The entwined evolution of AI and the science workforce: shaping the future

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The Science Council is a collaborative interdisciplinary community of more than 30 professional bodies and learned societies across the breadth of science. We work together to inspire, develop and support scientific professionals, and we are committed to professional recognition of people working in all roles across scientific disciplines and applications.

Introduction

The Science Council convened a one-day conference that brought together professional bodies, researchers, policymakers, employers, educators, and science sector stakeholders to examine the shared and evolving relationship between artificial intelligence (AI) and the science workforce. Discussions explored how AI is changing scientific practice, workforce capabilities, career pathways, leadership, governance and inclusion, while also considering how scientists and science-based professions will shape the future development, deployment and governance of AI.

A central theme that emerged was that the relationship between AI and science is not solely technological. The success of AI in advancing science will depend on the capabilities, judgement, ethics, diversity and adaptability of the people who design, use and govern it. AI is already influencing scientific discovery and professional practice, but the future trajectory of this transformation will be determined by human choices, institutional frameworks and societal values. This report synthesises the discussions and provides some recommendations on this topic.

1. AI in science research

AI has become increasingly embedded across scientific disciplines, building upon decades of application in machine learning, statistical modelling and computational science. AI was referred to throughout discussions as being used, among many areas, including in:

- Management and analysis of increasingly complex datasets.
- Integration of knowledge across disciplines and information sources.
- Hypothesis generation and prioritisation.
- Experimental design and optimisation.
- Automation of routine analytical and administrative tasks.
- Enhanced modelling and simulation capabilities.

While AI has the potential to accelerate discovery and increase productivity, advancing science remains dependent upon human expertise. Scientists must retain responsibility for asking meaningful questions, evaluating evidence and interpreting results.

Three priorities emerged on this topic. First, scientists require AI literacy alongside strong disciplinary expertise. Beyond technical competence, the ability to critically evaluate AI-generated outputs, understand uncertainty and exercise professional judgement is essential.

Second, emerging AI-enabled careers must remain accessible and inclusive. Without deliberate intervention, AI could exacerbate existing inequalities in scientific careers rather than broaden participation.

Third, organisations need cultures that support continuous adaptation and learning, alongside interdisciplinary collaboration, which will be critical if science organisations are to benefit fully from AI while maintaining public trust and scientific integrity.

AI is influencing not only individual research projects but the broader research system itself. The ability to analyse data at scale, accelerate knowledge synthesis and support complex modelling has implications across all scientific disciplines.

It was noted that research systems must adapt quickly enough to remain internationally competitive.

2. AI, inclusion and ethics

Ethics was widely viewed as a foundation rather than a secondary consideration in AI adoption, for outputs to be considered trustworthy. Discussion focused on reliability, transparency, accountability, fairness and human oversight.

AI systems can exhibit non-deterministic behaviour, generating different outputs from the same inputs due to multiple valid execution paths or probabilistic processes. This is acceptable (maybe even helpful) in some contexts but poses risks in high-consequence applications, underscoring the need for human review of outputs.

A lack of transparency remains a major concern because many systems provide limited visibility into how outputs are generated. The need for traceability was highlighted, with mechanisms linking outputs to training data, underlying models, and decision-making. Increased transparency is necessary to increase public and professional confidence.

There are currently questions about who is responsible for decisions informed by AI. Algorithmic bias, errors and unintended consequences create challenges for assigning accountability when AI systems are embedded in complex environments. There is a strong consensus that accountability must remain with human users.

Bias may arise from training data, model design or human decision-making. This means that it is important to have rigorous evaluation methodologies, including approaches such as counterfactual fairness testing, alongside broader efforts to improve data quality and representativeness.

Participants noted growing public uncertainty regarding AI and declining confidence in some scientific institutions. Strengthening public understanding of AI, improving transparency and communicating scientific work more effectively were identified as important priorities.

