

Labour Party National Policy Forum: Our digital future consultation

Introduction

The Royal Society is the National Academy of Science for the UK and the Commonwealth. It is a Fellowship of many of the world's most distinguished scientists working across a broad range of disciplines in academia and industry. The Society draws on the expertise of its Fellows and Foreign Members to provide independent and authoritative scientific advice to UK, European and international decision makers. The Society's fundamental purpose, reflected in its founding Charters of the 1660s, is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity. Our strategic priorities therefore are to promote excellence in science; to support international collaboration; and to demonstrate the importance of science to everyone.

The Royal Society welcomes the opportunity to submit written evidence to the Labour Party National Policy Forum's 'Our Digital Future' consultation. This submission first highlights the tensions that exist between the advantages and disadvantages of the expansion of data-enabled digital technologies, before going on to address the consultation's specific questions drawing on the Society's areas of expertise.

Key Points

1. The expansion of data-enabled technologies brings huge benefits to society

- Digital technologies are revolutionising every aspect of innovation, from earth observations for studying climate change and supporting development, to improving scientific productivity through 'in silico' techniques such as modelling and simulation, to sensing and analytical tools revolutionising business models.
- The well-governed use of data and data-enabled technologies can stimulate innovation and efficiency in public services, provide evidence for research, improve productivity and deliver significant economic and wider social benefits to the UK, from improving healthcare and treatment discovery, to better managing critical infrastructure such as transport and energy.
- For example, investment in digital technologies has huge potential to support the UK's transformation to net-zero. As technologies develop and systems for data use evolve, there will be further opportunities to find new ways of carrying out everyday tasks, with digital technologies bolstering a low-carbon revolution.
- Data Science can also address major challenges such as the current pandemic, which has shown how data is part of our critical infrastructure

2. However, there are some potential risks associated with the expansion of data-enabled technologies that must be managed

- *Data capture and processing is increasingly pervasive:* Huge amounts of data are now produced by new actors and at new scales on a daily basis, often linked to new societal uses of technology, as wearable devices quantify individuals' health, social media platforms record the minutiae of daily life, and companies across sectors produce data to improve their products and processes. Other data capture happens less deliberately, as individuals walk around retail spaces equipped with sensors, connect to public Wi-Fi hotspots, or use services such as on-demand taxis.

- *Data collection and use are becoming harder to separate:* Whereas previously data would be collected about a specific activity in order to inform a specific purpose, the link between data collection and pre-defined purpose is weakening.
- *Non-sensitive data can hold sensitive insights:* Existing forms of data that people have readily shared online, such as videos, images or text, now betray considerably more information than when existing governance mechanisms were shaped. Robust and future-proof anonymisation is becoming increasingly challenging as the data environment becomes an interlinked and open network.
- *Bias and unfairness:* Using data which reflects bias and unfairness in society can mean that machine learning algorithms inherit subjective biases which are present in the data on which the algorithms are trained. This can lead to bias and unfairness in algorithmic decision making. Gaps in data can also impact vulnerable groups if they are missing from the data.

3. Steps must be taken now to ensure that nobody misses out the on benefits of digital technologies

- In the context of changing patterns of work and longer productive lives, equipping school leavers with the knowledge, essential skills and resilience to handle an uncertain future - including an expectation and opportunity to continue learning throughout life.
- The Society is calling on the Government to establish a Royal Commission to seek to set out a vision for a secondary education system that will nurture future generations of innovative thinkers and resilient citizens.
- Any review should consider key concepts that all young people must understand to ensure that they can successfully navigate the rapidly expanding digital world. An analysis of the future data skills needs of students, industry and academia is needed to inform such a review.
- Women make up a disproportionately small fraction of the educational pipeline associated with data science positions. Further efforts are needed by all stakeholders to increase diversity, including gender.

4. COVID-19 has illustrated the need to rapidly improve data readiness

- The COVID-19 pandemic has been a striking example of the need for robust data systems and the importance of a digitally enabled society. The rapid assembly of evidence for analysis in tackling the coronavirus pandemic has been hampered at all levels by data access and sharing. While there have been impressive new data systems established at pace, there have been major obstacles in terms of comprehensive and connected collection of data; data quality; the ability of researchers to access data from the public and private sectors, and sharing data across the health system. These need to be overcome in order to create resilience to future pandemics and to enable researchers to provide evidence and analysis at pace.

