

# AI and the Future of Professional Knowledge: Nature and the environment

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Natural England Research Report NERR145

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# Executive summary

## Aims

This report summarises the results of a short research project to explore the impact of Artificial Intelligence (AI) on the future of knowledge professions, with a particular focus on nature and the environment. The aim was to enable strategic thinking around the integration of AI and its potential impact on professional knowledge within the environment sector, and specifically how practitioners (predominately staff working in Natural England) may conceptualise the opportunities / challenges, in order to inform an appropriate organisational response. This report therefore highlights key emerging trends in AI as relates to nature and the environment and discussion points from practitioners.

## Method

The project was run from January to April 2024 and was part of a broader collaboration between organisations seeking to understand the strategic implications of AI. Work focused on a horizon scanning exercise, creation of trends / thematic effects ('change cards'), and an in-depth workshop involving practitioners from Natural England and partner organisations.

## Findings

- Insights from the project challenged assumptions concerning the extent to which AI applications can be grouped together for strategic / management purposes. AI is designed and deployed in different ways depending on context.
- Understanding this context is important in anticipating opportunities and challenges brought by AI, assessing acceptability (for staff and public), and mitigating potential for misuse.
  - Tools and applications:
    - Data integration, monitoring, and simulating / modelling the natural environment are all potential AI use cases for the environment sector.
    - Further deployment of AI tools in the sector is dependent on, for example, the future (growing) capabilities of AI tools and potential for 'AI-friendly' process reengineering.
  - Governance and engagement:
    - Building resilience to AI risks is crucial, and this entails building human capability to use it effectively.
    - Guidance must be able to adapt to a changing picture, and there will be broader organisational and societal issues that require a culture of iterative adaptation to respond to. AI should augment, rather than replace, human knowledge.

- The workshop discussions can be summarised along the following headline areas.
  - Data and gaps: Issues concerning data accessibility, data bias, and incomplete datasets were seen as important for how AI will be used in the environment sector and its ability to support wider environmental goals.
  - Power and vulnerability: To achieve benefits for the environment and nature, participants felt there is a need to understand the 'winners and losers' of AI models, who such models are designed for (hence, who they exclude), and what counts as *good AI*.
  - Rights and no-rights: Participants felt the regulation of AI systems in the environment sector may be difficult, and the various ways AI can uphold or ignore rights, and the erosion of human rights to object, have implications for action to tackle environmental problems.
  - Perceptions of opportunities and threats: AI technology was seen to potentially influence how organisations operate, both in terms of their delivery focus and their role, and conceptions of the environment and nature.
  - Benefits and disbenefits of technological sophistication: Participants felt AI systems offer increased scope for developing knowledge but also bring increased complexity which may be difficult to manage.
  
- Discussions overall supported the following activities:
  - Developing guidelines for the use of AI in the environment sector to enhance trust in outputs.
  - Developing skills in the environment sector to increase knowledge of the various types of AI systems / approaches and their limitations.
  - Focusing on decision-making processes to define the (potential) role for AI and human responsibilities.
  - Continued examination of how human rights, needs, and concepts of environmental justice can be integrated into AI-supported decision-making.
  - Discussions between environmental organisations and their staff to understand and direct the impacts of AI on their roles.

## Limitations

This project was intended as a 'snapshot' to enable the exploration of potential challenges and benefits of the use of AI in the environment sector, as could reasonably be anticipated at the time of the research. Further work to explore this area will be required as AI technologies develop, and their societal impacts come into focus.

Participants for this project were sampled opportunistically, and different discussions and areas of focus may have emerged from a different group. Results nevertheless present selective reflections on themes of AI's impact on the environment sector that may have wider relevance.

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# 1. Project overview

## Context

Artificial intelligence (AI) is “the use of digital technology to create systems capable of performing tasks commonly thought to require intelligence” (Government Digital Service, 2020). Interest in AI has increased substantially since 2023 when new generative AI tools (based on Large Language Models) were made accessible to a far wider audience than previously and highlighted the substantial power of this technology. AI has since been integrated into ever more of the digital tools we use every day at home and work as well as commercial and public services, and there is huge potential for AI to transform sectors and society.

Organisations have recognised that building AI capability may enable them to realise efficiencies, be more effective, and provide better services. However, the emerging technology also brings potential challenges. Accordingly in the public sector, guidance has been issued for civil servants using generative AI (UK Government 2024), there are regulations around use of AI in public services (e.g. via the Information Commissioner’s Office), and frameworks have been published for development of AI (e.g. the Generative AI Framework; Central Digital and Data Office, 2024). The available guidance emphasises that organisations need to carefully consider proposed AI-enabled delivery so that the resulting approaches, business processes, and ways of working can be developed and deployed responsibly.

There are specific issues for the environment sector. The importance of machine learning to interpret ‘big data’ that would otherwise be impossible or impractical for humans to analyse (e.g. in earth observation) is well established.<sup>1</sup> Nevertheless, the potential impacts of a broader shift towards AI enabled policy practice is still being explored.

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<sup>1</sup> For example, Natural England has a strong history of using machine learning. E.g. the AI for Peatlands project ([https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Conf%202022%20Speaker%20PWRPTs/2\\_Ane%20Williams.pdf](https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Conf%202022%20Speaker%20PWRPTs/2_Ane%20Williams.pdf)) and Living England map (<https://naturalengland.blog.gov.uk/2022/04/05/living-england-from-satellite-imagery-to-a-national-scale-habitat-map/>) (Accessed: June 2024)

## Aims

The “AI and the Future of Professional Knowledge” project was intended to enable strategic thinking around the integration of AI and what it may mean for professional knowledge within the environment sector. Insight can be obtained from the wider literature, but how AI will develop is uncertain and little is known about how practitioners conceive the opportunities and challenges different AI-enabled futures might bring for them and their work more generally. This project was intended to begin to fill that knowledge gap. This may inform how environmental organisations (and specifically, Natural England as the project sponsor) may frame a response and positively shape a future with AI.

## Project structure

Natural England joined a research collaboration brought together by Jigsaw Foresight that included the Law Society of England and Wales, the Royal Society of Chemistry and a global manufacturing company. This collaboration enabled a wide range of insights from a variety of professional backgrounds to be brought together and inform research and responses around developments of AI technologies through cross-disciplinary discussion. The present report focuses on insights developed through that collaboration within Natural England in January to April 2024 via a rapid project designed to build a strategic overview of AI and its applications. It was recognised that the pace of technological development of AI meant that insights could be out of date quickly, so this project was designed to produce outcomes quickly, and to be easily repeatable in the future as required.