The UK's ability to harness AI successfully will depend upon integrating ethical principles into AI development, deployment and governance. Ethical approaches can improve reliability, accountability and public confidence while reducing the risk of unintended harms.

A consistent principle emerged that AI should augment rather than replace human judgement. Scientists retain responsibility for evaluating outputs, recognising limitations and making decisions

3. Ethical governance of AI in science

Ethical governance emerged as a critical enabler of the adoption of trustworthy AI in science. It should not be viewed as a compliance exercise undertaken after systems have been deployed. Rather, it should be integrated throughout the lifecycle of AI systems, from research design and data collection through model development, deployment, monitoring and eventual retirement.

Given the enormous pace of change, participants argued for governance approaches that are adaptive, multidisciplinary and capable of evolving alongside technological change. This approach recognises that ethical performance cannot be achieved through technical measures alone. Governance frameworks must encompass organisational culture, leadership, professional standards and accountability mechanisms.

Participants noted that explainability requirements may differ according to context. In low-risk applications, broad transparency regarding limitations may be sufficient. In high-consequence environments, such as health, defence or public policy, more rigorous explainability and validation standards may be required.

The principle that responsibility cannot be delegated to AI systems was highlighted throughout the day. Scientists, employers, institutions and policymakers retain responsibility for decisions informed by AI. AI systems may generate analyses, recommendations or predictions, but interpretation and action remain human.

Professional registration and codes of conduct were identified as potentially valuable mechanisms for reinforcing accountability and ethical decision-making within the scientific workforce.

The integrity of research is a particularly important area of governance. Guidance is required on the use of generative AI in scientific writing, disclosure requirements, verification of outputs, intellectual property considerations and citation practices.

Participants also highlighted an emerging role for AI assurance, including independent evaluation of fairness, reliability, robustness, bias and uncertainty. The new Centre for AI Measurement within the National Physical Laboratory was highlighted, as it focuses on emerging AI measurement initiatives to develop standards, benchmarks, and validation frameworks for trustworthy AI.

Trustworthy systems are more likely to gain acceptance from researchers, funders, policymakers and the public. Investment in governance therefore has the potential to become a strategic advantage rather than merely a compliance requirement.

Ultimately, ethical governance was viewed not as a barrier to innovation but as an enabler of adoption, trust and long-term scientific impact. Formal frameworks alone cannot guarantee responsible practice. Scientists and organisations must foster cultures in which individuals are encouraged to question assumptions, identify risks and raise concerns. Ethical reflection should be treated as a routine component of scientific and technological decision-making rather than an exceptional activity undertaken only when problems emerge. This includes creating space for discussion of societal impacts, encouraging multidisciplinary perspectives and recognising that the deployment of AI involves choices about values as well as technical performance.

4. AI and Early Career Pathways in the Science Workforce

AI is changing the nature of early-career scientific work. While automation may reduce routine tasks, participants stressed the continuing importance of developing subject expertise and professional judgement.

Employers increasingly value creativity, critical thinking, communication, collaboration and interpersonal capabilities. To support this development, mentorship remains vital. Learning through interaction with experienced colleagues remains critical for acquiring knowledge, professional judgement and scientific reasoning.

Early-career scientists must learn not only how to use AI tools but also how to critically evaluate their outputs. Four capability areas were suggested to successfully support the integration of AI into work. These are: a foundational understanding of AI, practical proficiency, critical evaluation, and knowledge of ethics and governance. Effective use of AI requires an understanding of the underlying subject matter to evaluate, challenge and improve generated outputs.

Educational systems are lagging, which is a concern. AI literacy should become embedded across schools, universities and professional development programmes while preserving core scientific competencies.

Several areas were highlighted in the discussions that are important for early-career scientists.

Individuals will need to be aware of the strategic significance of a new research ecosystem in which competitive advantage will increasingly depend on access to computational infrastructure, advanced skills, and interdisciplinary collaboration.