Consultation Questions

1. How can we promote digital innovation across all of the UK's regions and nations? How can we ensure it generates good, fulfilling jobs for everyone as we build back, better?

- 1.1. The rapid evolution in digital technologies will have an impact on all sectors across every one of the UK's regions and nations. We are already seeing this change. For example, over a five-and-a-half year period from 2013 to 2018, there was a sharp rise in UK job-listings for 'Data Scientists and Advanced Analysts' (+ 231%) driven predominately by increased numbers of vacancies for Data Scientists and Data Engineers¹ This is an opportunity to generate new high-quality and long-term employment opportunities. But while there is

¹ <https://royalsociety.org/-/media/policy/projects/dynamics-of-data-science/dynamics-of-data-science-skills-report.pdf>

considerable strength in UK data science in academic, industrial, charitable and government sectors, the UK needs a sustainable flow of expertise to become a leading data science research nation. There is a parallel need to retrain people and provide opportunities for lifelong learning for groups whose jobs are changed due to automation – see response to question 5 in addition to the below.

- 1.2. Universities can play a key role in supporting this transformation by working in new ways to upskill the workforce. Those with good industry links can play an important role in developing appropriate professional training. By working in collaboration with employers they can help address regional skills gaps and productivity needs. There are pools of potential talent which could be reached to address local needs and there could be more courses, apprenticeships and work placements outside of London and the South East. Employer-led Trailblazer groups and public sector bodies should further support and expand existing programmes, such as those run by the Office for National Statistics and the BBC, and work together to resolve knotty delivery issues.
- 1.3. There are also synergies between promoting digital innovation and achieving other objectives relating to building back better. For example, digital innovation can play a major role in achieving net-zero. The UK's net-zero target will require major emissions reductions from all sectors of the economy. Rapid and unprecedented changes in energy, land use, urban development, transport, infrastructure and industrial systems are needed, with implications for how individuals live and work. Digital technologies could support this transformation, and there are opportunities now to invest in the digital sector in ways that could help achieve the net zero target. Digital technologies have already reshaped many daily activities – from online retail to on-demand transport services – with individuals using data-enabled systems to bring physical activities into the digital realm, reducing carbon emissions in the process. As technologies develop and systems for data use evolve, there will be further opportunities to find new ways of carrying out everyday tasks, with digital technologies bolstering a low-carbon revolution. There is a near endless list of areas where machine learning and conventional computing can be deployed to improve efficiency and lessen the impact a process has on the climate. Machine learning in self-driving cars, for example, is promising a future of more efficient journeys as computers replace humans behind the wheel. Combining digital sensors, wireless networks and computer algorithms can help farmers shift to precision agriculture, where the amount of water, fertiliser and energy they need to grow their crops can be improved. Offices and our homes can be better monitored to ensure they are only heated and cooled as needed.

2. What principles should govern our lives online and protect us all against harm? How should they be enforced?

- 2.1. While the current UK data governance architecture provides a great deal of what is necessary right now, it must continue to evolve to meet future challenges. The Society, jointly with the British Academy, published a set of four high level principles in 2017 in its report *Data Management and Use: Governance for the 21st Century* that should guide this process:
 - protect individual and collective rights and interests
 - ensure that trade-offs affected by data management and data use are made transparently, accountably and inclusively
 - seek out good practices and learn from success and failure
 - enhance existing democratic governance.
- 2.2. We also identified the following core functions necessary for a successful data governance landscape:

- **Anticipate, monitor and evaluate:** considering alternative futures, managing risks, keeping pace with changes, and reflecting on performance.
- **Build practices and set standards:** enabling and continuously improving well founded practices that can be spread quickly across relevant sectors and uses.
- **Clarify, enforce and remedy:** ensuring sufficient arrangements for evidence gathering, debate and decision-making, and for action in the forms of incentives, permissions, remedies for harm, incentives and penalties.

2.3. Following this, a number of institutions and initiatives have been established, each playing a different and complementary role, as outlined below. The Centre for Data Ethics and Innovation (CDEI) was created in 2018, following our recommendations. It is too soon to comment in detail on how well the CDEI is operating, however it is important to recognise that it exists alongside a number of complementary organisations including the Ada Lovelace Institute, which has a mission to ensure data and AI work for people and society.