## Research questions

Following an internal staff survey about awareness of AI and discussion in Natural England’s Science, Evidence and Analysis governance groups, a question set was created to orient this project towards particular organisational and sector-specific requirements. These questions revolved around two main areas of interest: tools and applications, and governance and engagement.

### Tools and Applications

1. What are some key current applications of AI to sustainability, environment, and nature recovery?
2. How might AI tools develop in the future? What might be the key benefits / opportunities and risks / threats emerging?
3. How might new AI tools help enhance capabilities? For example:



- a) Operating more efficiently.
- b) Monitoring changes in the natural environment and the key drivers of those changes.
- c) Making better use of data.
- d) Engaging people in nature recovery.
- e) Supporting access to and interpretation of evidence for Natural England staff and the public.
- f) Communicating across the organisation and externally.

## **Governance and Engagement**

4. What principles, standards and guidance exist to underpin the use of AI?
5. How might such principles, standards and guidance continue to evolve? In particular, how can 'responsible research and innovation' be applied to the development and application of AI tools?
6. Is a 'balance' of benefits and harms (exploiting opportunities vs mitigating risks) an appropriate approach or are there more fundamental issues involved (e.g. rights-based approaches)?
7. How might AI effective standards and guidance be established? For example:
  - a) Tailor development activities to the challenges brought by AI.
  - b) Shape decisions to invest in the new technology.
  - c) Enable consistent understanding and approaches to the development and use of AI.
8. How might we best engage in ongoing constructive dialogue with staff and stakeholders on the development and use of AI tools? For example:
  - d) Identifying the range of experiences, understandings and values among colleagues and stakeholders.
  - e) Enabling learning from experience.
  - f) Enhancing governance of data and knowledge activities including the use of AI.
  - g) Taking a broader and evolving view of ethical, legal and social (ELS) considerations of the development of use of AI in nature recovery and business delivery (ways of working).

## 2. Research process

This project comprised a set of activities intended to encourage consideration about how AI technologies can or should be integrated and the consequences of such developments.

There were three main aspects of the project: (1) Horizon scanning to identify themes for future scenarios and identify key themes in the available literature. (2) Creation of 'change cards' representing trends leading to different futures. (3) Qualitative exploration and reflection primarily in a workshop involving practitioners (Natural England staff and partners).

The approach focused on providing a space to voice emotional and intellectual responses to discourse around AI. This design allowed participants with different levels of knowledge of AI to join discussions in a meaningful way. The narratives surrounding AI technologies have generated strong reactions amongst many professional knowledge workers globally,<sup>2</sup> and this project supported constructive exploration of potential changes catalysed by AI development.

### Horizon scanning

Horizon scanning was undertaken on the topic of AI and the future of knowledge professions as structured by the questions above. The horizon scanning process involved a team of researchers searching for articles in news feeds, foresight resources, online journals and blogs around developments in AI technology pertinent to the knowledge professions using keywords.<sup>3</sup> The aim was to capture important and developing themes for development and discussion rather than to provide an exhaustive view of all AI-relevant material.

Articles were added to a database and tagged with the core driver behind the change using the PESTLE-V framework (Political, Economic, Social, Technological, Legal, Environmental and Values). This broad scanning process identified sources before focusing more narrowly on the research questions to track specific changes as well as broader shifts in the knowledge professions and AI technology.

A scanning 'huddle' every two weeks allowed the researchers to review some of the main articles of interest, share opinions and ask questions, alongside

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<sup>2</sup> E.g. <https://futurism.com/scientists-ai-threatens-science> (Accessed 28 June 2024)

<sup>3</sup> Search terms included: Artificial Intelligence, AI, Generative AI, Environment, Nature, Knowledge.

representatives from the organisations involved in the research collaboration in a type of reflexive practice.<sup>4</sup> Articles were grouped around ideas and concepts based on some of the themes iteratively gathered from the horizon scanning and the research questions.

## Change cards

The horizon scanning process was the basis for the creation of a series of change cards that related to the original research questions. The cards were intended to highlight ways in which AI could impact on the environment sector and support discussion of the desirability, risks and potential benefits of these impacts. The collection of change cards identified 12 emerging trends, with each card highlighting sources that explored the trend/change, a summary of how these changes could have an impact, and what could affect their impact. Each change card had an associated prompt to be used in a futures wheel exercise at the staff engagement workshop.<sup>5</sup>

## Workshop

An online whiteboard area was created to be used as a gathering space for conversations around AI and professional knowledge leading up to, during, and after an in-depth workshop. This record was augmented with facilitator notes following the workshop based on the discussions (see Figure 1).

The workshop was conducted online and included around 35 participants from a variety of professional backgrounds predominately within Natural England, but also including participants working for NatureScot, Natural Resources Wales, the Northern Ireland Environment Agency, and the Law Society of England and Wales. Participants represented their own views rather than those of their organisations. Participants included operational (local teams, planning/licensing), strategy, and technical (scientific and analytical) staff. This was an opportunistic sample not designed to be representative of the organisations or broader environment sector practitioners. Participants were randomly split into seven groups. Each group had a different futures wheel / prompt based on a change card assigned to their group, although participants were given access to all change cards prior to the workshop.

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<sup>4</sup> E.g. Olmos-Vega et al. (2022).

<sup>5</sup> For futures wheel see Glenn (2009)

Participants thought through the different layers of consequences based on the future change assigned to them.

After spending time in break-out groups with facilitators, participants were invited back into plenary to explore the futures wheels of other groups and discuss any similarities and differences. Participants could add their comments directly to the online whiteboard as well as contribute verbally. Facilitators made notes and following the workshop these were collated and summarised through exploring joint understandings.

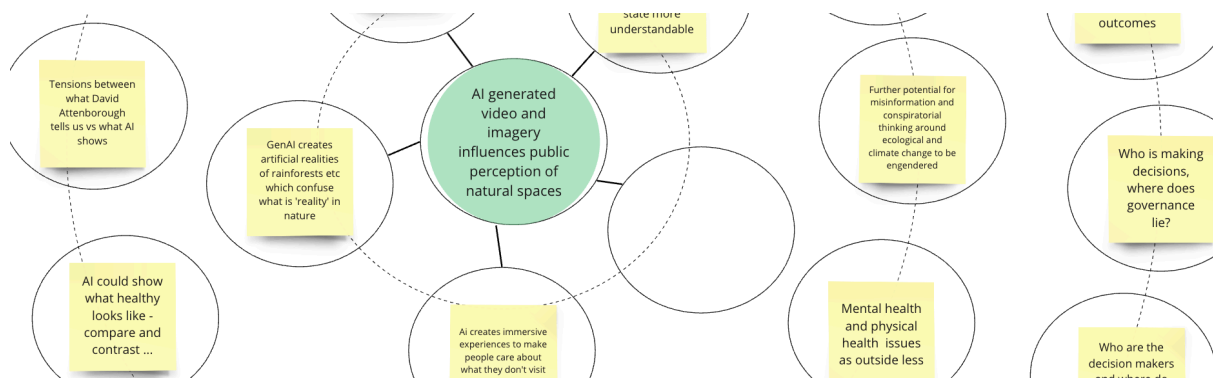


Fig 1. Screenshot from workshop whiteboard

### 3. Results

#### Horizon scanning

The change cards created via horizon scanning are available as Appendix 1 with a summary provided in Tables 1 and 2.

