Science 2040: A vision for the future
Executive summary

Science has long been at the heart of human progress, driving economies, improving our health and wellbeing, and deepening our understanding of the universe. The UK has built a reputation as a global leader in scientific research, but sustaining and strengthening this position requires long-term vision, strategic investment, and policy frameworks that foster and enable innovation. Science 2040 sets out a vision for a science and innovation ecosystem that is more resilient, more responsive to society's needs, and better aligned with the challenges and opportunities of the decades ahead.

Science enriches lives in profound ways. Beyond its substantial and varied economic contributions, it informs decision-making, inspires curiosity, and equips us to tackle emerging challenges – 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. A robust and trustworthy science system, in which scientific inquiry and application are able to thrive, is essential to national security, societal resilience, and long-term prosperity.

The UK science landscape is at a critical juncture. Capriciousness in politics has led to unpredictable and short-term funding cycles that undermine research stability and create an uncertain investment environment. Gaps in key skills and infrastructure hinder the country's ability to translate discovery into application. The fragmented nature of vocational and higher education pathways limits the flow of skilled talent into research institutions and industry.

At the same time, restrictive immigration policies risk deterring global expertise, and barriers to interdisciplinary collaboration slow progress on complex challenges. Increased politicisation of research in other parts of the world is creating new uncertainties that not only threaten academic freedom but also disrupt the international networks and collaborations that science depends on.

Yet the UK has an opportunity to strengthen its scientific future, even in the face of global geopolitical shifts reshaping the context in which research and innovation take place. By fostering partnerships between industry, academia, and government, investing in world-class research facilities, and creating a more diverse and inclusive research workforce, the UK can reinforce its position as a hub of discovery and innovation. A more agile and sustainable funding model will provide the foundation for breakthroughs that drive long-term economic growth and improve lives across society.

Purpose of the interim report

This report brings together the first phase of the Science 2040 programme, focused on the value of science to society and current strengths and weaknesses of the UK's science and innovation system in delivering this. It draws insights from those working across research, industry and government, as well as on historical analysis and international comparisons. It reflects a shared recognition that meeting the ambitions of the coming decades will require a more strategic, coherent, and enduring approach to science policy.

It seeks to make a general case for a long-term vision of science for the UK and what the parameters of this should be, and identifies the greatest long-term challenges this needs to address.

The full interim report can be viewed online at:
royalsociety.org/science2040

Guiding principles for the science system of 2040

The future is uncertain. The UK will need a science system that is agile and responsive to change in order to empower scientists and investors to pursue and support the ambitious research that will lead to the next generation of breakthroughs, and to act responsively to emerging opportunities or emergencies.

Facing a tumultuous world, government will need to act to reduce uncertainty where it can rather than adding to it. This means ensuring a clear, stable and predictable policy environment.

Whatever the world of 2040 looks like the following principles need to be baked into UK science policy to ensure it remains able to deliver for society:

1. **Excellence**
   Maintain the highest standards in research, innovation and the application of these to secure the UK's global standing.

2. **Research integrity**
   Ensure transparency, reproducibility, and ethical rigour in scientific practice.

3. **Institutional diversity**
   Develop a more diverse research system that fosters innovation, enhances resilience, drives competition, and enables collaboration.

4. **Predictability in policymaking**
   Create stable policy conditions in which investors feel confident to invest and gives the stability within which scientists can take risks.

5. **Interdisciplinarity**
   Break down silos between fields, enabling collaboration on complex challenges.

6. **Coherence**
   Ensure alignment across sectors and policy-making bodies to enable the free flow of ideas and talent across the research and innovation ecosystem.

7. **Enabling regulation and administration**
   Build streamlined, efficient, and supportive frameworks that facilitate research activities while minimising unnecessary bureaucratic burdens.

8. **Independence of research**
   Ensure those who understand the research best are empowered to take the decisions over research activities.

9. **A system inclusive of all**
   Build the talent pool so the research and innovation ecosystem can benefit from a diverse range of talent and expertise who are empowered to operate at their full potential.

10. **International collaboration**
    Strengthen international ties, making the UK a magnet for talent and collaboration.

Science is the foundation of a thriving society. The UK's continued success depends on sustained investment, a dynamic research environment, and an unwavering commitment to excellence in every aspect of the scientific endeavour.