2.4. It will be important to keep a holistic overview as this governance landscape develops. In June 2020, the Royal Society published [The UK data governance landscape: explainer](#) providing an overview of key UK organisations and structures currently responsible for data governance and an overview of key UK organisations that advise on data governance. This explainer also provides a brief introduction to how different kinds of governance and advisory organisations address key areas in data governance, such as data ethics, data privacy and anonymisation, data-sharing and data interoperability, data protection and security, and responsible innovation, as well as some key resources for further engagement with these areas. Setting out the landscape in this way can help to show where there are areas of data use which are not adequately covered by the existing landscape, or where the functions of governance set out above are not being carried out.

2.5. There is also benefit in developing a professional framework for data scientists with shared codes of practice, including appropriate governance of data collection and use and ethics training is an important short-term goal. We are pleased that the Royal Statistical Society, British Computer Society and Operational Research Society are developing professional standards for data science. The UK government is currently in the process of a consulting on a National Data Strategy that will continue to shape this environment: <https://www.gov.uk/guidance/national-data-strategy>

3. How can we put people in charge of their online lives? Do we need stricter – or different - rules for how large corporations and public bodies use our personal data?

3.1. Strong data governance is needed to guarantee public confidence and to ensure people are in charge of their own online lives. Ensuring that individuals and organisations can exercise the appropriate rights and controls over data is essential to the data economy and is at risk unless we build the right approach to data rights and control. This goes hand in hand with a basic grounding in data literacy from primary education onwards (see question 5).

3.2. Ensuring that the data governance landscape works for the new digital age is a work in progress, and some of the core concepts that underpin governance of data use are challenged by current technologies and data management practices. These include consent and the idea of data ownership.

3.3. In October 2018 the Royal Society held a seminar with the British Academy and techUK to explore and understand what is meant when individuals and groups refer to ‘owning’ data or ‘my’ data, and to explore the concept, value and limitations of data ownership from individual and organisational perspectives, in both the private and public sectors. It considered the sound bases from which to consider and probe the concept of data

ownership and discussed issues relating to the ability to exert rights and control over data use and assessing and accessing the value of data.

- 3.4. The seminar identified the following key points as warranting further consideration and discussion moving forward:
- Use of the term “data ownership” raises significant challenges and may be unsuitable because data is not like property and other goods that can be owned or exchanged
 - Instead discussion should explore the rights and controls individuals, groups and organisations have over data, and should encompass a societal as well as individual point of view
 - Broader debate could help to better describe the data rights and controls that are often associated with the concept of ‘data ownership’².
- 3.5. The Ada Lovelace Institute, in which the Society is a partner, is actively carrying out an important programme of research and public engagement that will understand and evolve new data narratives, and learn from international data access and data partnerships, to inform best practice and create regulations that strengthen data rights.

4. How can the government better use tech to work for the public?

- 4.1. Realising the potential of digital technologies will require access to well-governed data, but large-scale data analysis may be constrained by important legal, reputational, political, business and competition concerns. The recent COVID-19 pandemic has demonstrated the importance of data access and sharing at pace. There have been major obstacles in terms of comprehensive and connected collection of data; data quality; the ability of researchers to access data from the public and private sectors, and sharing data across the health system. These need to be overcome in order to enable researchers to provide evidence and analysis at pace.
- 4.2. Certain risks relating to data use can potentially be mitigated and managed with a set of emerging technologies and approaches often collectively referred to as ‘Privacy Enhancing Technologies’ (PETs), PETs are a nascent but potentially disruptive set of technologies, which, combined with changes in wider policy and business frameworks, could enable significantly greater sharing and use of data in a privacy-preserving, trustworthy manner. PETs could create new opportunities to use datasets without creating unacceptable risks.
- 4.3. PETs are therefore a potential tool in enabling the ethical management and exploitation of data. The UK can drive the development and adoption of PETs. There is an opportunity for government to lead by example in demonstrating the utility of these approaches³. Government can be an important early adopter, using PETs and being open about their use so that others can learn from their experience. Government departments should consider what existing processing might be performed more safely with PETs and how PETs could unlock new opportunities for data analysis, including opening up the analysis of sensitive datasets to a wider pool of experts whilst fully addressing privacy and confidentiality concerns.
- 4.4. The Government Digital Service (GDS) was a step in the right direction in terms of raising the competence of civil servants in the utilisation of 21st century digital technologies. However it is important to ensure that the whole of the civil service accelerates and mainstreams its utilisation of digital tools and techniques.