Table 1: Tools and applications change cards

Title	Summary	Prompt
The digitisation of species	AI use by ecologists to monitor species and environments	AI tools informed by tracking sensors monitor the health of wildlife
Another green world	Developing “digital twins” of real environments	AI powered simulations of environments are used for policymaking
Predictive impacts	The use of AI systems to predict change and take pre-emptive action	AI tools create better predictions of the weather

Title	Summary	Prompt
A heap of broken images	Generative AI creating false representations of natural environments	AI generated video and imagery influences public perception of natural spaces
Hearts and Minds AI	The use of AI tools as propaganda	AI models are used to summarise and "translate" policy decisions to the public
All Chat no Action GPT	The potential for AI technology to be overhyped and have limited use-cases	Hype around AI potential triggers government mandates and targets to force adoption of AI tools

**Table 2: Governance and Engagement Change Cards**

Title	Summary	Prompt
Who watches the watchmen	Government legislation and regulation around AI systems	UK AI regulation only allows certain governmental departments to use AI tools
Rights versus risk	Different regulation approaches to AI such as a rights-based (consider human impact) rather than risk-based (limit potential damage) approach	The UK adopts a general rights-based approach to AI regulation
The right way forward	Lack of guidance within organisations around AI tech use	AI tools banned for decision-making work
Speed-running life	Potential impact of AI tools on the speed of production in different fields	With the use of AI tools, project delivery and reporting time is halved but the rate of mistakes increases
Beyond the Body of knowledge	Impact of AI technologies on research and publication including the prospect of robotic laboratories powered by AI tools	Generative AI models are used to write and summarise reports in evidence gathering processes
Onboarding AI	The need to onboard AI systems within workplaces	AI interns are hired alongside human interns

# Review

While not being an exhaustive review of the available literature, there were insights from the topic searches around AI tools and applications with respect to the environment sector, and how environmental organisations could establish governance and staff engagement mechanisms to control the use of AI.

## Tools and Applications

### Current applications of AI to sustainability, environment and nature recovery

Generative AI models, like ChatGPT and other Large Language Models (LLMs), have more general applications, whereas narrower models (often under the designation of "Machine Learning") tend to focus on specific tasks and fields of data (Davie, 2024). Machine learning has been used for some time to locate signals or find patterns from large datasets, examples of this range from recognising specific animal calls from recordings or finding patterns from arrays of sensors deployed in an ecosystem (Konya & Peyman, 2024; Marshall, 2023; Ryo, 2023). The recent hype around AI was largely centred upon LLMs and their introduction to the public. Their implications for sustainability, environment and nature recovery are still being explored. Several companies have set themselves up as third-party services working between users and cloud-based LLMs, focusing on automation of business processes, development of personalised marketing campaigns, automated service responses (like chatbots), summarising large documents, and email assistants (Shein, 2021). Many concrete applications for AI tools in business delivery are still, as of early 2024, to be determined (Fletcher & Nielsen, 2024). There is also an issue around the training and maintenance of AI models that are having a negative impact on the environment and sustainability goals (Crawford, 2024).

### AI tools' future development

So far, AI tools developed for specific use-cases tend to be unable to work well outside of their established functions. On the other hand, LLMs are more general but are not always accurate and prone to bias and "hallucinations" (incorrect outputs; Metz, 2023).

There are several emerging developments in AI technology that are relevant for the environment sector.

1. Bringing multiple sources of data together under one central command centre that uses AI to process and make sense of different sources of information. For example, data from sensors, satellites, drones and other Internet of Things (IoT) devices are being combined and processed by AI tools for enhanced accuracy and precision. This kind of system has already been deployed on ecosystem monitoring, agriculture, and in emerging fields

like "Spatial Finance" – the integration of geospatial data and analysis into financial theory and practice (Luberisse, 2023; Papenbrock, 2023).

2. The use of AI tools in medical diagnosis may be comparable to the monitoring and implementation of environment policy. AI tools are being used to help diagnose issues and recommend actions faster and with more accuracy than humans could (Harper, 2023). Applications in the environment sector include spotting patterns / changes in habitat, species distribution, and human-environment interactions.
3. Through digital twin technology, AI advances offer numerous opportunities for realistic simulations of real-world spaces, improving current models and simulating larger environments. These could provide a 'sandbox' to test and evaluate environment policy and practice, as well as predict future pressures for land managers.
4. Further into the future, "quantum AI" that uses quantum computing with artificial intelligence could radically extend the capacities for modelling the natural environment (Reichental, 2024; Turliuk, 2024). These approaches could enable the modelling of environments at an incredibly precise scale (including the simulation of microbiological life), increasing the accuracy of predictions.
5. The use of generative AI could bring new voices to bear on environmental policy and/or to enable wider engagement. It would be possible to use AI, for example, to summarise the views of societal groups such that they could be involved in the formulation of policy (e.g. through training models on specific sections of the population) and even to have nature 'speak for itself'.

Some of the risks of this development are based on concerns around keeping "humans-in-the-loop" when these systems are used to trigger activity. There is also concern around data reliability and quality, and the potential for missed variables in any system aiming to track an environment in its totality.

### **AI tools' potential**

Separating the hype around AI tool productivity benefits from the reality of its use in the workplace can be challenging. In theory, the automation of "positive" work outputs should increase productivity, but negative aspects of the workplace could be automated as well (e.g. AI tools could usher even more emails and spam content; McMillan, 2024).

AI technology works on data and needs a technical and decision-making infrastructure around it to function. For the environment sector, access to sensor devices and robust networks are a couple of limitations for monitoring the natural environment with AI tools. Additionally, since natural environments have multiple uses and owners, AI-enabled insights still need to be agreed with and acted upon, which highlights the overall need for human relationship-building alongside technical development.