Recommendations

RECOMMENDATION 1

Establish a long-term science strategy to end the damaging cycle of short-termism and stop-start investment in science

By 2040, the UK will be seeing the long-term benefits of a resilient, forward-looking science strategy – one that has provided policy clarity in the face of global volatility and enabled sustained real-terms growth in research and development (R&D) investment for over a decade. Cross-party support will have been central to its continuity and impact. To achieve this by 2040, government needs to:

- Implement a 10-year investment framework, reviewed every five years, ensuring science funding keeps pace with inflation, global developments and economic opportunities.

- Ensure greater flexibility in the year-on-year budgeting requirements for funders within these longer-term funding envelopes to support more effective and efficient investment for the whole system.

- Align science policy with long-term industrial, skills, and infrastructure strategies to create a coherent national approach to research and innovation.

- Develop an internationally focused science strategy to attract global R&D investment and establish measurable targets for skills development and infrastructure.

- Develop metrics that capture the full value of investment in R&D to the economy. These must account for the 'non-rival' and 'non-excludable' nature of scientific knowledge, meaning many people can benefit and build on any single scientific advancement; and the inherent uncertainty and variability on the journey from cutting-edge research to economic impact.

RECOMMENDATION 2

Strengthen the skills and education ecosystem to deliver a more numerate and scientifically literate population

By 2040, a joined-up, strategic approach to skills and education policy will have been fully embedded across the UK, aligning efforts across all levels of government, from central departments to devolved administrations and combined authorities. To achieve this by 2040 requires action imminently to:

- Ensure a broad curriculum that engages students in science, mathematics, and data skills to age 18, with hands-on, practical learning.

- Ensure the public have access to trustworthy and high-quality information about science, the natural world and emerging technologies, as a counter to misinformation.

- Support both higher and further education sectors, ensuring clear technical and vocational pathways and closer collaboration with industry and training providers.

- Support talented researchers to reach their full potential by providing appropriate training opportunities and rethinking the career pyramid.

- Incentivise private sector involvement in workforce training, upskilling, and lifelong learning to keep pace with new technologies and methodologies.

- Reform immigration policy to make it easier for world-class scientific talent – both established researchers and those early in their careers – to work and settle in the UK, removing barriers such as high upfront visa and health surcharge costs.

RECOMMENDATION 3

Foster a diverse research and innovation system to ensure system-wide adaptability and resilience

By 2040, a wider variety of institutions and funding sources must be supported to foster adaptability, resilience, and breakthrough discoveries. To deliver this, government should:

- Maintain a balanced portfolio of discovery, applied and mission-driven research to ensure long-term scientific progress.

- Strengthen the UK's role as a leader in interdisciplinary and collaborative research, including integrating AI, materials science, and biotechnology to address societal challenges.

- Address gaps in maintaining foundational scientific knowledge that is crucial to national security and future technological development.

- Promote competitive funding mechanisms to sustain research excellence and encourage bold, high-risk innovation.

RECOMMENDATION 4

Make the UK a leading nation in which to innovate and translate knowledge

By 2040, the UK must have removed barriers to innovation and enhanced pathways from research to commercial and societal impact. To achieve this:

- Review and optimise translational pathways, ensuring institutions are structured to maximise knowledge commercialisation. Act to ensure translation institutions complement other parts of the system and remove needless barriers to translation activity for other publicly funded research institutions where such functions may be important while not the sole focus.

- Create an enabling regulatory system to incentivise innovation and ensure UK-generated research translates into economic value captured in the UK. Remove constraints that inhibit innovation, ensuring policies enable rather than restrict scientific progress and application.

- Tackle disparities in access to innovation opportunities, ensuring diversity in participation across geography, gender, and ethnicity.

- Improve the overall investment environment by reducing policy uncertainty.

RECOMMENDATION 5

Reimagine science careers and organisational structures

By 2040, science careers and research organisations should be restructured to support a dynamic and inclusive research environment. Making this a reality requires government to:

- Adapt doctoral training models to better align with the needs of both academia and fast-moving industry sectors.

- Develop new science training pathways for data- and technology-intensive fields, equipping people with interdisciplinary skills.

- Actively incentivise intersectoral mobility through funding mechanisms, employer initiatives, and in recognition and assessment frameworks.

This document is a summary of the key messages of the *Science 2040 interim report*. The full report can be viewed online at: **royalsociety.org/science2040**