² <https://royalsociety.org/-/media/policy/projects/data-governance/data-ownership-rights-and-controls-October-2018.pdf>

³ <https://royalsociety.org/topics-policy/projects/privacy-enhancing-technologies/>

5. How can we ensure that no-one is excluded from the digital revolution. What are the main barriers to digital inclusion and how can we remove them?

- 5.1. In the context of changing patterns of work and longer productive lives that will be shaped in part by the digital revolution, equipping school leavers with the knowledge, essential skills and resilience to handle an uncertain future - including an expectation and opportunity to continue learning throughout life – will be crucial. This need for resilience and adaptability - both of our education system and our young people - has never been clearer than during the Covid 19 pandemic, which has already significantly disrupted the education of young people and it is likely to entrench disadvantage further. –To navigate future challenges and make the most of new opportunities, our young people need an education that provides a broader range of skills and knowledge, including a mastery of technology, a focus on what cannot easily be automated, and interpersonal skills.
- 5.2. While other top-performing countries have refocused their education systems, the structure of learning and assessment in the UK nations has remained broadly the same for decades. We urgently need to examine what kind of education system will equip our young people for the future and what knowledge, skills and experience our schools and colleges should deliver and assess, and how. For this reason, the Royal Society is calling on the government to establish a Royal Commission to seek to set out a vision for a secondary education system that will nurture future generations of innovative thinkers and resilient citizens.
- 5.3. As daily interactions with machine learning become the norm, a basic grounding in what machine learning is, and what it does, will be necessary in order to grasp how our data is being used. Such digital citizenship will become an essential tool for navigating the digital world and will need to be learned by people of all ages. Throughout the education system we should also strengthen the development of data literacy, as a basic understanding of key concepts in machine learning introduced at primary school can help with navigating this new digital world.
- 5.4. There are already many school-based and extra-curricular initiatives to encourage data literacy. Machine learning and data science should be factored into both curricular and enrichment activities in this space, and in relation to scientific and other non-scientific subjects. Steps to increase machine learning literacy, and engagement in data science, from a young age may therefore include:
- Key concepts in machine learning being introduced as part of the computing curriculum, with students interacting with or coding machine learning algorithms in practical classes.
 - Insights from machine learning – or examples of how these systems work – being used in science classes or in non-scientific disciplines.
 - Discussions about key ethical concepts in machine learning, and the governance of access to personal data, in ethics classes.
 - Promoting, and replicating initiatives such as Code First: Girls, which supports young adult and working age women to develop further personal and professional skills. Further examples of such initiatives are set out in the Royal Society Report *Dynamics of Data Science Skills*.
- 5.5. It is essential to address underrepresentation and evaluate diversity in areas of data science including machine learning. Women make up a disproportionately small fraction of the educational pipeline associated with data science positions, and further efforts are needed by all stakeholders to address diversity, and not only of gender. This is particularly

relevant as the development of data science talent needs a wider set of skills, including those involved in identifying, understanding and interpreting real-world problems. A diverse pipeline of data scientists is more likely to pick up or be concerned by inadvertent biases in algorithms that can impact on many different types of people.

- 5.6. Digital technologies and AI are of course likely to influence working lives in a range of ways. To ensure that already disadvantaged groups are not adversely affected, it is important to consider the means for meeting the likely demand for re-training for displaced workers through new approaches to training and development; and introducing measures to share the benefits of AI across communities, including by supporting economic growth.
- 5.7. A large number of people continue to have poor, limited or no access to high-speed internet or good quality mobile phone coverage. This has increased feelings of isolation and loneliness during the pandemic, particularly for older people and those living in rural areas. According to the 2019 Labour party manifesto, only 8-10 per cent of premises in the UK are connected to full-fibre broadband, compared to 97 per cent in Japan and 98 per cent in South Korea. This, along with 5G mobile phone coverage, should be rolled out across the whole of the UK as a priority.

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