One of the strengths of AI tools is their ability to find new patterns and connections within diverse data sets. This strength could be bolstered by access to more data. However, data privacy and licensing issues could challenge data availability, with ethical issues around training LLMs on user data from social media platforms and on other content published on the web but used without permission. There is an emerging international discussion around the "politics of data" as they are used by large technology companies for their own ends (Asaro, 2023; Matulionyte, 2024; Sehgal, 2023).

AI tools could also be used to summarise and translate data from research documents in language that is more accessible, enabling better communication across organisations and the public. This use of AI tools could help connect the public to issues of the natural environment and raise awareness, but in each of these cases human workers will have to create the prompts and determine what an AI system needs to create, and why – there is no quick automated fix (Wong, 2024).

## **Governance and Engagement**

### **Benefits and harms of AI**

Specific cases of AI-related harm have already been documented (e.g. bad actors using generative AI models for fraudulent or exploitative use; Mole, 2023). While the use of AI requires new discussions around its potential positive and negative impacts, experience of previous innovations and 'disruptions' indicates the importance of considering: (1) AI tools' context (where they are used and what human operators use them for), (2) What counts as a harm and for whom and when (e.g. the potential for long-term unintended consequences), and (3) Appetites for risk (therefore, tolerance for mistakes). Wider societal values will also be important, such as public perceptions of institutions that use AI models to make decisions or in communicating (e.g. to generate images; Safi et al., 2024; Taylor, 2024), transparency and trust. This indicates that a key challenge is overcoming lack of clarity about what AI tools have been trained on, therefore what rights may have been ignored in that process and what biases could be inbuilt in the system (Appel et al., 2023). Even bespoke generative AI systems tailored to specific organisational needs have often been built upon foundation models that may have been trained on copyrighted material or content from social media sites (Claburn, 2024).

### **Principles, standards and guidance around AI**

The development of AI requires better technology (needs led, accessible and useable, reliable), enabling humans to use it well (knowledge, competency, skills, and behaviours), and governance that allows user needs to be met while being mindful of technical, social and legal issues. Organisations have taken different approaches to how to control the use of AI tools. Overall (at time of writing), away



from the public sector, in many industries there has been relatively little guidance on how employees can use AI technologies despite concerns around data protection (Ranger, 2024). As many LLMs are readily accessible to the public for free, limiting staff use has been seen as difficult to enforce. Some companies have opted to develop their own AI models, trained on company data, to avoid data privacy issues (McKinsey's *Lilli* model is one example; McKinsey, 2023). Examples of AI guidance in legal settings can be found in the Courts and Tribunals Judiciary and the Law Society's guide for its members on generative AI.<sup>6</sup>

### **Evolution of guidance and responsible research and innovation**

There is an ongoing need to focus on building resilience to AI risks – for example, preparing for shocks and surprises, and the influence of 'bad actors' aiming to cause harm through deliberate actions (disinformation; see Galaz et al., 2023). Guidance around AI use will be subject to what AI tools prove capable of doing. This is still being explored, with users discovering ever more use cases for AI tools and LLMs. AI tools can take several forms, and this carries different implications for development of guidance. For example, some LLMs allow users to upload data that can be analysed by their AI model, but other tools essentially function like an enhanced search engine, one having more privacy risks than the other (David, 2024; O'Brien & Parvenu, 2024).

Within research and innovation, the need to provide reliable sources and provide opportunities for disagreement at various levels of decision-making may encourage an approach to AI models that augment human knowledge rather than function as a "black box" replacement for human knowledge workers. Innovation around AI tools need to factor in wider impacts on the organisation and the non-technological infrastructure needed to create automated workflows (BaHammam, 2023). Innovation is a continuous process, most effectively driven by purpose not just by capabilities, building a culture of iterative anticipation, interaction, reflection, and response (Carr et al., 2016).

### **Strategic standards and guidance around AI**

The high levels of uncertainty and emergent uses around AI tools make any long-term standards or guidance difficult. The ability to respond to emerging opportunities and issues around AI development in a way that is acceptable to employees and wider society will be key to developing effective approaches to AI use for organisations (e.g. Zirar et al., 2023). Regularly gathering insights from the workforce

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<sup>6</sup> <https://www.judiciary.uk/wp-content/uploads/2023/12/AI-Judicial-Guidance.pdf>;  
<https://www.lawsociety.org.uk/topics/ai-and-lawtech/generative-ai-the-essentials>.

as AI technology evolves will also be invaluable to this end, in particular encouraging critical assessments of emerging technology and gathering a variety of perspectives on the ground to anticipate how it will fare in implementation, interact with existing processes and systems, and disrupt or enable business approaches. AI is still in its infancy, and while it is difficult to predict the future, enabling organisational agility and flexibility may prove key ingredients for being well-prepared.

### **Building a dialogue around AI**

Sharing work practices, such as recording staff use-cases for AI in their workflow, could be a constructive way to share knowledge and openness around integrating AI tools (Jarrahi et al., 2023). Practices like this also help organisations get a better picture of the potential use for AI tools within the workplace and allow workers to assess the effectiveness of AI tools. There may also be benefits from understanding how people perceive, approach and interact with AI – with different behavioural responses likely from different applications of AI although the core technology and its capabilities remains the same (e.g. McKee et al., 2023).

AI tools are not a magic bullet to solving workplace delivery problems, and successful integration of AI tools requires substantial effort to set up (Field, 2023). Sharing and gathering knowledge around innovative use of AI tools will be a necessary discipline for effective integration. We found that the workshop for this project offered one such space for effective sharing of knowledge and discussion around AI developments. Working collaboratively across internal departments and other fields of professional knowledge work helped participants to engage in wider impacts of technological developments beyond the scope of their day-to-day work.

## **Workshop discussions**

Discussions in the workshops can be grouped into the following themes: data and gaps, power and vulnerability, rights and no rights, opportunities and threats, and increase in scope along with greater complexity.

### **Data and Gaps**

**Summary of views: Issues concerning data accessibility, data bias, and incomplete datasets are significant in considering the future use of AI in the environment sector.**

Participants agreed AI could bring benefits in enabling new and faster analysis (including evidence synthesis), and new ways of explaining scientifically complex environmental concepts – including enabling the public to ask direct questions of AI ‘experts’. However, they were not confident in AI-enabled models (including those based on AI-generated data) developing in ways that were transparent. Participants

specifically linked not knowing what large language models have been trained on, and how outputs have been created, with a lack of trust in these models overall. Participants' positions on how far such AI-derived environmental knowledge could be seen as having legitimacy was central to their perspective of AI as being a positive or negative disruption. Participants with experience of 'narrow' AI contrasted the different types of AI, with generative AI-led analysis and processes seen to have the potential to undermine the more auditable methodologies associated with machine learning / deep learning approaches.

