCCPE (accessed 19 April 2026).

Next steps

The academic scientific community shows a strong and growing commitment to public engagement, and recognises its personal and social value. This suggests that a culture of public engagement already exists within the scientific workplace. Enhancing this culture requires an equivalent commitment from other key stakeholders, particularly HEIs and research funders. The research community itself also needs to advocate for public engagement, to persuade employers, research leaders and funders to provide the support needed to achieve a shared set of objectives. The UK has always been at the vanguard of public engagement, and has the opportunity to maintain its global leadership, but this will require it continuing to build on the positive directions of the last 10 – 20 years.

Although HEIs face a challenging financial environment, funding of public engagement should be seen as a strategic investment in the future. Public engagement is vital to universities' existence on the grounds of:

- building public support for research activities and raising the profile of these activities;
- maintaining legitimacy for public investment in their core activities of research and education;
- demonstrating transparent and ethical practice;
- highlighting their key role as facilitators of constructive and mutually respectful dialogue;
- inspiring the next generations of students, researchers and educators;
- boosting opportunities for external recognition through prizes and attracting philanthropy.

Public engagement by scientific researchers can be seen as one aspect of institutions' wider stakeholder engagement. Public engagement strategies should be aligned with wider organisational stakeholder engagement strategies, recognising that effective science-based public engagement can be a powerful way to communicate an organisation's activities, values and identity, and sometimes public support for those activities can in turn influence policymakers.

HEIs have a key role to play in creating an environment in which scientists can contribute to engagement, for example by:

- treating engagement as an essential strategic component of a university's mission to disseminate knowledge, therefore justifying long-term investment;
- signalling that engagement is important by putting in place recognition, rewards and incentives for research staff and public engagement professionals;
- building researchers' competencies and confidence by providing training and professional support;
- establishing an infrastructure for engagement, such as professional support staff, and committing to sustain it for the long term.

In addition, institutions should look for opportunities to develop partnerships; for example, to create a regional academic infrastructure to support public engagement (to improve cost-effectiveness of those investments), or by establishing collaborations with other local cultural organisations and venues – such as those described in Chapter two: Informal engagement with science – where available.

Research funders also have a role to play, not least by ensuring that public engagement activities are embedded in grant applications and appropriately resourced.

In addition, bodies responsible for monitoring and allocation of financing, such as the funding councils for England, Scotland, Wales and Northern Ireland, and the responsible government departments, are significant influences on HEIs. Beyond simply compelling institutions to monitor engagement, these bodies should develop robust evaluation frameworks that recognise the diversity of engagement activities and the variety of social and economic benefits they can deliver and allocate resources accordingly.

RECOMMENDATION 17

Vice-chancellors and other academic leaders should strengthen the long-term institutional commitment to public engagement.

- Review how effectively their institution is supporting public engagement. Use the results to develop an action plan, with designated responsibility in the senior leadership team, based on an investment case that recognises the value of public engagement in local communities and beyond.
- Ensure that public engagement activities are recognised in promotions processes, reward and recognition measures, workload allocation, hiring criteria and institutional award programmes.
- Invest in staffing and infrastructure for public engagement, to enable time-constrained researchers to conduct engagement activities.
- Develop programmes that build competencies in engagement at all stages of research careers.
- Explore opportunities for regional partnering with other institutions to develop core infrastructure for public engagement.
- Develop stronger links with philanthropic bodies and local employers, schools and cultural venues to ensure support for public engagement activities.

RECOMMENDATION 18

National funding councils and responsible government departments should ensure that mechanisms of research evaluation recognise the importance of public engagement.

- Ensure all national evaluations for research and knowledge exchange facilitate benchmarking of university public engagement infrastructure, resource and strategic alignment and provide financial incentives to institutions which meet these benchmarks.
- Ensure that recognition of engagement is sustained in future national research assessment exercises.

RECOMMENDATION 19

Research funders (including the Royal Society) should ensure that public engagement is seen as core to scientific research, and maximise researchers' opportunities to undertake engagement activities; they should also monitor and set annually published targets for spend on engagement as a proportion of their research-funding budgets.

- Create additional training opportunities that reflect current knowledge gaps and areas of interest (for example, policy engagement, social media engagement, ethical/inclusive research practice, design of participatory or citizen science research).
- In addition to providing public engagement funding for individual researchers through normal research grant mechanisms, provide competitively awarded ring-fenced multi-year funding for strategic public engagement projects with teams/networks of researchers and public engagement professionals rather than individuals, to support HEIs in planning for long-term engagement strategies.
- Support the sharing of best practice in public engagement, science communication and evaluation methods, capitalising on the NCCPE's Research Excellence Framework impact case study work and other independent reviews.
- Commit to repeating the *Factors affecting public engagement by UK researchers* survey on a five-year cycle.