The UK possesses significant strengths in AI research, innovation and governance. Maintaining leadership will require investment in infrastructure, talent and research capability, together with support for emerging disciplinary areas and AI-enabled discovery.

While AI is beginning to reshape early-career experiences across scientific professions, the long-term consequences remain uncertain. It was agreed that AI is unlikely to eliminate the need for early-career scientists, but it is changing the nature of entry-level work. Routine tasks are increasingly automated, allowing early-career professionals to focus on higher-value activities. As AI technologies evolve rapidly, scientific careers are likely to require ongoing reskilling and adaptation. Flexibility and lifelong learning are therefore regarded as essential attributes for future professionals.

5. Insights on the impacts of AI and the future

Ahead of wider discussion we received an overview highlighting the strategic implications of AI for the UK research and innovation ecosystem.

UKRI is the largest funder of science research in the UK, operating through a set of research councils that lead different aspects of research investment. AI research projects are led through the Engineering and Physical Sciences Council. The reach and scale are large, so any change in research systems, such as AI, has a significant impact on ways of working.

When public money is being used on research and innovation the research needs to make a tangible difference to the UK economy. This means there is a challenge with what you focus on in the short term and the long term.

There are other considerations such as timing. Demonstrating value for money will tend to run on government election cycles as politicians want to be confident the money is being used to deliver impact. The public want to see value from research and innovation, and they too expect something that they can see.

Curiosity-driven research funding needs to consider how to grow emerging areas, how to bring disciplines together to make things happen, how to create an environment that builds capabilities, and how to change the way we do things.

One of the major challenges facing the UK's AI development is access to computational infrastructure. Advanced AI methods require significant computing resources, creating both opportunities and constraints. We need to make sure we have enough compute for people to train and use future methods.

It is noted that the UK is looking at how to manage and/or invest strategically in computing infrastructure, research data resources, skills and workforce development, and AI-enabled research platforms. Infrastructure should be viewed as a national capability that underpins future scientific competitiveness.

A key element of future investment should be the development of adaptable scientists capable of evaluating and adopting emerging technologies throughout their careers. There are opportunities for skills development using AI, some of which is already happening in biomedical research, materials science, fusion research, AI for scientific discovery and the creative industries.

Success in these and other areas will depend on effective collaboration across disciplinary boundaries and between academia, industry and government. The scientific community must communicate the social and economic value of research more effectively.

Wider discussion highlighted environmental sustainability as a significant concern related to AI. Participants flagged ethical concerns about the energy requirements of large-scale AI systems and called for greater emphasis on efficient model design, resource optimisation and sustainable computing approaches. The environmental impacts of AI were also cited as a major concern for younger people entering the science profession and using AI. Future AI systems should prioritise efficiency while reducing computational and energy demands, which ultimately would support the UK being more competitive.

6. Diversity in a science workforce shaped by AI

AI has the potential both to reduce and to reinforce inequalities. Participants emphasised the importance of adopting an equity-first approach to AI development and deployment. Outcomes will depend on how systems are designed, governed and accessed.

AI can support accessibility, improve communication across language and cultural boundaries and provide tools that enhance participation for groups that have historically faced barriers within scientific careers.

But there are risks such as digital exclusion; unequal access to AI technologies; algorithmic bias in recruitment and assessment; reinforcement of socioeconomic inequalities; and underrepresentation in training datasets and in team development. There are also risks regarding digital exclusion and unequal educational access and inclusion, which require deliberate action in the design, deployment, and governance of AI systems to counter inequality. AI literacy must extend beyond technical use to include understanding of limitations, bias and appropriate application.

Participants observed that while AI may support equality, diversity and inclusion initiatives, it cannot replace the importance of human engagement, empathy and relationship-building. Effective inclusion remains fundamentally a human responsibility.

7. AI in policymaking

Atlas is a new AI-driven tool developed by Nesta for policymakers to enhance evidence-based decision-making. It has achieved 83% precision and 63% recall in information extraction and is currently being piloted across several Government departments. Participants had a chance to view and try the tool.