It was felt that there were positives of AI systems being able to draw from wider and more diverse ranges of sources than humans, but there were also challenges concerning possible bias. Participants raised the potential problem of bad data sets, with AI systems amplifying the impact of in-built biases as well as the "Habsburg Effect" where AI-generated data distorts future AI models. This was seen to be an acute issue for the environment sector, where AI-powered systems may not model the environment correctly leading to poor decision-making and environmental damage that could be hard to recognise and undo. The conclusion was that there would be a negative impact if AI systems became normalized without sufficient (and good) data on which to confidently base their judgements.

With specific reference to Natural England, AI was seen to have the potential to clash with Natural England's values, and inappropriately promote one approach over others. One participant stated: "[Natural England] is an evidence-based organisation – AI might not follow that logic". Participants suggested that AI needed to 'understand' the difference between correlation and causation in how it interpreted data, so that it could avoid incorrect implications for action. Several potentially problematic uses of AI were discussed, including AI-generated imagery having the potential to give a false sense of natural environments and biodiversity, thereby degrading the importance of work on the ground to understand and recover nature.

### **Power and Vulnerability**

**Summary of views: To achieve benefits for the environment / nature, we need to understand the 'winners and losers' of AI models, who they are designed for (hence, who they exclude), and what counts as *good AI*.**

Participants felt AI could empower people and democratise expertise, potentially challenge institutional power and enable better local/personal connections with nature. AI could challenge decision-making in a variety of ways, for example by forcing the need for more transparency over how decisions are made through opening this up to AI-enabled technologies. However, participants also noted that incorporation of AI into systems could also have a "black box" effect where decision-making is hidden behind "technical walls". AI models could create a lower risk of reputational damage if a wrong decision is made, since the AI could be blamed, but

that this could also reduce overall confidence in the decision-making process. This reflected a general feeling that AI needed to be carefully developed and controlled to ensure that outputs led to 'fair' decisions.

The theme of fairness was closely related to that of control. Participants reflected that a convergence or development of a monopoly amongst AI systems could lead to a weakening of alternative viewpoints. This could exclude those without access to the technology or for whom the underlying data were not complete / accurate. Participants discussed concerns around who has the power to regulate and review the data generated by AI models (in organisational terms as well as in a wider legislative sense), as well as the need to standardise the quality of AI models so that limitations could be clearly understood and controlled.

Participants felt that AI could affect a workplace in several ways. First, at an organisational level, some participants raised a concern that the pressure to be seen as ahead of the technological curve could impact funding decisions negatively if resources were directed towards what was new rather than what was effective. Second, some participants argued that AI use could increase burnout amongst staff from the increased speed and quantity of information they were confronted with – with people reportedly already feeling negative effects of 'information overload'. This was offset with the potential for AI to act as a digital assistant, which again depended on how much the AI was trusted. Third, participants discussed the potential for complacency if AI systems were seen as infallible, and also for reduced opportunities to challenge what seems wrong. There were discussions around how best to train staff in a future workplace embedded with AI systems to avoid these issues.

As a counterpoint, there was also speculation that AI technologies could prompt a move towards "human-only" industries and economies if AI was distrusted, seen as a lower quality option, or took over in key sectors.

## **Rights and No-rights**

**Summary of views: The regulation of AI systems may be difficult in the environment sector, and the various ways AI can uphold or ignore rights, and the erosion of human rights to object, have implications for action to tackle climate change.**

A participant queried, when considering environmental issues "What does 'AI works' look like? Works for whom?" This exemplified a discussion about how AI tools are integrated into the workplace, what environmental decisions they could support, how these systems work with or against current understandings of human rights and needs, and how AI supports or weakens particular views of the world – including the core tenets of conservation and environmental policy. Participants expressed concern around the kind of values that AI systems will have, given the opaque ways

they are developed and the apparent lack of input to-date from the environment sector in this development. It was generally felt that the complexities about the 'rights' involved in environmental policy (such as weighing local and national objectives, expectations of different communities, and animal and human needs) posed risks for decision systems based on AI. Participants questioned the effectiveness and reach of protections that could be provided to humans and other species affected by AI systems, particularly in a future where AI / AI enabled decisions were afforded primacy over human ones or even had some degree of autonomy. One participant imagined a potentially more distant future and asked: "What happens if AI is given rights, yet AI doesn't value nature?"

The form of legal frameworks and regulation of AI as it relates to the environment was discussed in this context. Participants felt that in a context of global geopolitical uncertainty there was a potential for AI technology to be leveraged by private and state actors to get an advantage over rivals, with negative impacts for the position of AI as a 'truth-teller'. It was felt that global AI jostling might cause different regulations and laws in different jurisdictions, leading to loopholes in what might be in place to protect the public and the environment from negative aspects of AI. Similarly, the effectiveness of regulations and guidance was questioned when deployed amongst different firms who are in competition with each other. Participants discussed how the UK's response to the clamour for AI technologies might affect opportunities to use AI to find workable and equitable solutions for environmental problems. There was a broad concern that failure to embed human rights into AI technology would worsen inequality exposed and accentuated by crises such as global warming.

### **Perceptions of opportunities and threats**

**Summary of views: AI technology may influence how organisations operate, both in terms of their delivery focus and their role, and how we perceive the environment and nature.**

A perceived conceptual distance between the environment sector and AI was raised by participants, with an imbalance between the fast speed of AI models and the slow pace of nature. This was seen to potentially make it more difficult to bring a focus on AI-enabled (positive) change. Nevertheless, participants felt there was potential for hype around AI tools to encourage the environment sector overall to become more digitally and data mature, since AI represented a powerful application, with large potential benefits, requiring good technical infrastructure and governance. Participants felt there were several other opportunities brought by AI. AI could help decision-making, either by simulating or predicting the ramifications of certain decisions, or by offering scenarios for future change quickly, helping people to consider a wider range of options. There was a perceived enhanced role for environmental organisations in a future dominated by AI systems, participants noting

the ongoing need for human connection, empathy and the ability to maintain trust as well as being seen as a reliable source of information.

It was also recognised that AI potentially brings challenges. Participants compared two futures. First, AI tools could help encourage more creative work by staff when mundane tasks were automated. Second, an opposite effect where work shifts from humans having meaningful impact to being quality assurers of AI (“factory checkers”). AI was seen in both to have the potential to fundamentally change working in the environment sector, and participants felt organisations would need to “reimagine” what is wanted from staff to prevent them feeling marginalised and help them to feel a connection with organisational priorities. Some participants also noted a possible threat posed to natural environments by AI infrastructure (e.g. via the need for large data centres), that the “dopamine draw” of virtual environments could replace the natural environment in various ways, and that a greater reliance on AI-designed everyday materials (including drugs and food) could over time challenge what we value about nature.