RECOMMENDATION 20

The research community should advocate for increased institutional and funding support for public engagement, particularly early upstream engagement.

- Advocate for the importance of engagement within host institutions and externally.
- Build on the increasing emphasis on two-way engagement by embedding engagement earlier in the research cycle.

Annexes

ANNEX 1

Acknowledgements

The Royal Society convened an overall Steering Committee, with a Working Groups for each chapter of the report led by a Fellow of the Royal Society supported by sector experts.

The members of the Steering Committee and Working Groups involved in this report are listed below. Members acted in an individual and not a representative capacity, and declared any potential conflicts of interest. Members contributed to the project on the basis of their own expertise and good judgement.

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This report has been reviewed by expert readers before being approved by Officers of the Royal Society. The Review Panel members were not asked to endorse the conclusions or recommendations of the report, but to act as independent referees of its technical content and presentation. Panel members acted in a personal and not a representative capacity. The Royal Society gratefully acknowledges the contribution of the reviewers.

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ANNEX 2

Abbreviations

AI: Artificial Intelligence

ARI: Area of Research Interest

ASDC: Association for Science and Discovery Centres

BGS: British Geological Survey

BSA: British Science Association

CaSE: Campaign for Science and Engineering

CFC: Chlorofluorocarbon

COBR: Cabinet Office Briefing Room

COPUS: Committee on the Public Understanding of Science

CPD: Continuing professional development

CSA: Chief Scientific Adviser

ESC: Exeter Science Centre

GM: Genetically Modified

GO-Science: Government Office for Science

HEI: Higher Education Institution

HFEA: Human Fertilisation and Embryology Authority

LLM: Large Language Model

NCCPE: National Coordinating Centre for Public Engagement

NERC: Natural Environment Research Council

NGO: Non-Governmental Organisation

OECD: Organisation for Economic Cooperation and Development

PAS: *Public attitudes to science* (survey)

PE: Public Engagement

PISA: Programme for International Student Assessment

POST: Parliamentary Office of Science and Technology

PPI: Patient and Public Involvement

PSRE: Public Sector Research Establishment

R&D: Research and development

RAE: Research Assessment Exercise

RAiSE: Raising Aspirations in Science Education

RCUK: Research Councils UK

REF: Research Excellence Framework

RSPB: Royal Society for the Protection of Birds

SAGE: Scientific Advisory Group for Emergencies

SMG: Science Museum Group

STEM: Science, Technology, Engineering and Mathematics

UKRI: UK Research and Innovation

ANNEX 3

Key terms

Public engagement

Throughout this report, we use the definition of public engagement set out by the National Co-ordinating Centre for Public Engagement (NCCPE):

"Public engagement describes the myriad of ways in which the activity and benefits of higher education and research can be shared with the public. Engagement is by definition a two-way process, involving interaction and listening, with the goal of generating mutual benefit."[178]

In revisiting the chapters and themes of the 1985 *Public understanding of science* report[179], we have also included formal education and other areas of science communication and societal interaction with science in this report, which may not traditionally be included in discussions of public engagement.

'The public'

The term 'public' is used throughout this report in a number of different ways. In some cases, it is used as a direct quote from published reports or datasets such as the *Public attitudes to science* survey[180]. In some chapters we refer to public groups (communities or organisations with a shared focus, communities of a place or interest, or shared lived experience) and 'publics'.

Science, STEM and research

As with the 1985 report*, Public understanding of science*, we have limited this report to public engagement with 'science', or, more broadly, STEM subjects. This in large part references the remit of the Royal Society itself as a national academy[181], with a focus on the areas of research represented by the Fellowship and funding programmes. However, many of the recommendations made within this report aim to support public engagement with academic and industry-based research more broadly.

Information literacy

In a world of limitless information, the ability to evaluate the credibility of information – whether shared by human beings or AI – is a core life skill. Scientific and data literacy both form vital cornerstones of this.

178 National Co-ordinating Centre for Public Engagement, *Introducing Public Engagement* (2026). See: https://www.publicengagement.ac.uk/introducing-public-engagement (accessed 13 January 2026).

179 The Royal Society, *The public understanding of science* (1985). See: https://royalsociety.org/-/media/policy/publications/1985/10700.pdf (accessed 7 January 2026).