Key features include refining research questions, categorising evidence and generating detailed reports. Atlas uses large language models and academic/gray literature databases to synthesise research to develop policy interventions. Multiple validations are performed to generate text that corresponds to the original sources and can be traced back to the citations in the original documents. The tool guides users through research questions to provide results, including specifying population targets, outcomes and settings.

The tool categorises evidence using a scale inspired by the medical sciences, and includes systematic reviews, RCTs and expert opinions. The tool aims to select higher quality evidence to populate the summaries. A search can take between 30 and 40 mins to complete the analysis.

Given the requirements that both Government and other policymakers must turn around information, often at short notice, the tool has many benefits. Standard AI tools like CoPilot and ChatGPT are not robust enough or evidence-centred for policymaking.

The first version has proved popular. It is now undergoing another round of improvements, with new developments including value-for-money guidance and stakeholder mapping. The tool is currently free of charge.

8. Leadership in an AI-enabled environment

The panel explored how ethics, inclusivity, and responsible AI use move into culture, leadership skills, and systems. It is important to move away from polarised perspectives on AI and focus on how we engage with the middle road.

Leaders must navigate uncertainty while supporting individuals with diverse levels of AI capability, confidence and acceptance. Transparency emerged as a particularly important leadership principle. Organisations increasingly use AI in communication, recruitment, analysis and administration, yet these uses often remain invisible to employees and stakeholders.

Greater openness regarding where and how AI is used may improve trust and organisational learning. Rather than adopting simplistic or mandatory approaches to institutional AI strategies that will quickly become obsolete in a fast-moving, changing workplace, supporting flexible, context-specific adoption will be more effective.

We will still need to understand employees' psychology and the relationship between this and AI will shape behaviour. We are all individuals, and how we interpret and lead teams will be quite different, and that is unlikely to change. How we understand AI will be critical to how we build individual leadership styles. Top-down leadership styles will be outdated as no individual can know it all.

There are fears of excessive dependence on AI systems and protecting opportunities for reflection, creativity, experimentation and intellectual exploration is important. Scientific innovation often emerges from unexpected connections, diverse perspectives and curiosity-driven inquiry. These qualities must remain central even as AI becomes more integrated into scientific practice.

Have a proper digital strategy about AI for your institution. Guidelines on how you use AI in research are needed. While there may be groups who don't want to use AI in their research, for good reasons, we must be nuanced and not make assumptions about using AI.

Recommendations

Based on the conference discussions, the Science Council recommends the following:

- **Support the establishment of AI literacy as a core scientific competency.** Professional bodies, universities and employers should embed AI literacy within scientific education and continuing professional development frameworks. This should include technical understanding, critical evaluation, ethics and governance.

- **Protect human judgement as a core professional capability.** Scientific training must prioritise critical thinking, reasoning, interpretation and decision-making to ensure that AI augments rather than substitutes professional expertise.

- **Strengthen public engagement and transparency.** Scientists, institutions and policymakers need to communicate about AI applications, limitations and benefits to support public trust and inform debate.

- **Support career development**. Design training pathways to ensure that automation does not undermine opportunities for developing expertise and judgement. Leaders need to support ongoing career development, including through professional registration, for employees to remain current in their scientific practice.

- **Foster responsible leadership and organisational culture**. Create environments that encourage experimentation, reflection, transparency and continuous learning while maintaining strong governance and accountability. The scientific community must ensure that AI supports rather than constrains creativity, curiosity, diversity of thought, and the pursuit of new knowledge, recognising that these remain fundamental drivers of scientific progress.

- **Reduce AI's environmental impact.** Prioritise sustainable AI by supporting energy-efficient model design, resource optimisation and transparent environmental reporting, helping to reduce environmental impact while strengthening UK competitiveness and responding to growing concerns about AI's environmental footprint.

Ends.