### **Benefits and disbenefits of technological sophistication**

**Summary of views: AI systems offer increased scope for developing knowledge but also bring increased complexity which may be difficult to manage.**

Participants raised the view that AI tools could draw from more data sources and add perspectives from knowledge areas that have been traditionally paid less attention, which was seen as a positive outcome of using AI. A practical example would be AI models that simulate real world environments, affording more access to remote parts of the world creating “intellectual access” beyond the limits of physical travel. Further, AI tools supporting the scientific process could enable researchers to widen the scope of what they are looking at and give them more time to engage in higher level discussions about their findings, thereby improving their impact. The need to manage the complexity of AI systems, including the potential for different AI tools to be working together, was voiced by participants, and there was concern around potential conflicting views of different AI systems – for example, tools generating different responses to habitat condition assessments. Participants emphasised the dangers of AI hallucinations and other inaccuracies in this context, and felt there was a need to explicitly recognise AI-generated content, to increase knowledge of the various types of AI systems (e.g. large language models, machine learning) and their limitations, and have processes in place to manage potential inaccuracies and conflicting AI outputs.

## Overall

The data collated by this project challenged the extent to which different AI applications can be grouped together for strategic / management purposes. Sources and workshop discussions suggested deployment context is important in assessing AI's acceptability for environment sector practitioners and public, technical opportunity and risk, and potential for misuse.

The workshop discussions overall supported further in-depth, strategic debate around what AI means for the environment sector, and the following activities in particular.

1. Guidelines to be produced and/or further developed for the use of AI in the environment sector to enhance public trust in outputs, including ensuring transparency about AI use, accuracy of underlying data, and ability for humans to 'audit' AI outputs.
2. Developing skills in the environment sector to increase knowledge of the various types of AI systems / approaches and their limitations.
3. Focusing on decision-making processes to define the (potential) role for AI and the connected responsibilities (technical, social) of human actors in these processes. This should include AI as environment simulator, predictor, information consolidator / translator, and AI automation.
4. Continued examination of how human rights, needs, and concepts of environmental justice can be integrated into AI-supported decision-making and AI tools themselves – including consideration of equitable use and equal representation.
5. Discussions between environmental organisations and their staff to understand and direct the impacts of AI on their roles, put in place ways of working to mitigate risks where possible (including information overload), and enable responsible use of AI according to organisational priorities and wider societal values.

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# Appendix 1

Change card collection for the AI and the Future of Professional Knowledge project.

# The Digitisation of Species

**What it is:** Ecologists are using machine learning programmes to monitor and preserve endangered species. AI systems are being used to locate characteristics of specific animals from large amounts of recorded data - identifying species in computer imagery or recognising animal calls from audio recordings.

**How it could change things:** These AI tools could drastically reduce the amount of time spent by researchers sifting through large amounts of data, which could also drive an increase in data collection and digitisation. Digitisation of the environment/nature could shift perceptions and understandings of what nature is and what we recognise as "good" data. There could also be a challenge to our current understandings of "expertise" if machine learning programmes become the primary mediator between in-the-field data and decision-makers.

**What could impact this change:** Access to the right technology. Improvements in machine learning model's ability to recognise meaningful data from noise. The extent to which narrow AI models (trained on specific tasks) will be interoperable with other models designed for different tasks, and how these narrow models will relate to larger, more general AI systems.

## Sources:

[Conservation meets machine learning](#)

['Bear-dar' uses AI to protect communities and polar bears](#)

[How AI is acting as nature's defender on an island hosting thousands of puffins](#)

[Magpie geese return with help from ethical AI and Indigenous Knowledge](#)

**"Nature is not more complicated than you think, it is more complicated than you can think."**

Frank Edwin Egler, 1977

# Another Green World

**What it is:** Creators of "digital twins", digital representations of real-life objects and environments, are using AI to create larger and more accurate simulations of the environment. The University of Loughborough has recently received funding to create a self-learning digital twin of the UK, incorporating real time data to deliver advice on how to cut down greenhouse gas emissions. Others hope that machine learning could generate more objective climate models and reduce computational strain on current systems.

**How it could change things:** The speed and scale at which AI systems can process data could lead to better and more effective decision-making around environmental issues. AI systems could also encourage an over reliance on quantitative data, with increasing conflicts between diverse groups of stakeholders that find themselves caught in automated systems that cannot process subjective experience and community values. The ability to model complex systems digitally could generate new and creative policies that can be modelled in the digital environment before being put into practice, but this could also create a reliance on simulations that reduce critical thinking around objectivity and uncertainty.

**What could impact this change:** The ability to collect and access data. Digital twins of nations would represent a significant security risk. The space where technological "solutionism" meets politics, and public opinion could become increasingly fraught in the near future. Development of projects like Nvidia's Earth 2 project, a realistic model of the Earth to a metre scale.

## Sources:

[Revolutionary environmental artificial intelligence infrastructure detailed in new report](#)

[Machine learning and the quest for objectivity in climate model parameterization](#)

[UK's AI 'twin' will use big data to show the way to net zero](#)

[More Data, More Problems: Is Big Data Always Right?](#)

[Earth for AI: A Political Ecology of Data-Driven Climate Initiatives](#)

**"If climate change is now a data problem, whose problem is it and how should it be resolved?"**

# Predictive Impacts

**What it is:** Researchers are using AI systems to predict and take pre-emptive action in the environment. Denise Hardesty uses an AI system to identify plastic waste in remote locations and prevent it from entering water systems. In the UK a pilot programme in Devon deploys sensors in rivers and fields, along with satellite imagery, to monitor the local river system. An AI model has been trained on past data gathered from the region and will use live data from the sensors and satellite imagery to guide decisions that impact water quality, such as advising farmers when to use fertiliser for less water contamination. AI models are also being developed to predict weather patterns with increased accuracy using larger data sets.

**How it could change things:** Better predictions around forces in human and natural systems could benefit the environment, and protect people from extreme weather events, but the use of AI in this context could also cause greater damage when they go wrong. The link from making better predictions to taking action is not guaranteed - who or what agent will be able to act on these predictions? Will a perception of greater accuracy in prediction lead to a reimagining of all 'incertitude' as 'risk' - where all that matters is using the 'right' probability distribution?

**What could impact this change:** Technological development of sensor devices and "edge computing". Public perceptions of how AI systems are being used to make decisions especially the kind of automatic decision-making that AI systems are being designed for.