180 UK Research and Innovation, *Public attitudes to science* (2025). See: https://pas.ipsos.com/ (accessed 14 April 2026).

181 The Royal Society, *Mission*. See: https://royalsociety.org/about-us/who-we-are/mission-priorities/ (accessed 13 January 2026).

Science literacy

Scientific literacy means having sufficient understanding of science to be able to appreciate:

- what science is, how it operates, what it can and cannot reveal, its strengths and limitations;
- that science is not the sudden discovery of facts but a gradual reduction in uncertainty;
- that doubt does not mean knowing nothing;
- that openness and scrutiny through peer review are key to self-correction;
- that disagreement is essential and resolved by generating additional evidence.

A foundational core of scientific knowledge is still important, but is not the most critical aspect of a science education for those who are unlikely to pursue a scientific or technical career.

Data literacy

Data literacy is the essential skill that enables citizens to process, understand and evaluate the avalanche of data, figures and statistics they encounter daily across traditional and social media. Everyone in society should be enabled to discern scientific evidence from misinformation, understand how data can be used to influence thought and behaviour and accurately assess risk.

Science capital

Science capital is a concept which helps to explain why some people view science-related activities as "for them" and others do not. It includes elements such as[182]:

- Science literacy.
- The extent to which someone sees science as relevant to their life.
- Science media consumption.
- Participation in out-of-school science learning.
- Familial science knowledge, skills and qualifications.
- Knowing people in science-related roles.

Social value

Social value is defined through the Public Services (Social Value) Act (2012) which requires all public sector organisations and their suppliers to look beyond the financial cost of a contract to consider how the services they commission and procure can improve the economic, social and environmental wellbeing of an area.

182 https://www.stem.org.uk/sites/default/files/pages/downloads/Science-Capital-Made-Clear.pdf (accessed 19 April 2026).

ANNEX 4

Timeline of significant milestones in the 40 years since the Bodmer report

1985

Bodmer report (*The public understanding of science*) by the Royal Society.

Committee on the Public Understanding of Science (COPUS) established by the British Association for the Advancement of Science, the Royal Institution, and the Royal Society.

1986

GCSEs replace O-levels, with first exams sat in summer 1988.

1987

The Royal Society COPUS grant schemes initiated.

1988

Education Reform Act – the introduction of the National Curriculum for England and Wales.

2008

Education and Skills Act raises the education leaving age from 16 to 18.

2008

NCCPE establishes the 'Beacons for Public Engagement initiative'.

2009

Apprenticeships, Skills, Children and Learning Act 2009 establishes the Office of Qualifications and Examinations Regulation (Ofqual).

2009

RCUK (now UKRI) introduce the 'Pathways to Impact' as part of their grant application process.

2010

English Baccalaureate (Ebacc) introduced as a school performance measure.

2012

RCUK fund eight catalyst universities to develop their support for public engagement with research.

2014

Perceptions of science and scientists (later *Public attitudes to science*, PAS) first established.

2014

Research Excellence Framework (REF) 2014 conducted.

2015

Factors affecting public engagement by UK researchers survey conducted by Wellcome – continuing the themes of the 2006 *Science communication* survey.

2018

Global Monitor, to track public attitudes toward science and health, initiated by Wellcome.

KEY

All chapters | Chapter one | Chapter two | Chapter three | Chapter four | Chapter five | Chapter six

1992

Research Assessment Exercise (RAE) 1992 conducted.

1992

Education (Schools) Act establishes the Office for Standards in Education (Ofsted).

1996

RAE 1996 conducted.

1999 – 2000

Millennium science centres open across the UK.

2000

House of Lords Science and Technology Committee report, *Science and society*, published (the report was highly influential, advocating for a shift towards public engagement and dialogue, acknowledging public concerns about science and technology).

2001

RAE 2001 conducted.

2002

COPUS Council discontinued, following a report commissioned by the Office of Science and Technology.

2002

Science Media Centre established.

2002

Citizenship introduced as a statutory subject in the National Curriculum and as a GCSE subject.

2006

Research Councils UK (RCUK) Concordat for Engaging the Public With Research established.

Royal Society *Science communication* survey initiated.

2007

Government Office for Science (GO-Science) established.

2019

PAS 2019 conducted.

2020

T levels introduced as new technical equivalent to A levels.

2021

REF 2021 conducted.

2024

Curriculum and Assessment Review launched.

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- Influencing
- Research system and culture
- Science and society
- Corporate and governance

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