## Sources:

[Using Artificial Intelligence \(AI\) to research ways to stop plastic pollution from entering our environment](#)

[AI to stop water pollution before it happens](#)

[New AI systems could speed up our ability to create weather forecasts](#)

**"The first phase of the AI project was a desk-based model using historic data, with CGI saying it predicted pollution events with 91.5% accuracy."**



# A Heap of Broken Images

**What it is:** Many generative AI models can create realistic video, imagery and sound that many find difficult to distinguish from the real thing. Digital media forms that are currently relied on as evidence for what is happening in the world may lose their power in the face of AI-generated imagery and deep fakes.

**How it could change things:** Public trust over what counts as evidence could come under even more stress, and various systems could be vulnerable to false media - there has already been a case of a viral image fake having a real negative impact on the US financial system. Alternatively, there could be reactions against digital representations with a return to more non-digital and in-real-life experiences. If AI technology is used in decision-making, there could be a public backlash against perceived technocratic regimes of control. In this situation there might be greater debate and interest in how evidence is gathered and constructed, revealing conflicting societal values.

**What could impact this change:** Regulation around AI-generated content. Systems that are developed to trace AI generated work (although Open AI recently acknowledged that their version of this had failed). The efficacy of "Poison AI" tools that fool AI models into associating the wrong meta-data to web-scraped images, undoing the model from within.

## Sources:

[Deepfakes and scientific knowledge dissemination](#)

[Can We No Longer Believe Anything We See?](#)

[OpenAI Quietly Shuts Down Its AI Detection Tool](#)

[This new data poisoning tool lets artists fight back against generative AI](#)

**“The rapid advent of artificial intelligence has set off alarms that the technology used to trick people is advancing far faster than the technology that can identify the tricks.”**

# Hearts and Minds AI

**What it is:** We are already seeing the use of AI to sway public opinion on events, in both informative and divisive ways. During the wildfire disaster that swept through Maui in August 2023, China promoted a narrative that the fires were the result of a secret weather weapon developed by the United States, using AI-generated imagery to back up their claims. There is also the hope that large language models like ChatGPT will be able to translate complicated scientific theories to the public, creating increased awareness. In both cases, AI is already being used as a powerful tool for propaganda and engagement.

**How it could change things:** The media landscape could be weaponised in new ways. With increased connectivity, the way that events are perceived by global populations could be as important as the event itself. The speed at which information, true or false, could be disseminated will even destabilise AI systems that rely on scraping information from the web. The need for greater self-awareness and critical thinking could become key attributes of human workers, whilst AI-generated media could flatten the complexity of issues with mass produced and dumbed-down content.

**What could impact this change:** Advances in wearable technologies, such as Meta's recent patent on in-ear devices that link electrical signals to brain activity, could bring information closer to the human brain, with even fewer barriers between human neurological processes and the media sphere.

## Sources:

[China Sows Disinformation About Hawaii Fires Using New Techniques](#)

[What does ChatGPT mean for biology and the environment?](#)

[The professor trying to protect our private thoughts from technology](#)

[Meta Patent | In-ear functional near-infrared spectroscopy for cognitive load estimation](#)

**“All of these different patents, by themselves, are pretty powerful, but take all those data points from all those different sensors and put them together, you start assembling a person, and that person now has depth.”** Jake Maymar

# All Chat No Action GPT

**What it is:** Drawing on data from recent surveys, some reporters have noted that the level of discourse on AI within companies compared to actual use of artificial intelligence tools in everyday tasks is heavily skewed towards the former. In a survey amongst US businesses, it was found that 3.8% of them use AI to produce goods and services, with the majority of that coming from IT companies. For some, AI is increasingly seen as a bubble.

**How it could change things:** CEOs are also struggling to navigate the best course of action around AI technologies. With few large-scale use cases to hang onto, some have speculated that AI will only work best in smaller, disruptive companies as described in Elaine Pofeldt's *The Million Dollar, One Person Business*. If AI is more hype than substance, or just a solution to a different kind of problem than is faced by most businesses, organisations that over-invested in AI could be worse off. AI's lack of obvious success could challenge assumptions that technology is the main driver for innovation, with renewed focus on needs-led innovation from within society rather than solutions being imposed from technology companies.

**What could impact this change:** ChatGPT and other tech startups that have come out of Silicon Valley in the last couple of decades have benefited from an era of low interest rates that encouraged wide scale investment in speculative projects, and, allowed many companies to run at a loss as they gained market share. Global economic volatility could change the status quo.

## Sources:

[Should CEOs double-down on business transformation in the face of uncertainty?](#)

[Only 3.8% of Businesses Use AI to Produce Goods and Services, Highest Use in Information Sector](#)

[The AI hype bubble is the new crypto hype bubble](#)

[Big Tech Struggles to Turn AI Hype Into Profits](#)

**"...the overhyped aspect is that it, in one fell swoop, can deliver substantive business change... there's almost never a silver bullet answer there – there's never one thing you can do with AI that solves that problem in full."** Brad Lightcap, COO OpenAI

# Who watches the watchmen?

**What it is:** Concern around the potential power and uses of AI technology have led to calls for regulation and improvement of current models. Current propositions include; government legislation, AI containment (technological methods for monitoring and controlling the behaviour of AI systems), more open and diverse datasets to train models, and, explainable AI (a set of tools and frameworks to help users understand and interpret predictions made by machine learning models). To date, China is the only country to have created and enforced AI legislation, the EU finalised their "AI Act" in December 2023 but will take a few years to come into force, while the US government has asked leading tech companies to agree to eight commitments ensuring safe development of AI technology.

**How it could change things:** Different regions could end up having different AI regulations, with some areas prioritising innovation at any cost, whilst others take a more protectionist stance with less exposure to some of the risks around AI use. Greek economist, Yanis Varoufakis, believes we already live in a state of technological hegemony and surveillance that has usurped traditional political structures and turned us into "cloud serfs". The legislation of AI, or even whether this is possible to achieve, could reveal how deeply entrenched techno-feudalism has become.

**What could impact this change:** The evolving nature of regulation and uncertainty around various legislative procedures around AI use. Will copyright law finally come for large scale AI models that have been trained on data scraped from the web?

## Sources:

[Regulatory Framework Proposal for Artificial Intelligence](#)  
[EU's AI Act negotiations hit the brakes over foundation models](#)  
[AI regulation around the world](#)

**"There are more regulations on sandwich shops than there are on AI companies."**

Dr Stuart Russell, University of California

# Rights Versus Risk

**What it is:** So far, most discussions around AI regulation have taken a risk-based approach, seeking to limit the risks associated with the technology. One example of this is the EU's tiered system of AI models. "General purpose AI models" (read ChatGPT, Bard, etc.) were deemed "high-risk" by the EU because of their capacity to produce content that could threaten fundamental rights or societal values. However, others have suggested that any regulation around AI technology should take a rights-based approach linked to current frameworks of human rights. Rather than assessing the risks of AI generated outputs being used in various places, a rights-based approach would consider how human rights are being upheld or denied throughout the entire process of training and utilising AI models. It has been argued that a rights-based approach would tackle issues of bias in the data used to train AI algorithms and the unforeseen interactions and uses of AI systems on the general population.

**How it could change things:** Government institutions have mainly taken risk-based approaches to regulation, but critics note that this does nothing to challenge some of the assumptions and base encoding of data at the heart of many AI foundation models - we might always be building off inherently flawed algorithms. Developments within AI ethics and regulatory frameworks could mean that use of AI technology is banned in certain areas.

**What could impact this change:** Geopolitical competition, such as a predicted "AI arms race" between US and China could mean that getting ahead on AI technology defeats any attempt to regulate or limit AI tech thoroughly.

## Sources:

[The EU should regulate AI on the basis of rights, not risks](#)  
[The Pillars of a Rights-Based Approach to AI Development](#)  
[What would a human rights-based approach to AI governance look like?](#)  
[Towards a Human Rights-Based Approach to Artificial Intelligence](#)  
[Beyond a Human Rights Based Approach To AI Governance: Promise, Pitfalls and Plea](#)

**"The fact that AI systems can operate in unpredictable ways, and that systems that ostensibly perform "simple" or routine tasks can end up having unforeseen and often highly damaging consequences, deepens the risks."**

# Speedrunning Life

**What it is:** AI has been promoted as a tool that will increase the speed of work, if this becomes a reality the pace of life, work and leisure time could increase exponentially. Sociologist, Paul Virilio, believed that the speed of communication technologies contain their own kind of pollution that has profound impacts on human society and our perceptual grounding of living in time and space.

**How it could change things:** In the TV series, *The Simpsons*, there's a dialogue between the main character and his son that relates to issues of increased speed: "There's three ways to do things, the right way, the wrong way, and the Max Power way." "Isn't that the wrong way?" "Yeah, but faster." There could be many unknown consequences of the increased speed afforded by AI technologies. There could be quicker breakthroughs on a variety of technical and scientific problems, but there could also be a disproportionate impact on when things go wrong, with new forms of automated accidents. In a workplace obsessed with speed there will be the propensity to cut corners and sidestep principles. Technological developments could catalyse new conversations around the pace of life, questioning what lies underneath the need for speed in our work. Perhaps there will be designated slow zones?

**What could impact this change:** Attempts to slow down AI through greater regulation that requires checks and balances. How much AI technologies will actually be integrated into specific areas of work. Breakthrough use of AI in one work area will probably raise expectations around how long it takes to do things in other work areas - a domino effect.

## Sources:

[4 Charts That Show Why AI Progress Is Unlikely to Slow Down](#)

[How AI Will Revolutionize Warfare](#)

[How artificial intelligence is transforming the world](#)  
[Speed Pollution](#)

**"I think that the infosphere... is going to impose itself on the geosphere. We are going to be living in a reduced world. The capacity of interactivity is going to reduce the world to nearly nothing... there is already a speed pollution, which reduces the world to nothing." Paul Virilio, 1996**

# Beyond the body of knowledge

**What it is:** AI tools that are trained on research papers and used to summarise large documents could optimise the way information is shared and understood, but they could also exacerbate a "too long; didn't read" culture that misses nuance and gives too much power to AI models. In these developments there is also the potential for "self-driving labs" - "robotic systems that use AI to form new hypotheses, based on analysis of existing data and literature, and then test those hypotheses by performing hundreds or thousands of experiments." In this future, humans may not need to read or conduct the research first-hand.

**How it could change things:** Tools that extend the human senses for scientific research and experimentation have been around for centuries, but AI developments could lead to new forms of disembodied knowledge production. There could be an increase in scientific discoveries, as well as new connections from older research that has been processed by AI tools. There could be a greater need for data interpreters with so much information being produced by machine learning systems, whilst traditional researcher jobs become more automated.

**What could impact this change:** "Habsburg AI" describes the situation when AI models are increasingly trained on AI-written material, resulting in deformed AI models. In this scenario, the datasets used to train AI models could become more narrow, making these models less effective. There could be laws or requirements that AI outputs must have human oversight and there could be resistance within laboratories towards any shift to self-driving labs.

## Sources:

[The Business of Extracting Knowledge from Academic Publications](#)

[How artificial intelligence can revolutionise science](#)

[What are self-driving labs and how are they transforming the chemical industry?](#)

**"Robert Hooke, an English polymath, described the advent of new scientific instruments such as the microscope and telescope as "the adding of artificial organs to the natural". They let researchers explore previously inaccessible realms and discover things in new ways, "with prodigious benefit to all sorts of useful knowledge".**

# Onboarding AI

**What it is:** AI models will need to be shaped and taught by human workers for the technology to be integrated into the workplace. Many have argued that both human workers and AI systems will need to be trained to work effectively. On the one hand, AI models need to be fine-tuned by human workers for specific tasks and diversify their training data, and on the other hand, human workers need to understand AI tools, how they work and how they should best be used in different work settings.

**How it could change things:** Seeing AI development as a cooperative task between human worker and machine puts the integration of AI tools in a more positive light, emphasizing the agency of human workers to shape these tools rather than being replaced by them. Joseph Aoun, in his book *Robot-proof*, argues that education systems will need to be reoriented around technical ability, data discipline and human disciplines that machines cannot replicate. Learning and development approaches may have to change to meet the new and rapidly changing demands of the workplace integrated with AI technologies. AI use in entry level jobs could have an impact on tradecraft, where novices miss the mundane grunt work that helps to develop them into mature professionals.

**What could impact this change:** Workplace rules around AI may limit the kind and amount of data needed to train more company-specific AI models. How the workforce will accept AI technologies is also an uncertainty that will impact how AI is onboarded in teams. Poor strategies and understanding around embedding AI technologies in the workplace will also affect how AI is integrated.

## Sources:

[“Model collapse” shows AI doesn’t have the human touch, writer says](#)

[Why AI investments fail to deliver](#)

[Humanics: A way to ‘robot-proof’ your career?](#)

[On AI's dislocation of human labor, we owe the workforce better guidance](#)

**"The success or failure of AI initiatives has more to do with people than with technology. "**



