Written evidence from British Academy, University College London [PCW0054]

1.0 Introduction

1.1 About the British Academy

The British Academy is the UK's national body for the humanities and social sciences – the study of peoples, cultures and societies, past, present and future. We have three principal roles: as an independent fellowship of world-leading scholars and researchers; a funding body that supports new research in the humanities and social sciences, national and internationally; and a forum for debate and engagement – a voice that champions the humanities and social sciences.

The humanities and social sciences have a rich and unique contribution to make to the world we live in. The British Academy's fellowship represents breadth and excellence across these disciplines, and the Academy's policy work is dedicated to applying that insight to policy issues for public benefit and societal wellbeing. We bring independence, authority and objectivity to complex issues to enlighten the context, meaning and practicalities of challenges in public policy.

We have an ongoing programme of work on data and AI. This programme asks how big data, data-driven technologies and artificial intelligence (AI) are changing the way that people live, and how we can harness this change for good. A key publication in this programme is the impact of artificial intelligence on work, an evidence synthesis by the British Academy and Royal Society (2018).

1.2 About UCL Public Policy and Grand Challenges

UCL Public Policy supports engagement between a diverse range of researchers and policy professionals in order to enhance the use of evidence and expertise in policy and decision making.

UCL's Grand Challenges of Transformative Technology and Justice & Equality convene and foster cross-disciplinary research, partnerships, and initiatives across UCL and with external partners. GCTT explores the social impacts of new technology and how data can be used for good. GCJE examines the barriers people face to justice and how societal structures perpetuate and sustain inequalities.

1.3 About this submission

This submission is a summary of discussions that took place at a recent workshop hosted by the British Academy and UCL, as part of a longer project investigating social implications of AI on the Future of Work. This workshop took place over two virtual sessions on Monday 22 and Monday 29 June 2020 and included expert contribution from representatives from parliament, government, academia, business, technology, and education. Discussions were held under the Chatham House Rule. As such, this submission does not constitute a formal policy position of the British Academy nor its Fellows, UCL Public Policy, UCL Grand Challenges or any of the individual attendees of the

event, and we do not intend it to represent comprehensive coverage of the issues. However, we believe that it will nevertheless be of interest to the Committee.

The submission has three short sections:

1. What do we know about how AI might impact future skills and the quality and equity of work?
2. What don't we know about how AI might impact future skills and the quality and equity of work?
3. What should we do to advance action on AI and the future of work?

We have also attached two further documents that provide additional information:

- The background briefing paper circulated to attendees ahead of the workshop,
- The full write-up of the discussions at the workshop.

2.0 Discussion

2.1 What do we already know about how AI might impact future skills and the quality and equity of work?

Future skills

It can be very easy to overestimate what people and organisations know about AI. Significant outreach is needed, including to reach people who think that AI is not relevant to them.

The skills required for the better integration of AI into the workplace are not just technical skills in computer science. They also include skills like design, communication, critical thinking and creativity.

The pace of change in AI presents a challenge for education, retraining and upskilling because skills can rapidly become obsolete. We need a focus on adaptable curricula, transferable skills and continuous learning.

The varied ability of large corporations and SME's to upskill employees and support additional training may be amplified by advancing technology.

Quality and equity

We need to bridge the digital skills and infrastructure gap – providing everyone with basic digital literacy and access to core infrastructure like broadband internet.

Whilst overstated, there is a significant risk of creating an underclass of low-paid, low-skilled work. Avoiding this requires that AI does not exacerbate existing inequalities.

Machines built by people display bias. It is vital that we address this in order to ensure that we do not build inequities into systems that have the potential to become very powerful.

Regional and sectorial disparities will likely be further exasperated by advances in technology, its availability and the skills to take advantage of it.

2.2 What don't we know about how AI might impact future skills and the quality and equity of work?

Future skills

How might the barriers to an AI-related career increase as AI gets more complex?

What exactly are the skills gaps in the UK economy? Where are they located – by sector and by geography? Which skills might be most in demand in the future?

How do we weigh the importance of highly technical skills against more generalist 'soft' skills in future training?

How is retraining or upskilling later in life different for people with more or fewer digital skills and competencies?

How do we make better use of national assets in order to foster investment in life-long leaning?

What can we learn from other countries and AI skills initiatives?

How does the UK digital skills agenda evolve after exiting the EU?

What kinds of smart regulation does the UK need to enable action on upskilling and life-long learning?

Quality and equity

What kind of society do we want to live in?

What constitutes equitable work ?

How can we involve people with very little interest or skill in technology in conversations about technology policy?

How can we best communicate the benefits, risks and uncertainties of AI? How can we best stimulate informed public debate about the trade-offs? Who has responsibility for engaging the public in this debate?

What will the impacts of COVID-19 be?

What will the impact of exiting the EU be?

2.3 What should we do to advance action on AI and the future of work?

Employers, educators and government (at all levels) all have a role to play in advancing action on AI and the future of work that in a way that puts future skills, quality and equity at the heart. Some of these roles are explored below.

Educators

Educators need to be able to train learners to work with AI, and to understand its applications. This includes a wide range of jobs that do not yet exist. This requires education and training that focuses on adaptability, critical thinking skills, and how to learn.

The increasing ubiquity of AI will mean many more 'low code' and 'no code' jobs that involve AI. This requires education and training to ensure basic digital literacy across the population, and a better appreciation of the importance of non-coding skills like communication, problem solving and design.

Policymakers need to carefully consider the possible roles for primary, secondary, tertiary and continuing education.

Employers

Most businesses want to innovate and upskill their workforces, but there is huge variety in their ability to do so. Strategies for supporting SMEs, including those which think that AI is irrelevant to them, will need particular thought. Strategies could include working closely with membership organisations, or looking at clusters of industry in particular regions.

Workers will need to retrain and upskill throughout their working lives. This should be well-integrated into work, and educators and employers should work together. Workers should be empowered not only to develop their skills, but also to adapt their workplaces inline with the skills that they have gained.

Businesses should see improving the AI skills of their workforce and their uses of AI more widely as driven by their business purpose, rather than as part of a corporate social responsibility strategy.

Policy

There may be a significant role for government (at all levels) in coordinating and bringing together educators, employers and individuals across sectors and places to develop shared solutions.

There may also be a role for government in ensuring a basic standard of access that will underpin a positive future for AI and work. This could include minimum digital literacy standards and access to infrastructure including broadband internet.

AI is only one of the factors that will cause major changes in the nature of work over the coming decades, and it is not the first time that work has undergone a transformation related to

technology. For example, changes due to AI will sit alongside changes related to climate change, and many systems have already undergone significant shifts from paper to digital systems. The role of AI should be considered in this wider context of overlapping, interdependent factors in order to ensure an equitable transformation.

There is a role for public culture and the arts in provoking and enabling a conversation about AI, encouraging people from all backgrounds and workers from all industries to contribute their thoughts.

4. Further information

We would be very pleased to speak with you further about any element of our response. We expect to be using the outputs of this workshop discussion to develop a larger programme of work and would be pleased to keep the Committee updated as this develops over the summer.

Webpages

Data and AI, The British Academy
https://www.thebritishacademy.ac.uk/programmes/data-artificial-intelligence/

UCL Public Policy
https://www.ucl.ac.uk/public-policy/

UCL Grand Challenges
https://www.ucl.ac.uk/grand-challenges/

Annex 1
AI and the Future of Work
A Cross-Disciplinary Workshop

DRAFT NOTES

10.00am-12.00pm, 22 and 29 June 2020
Virtual

Introduction

About the workshop

The widely acknowledged digital skills gap holds potential for profound impact on future economic growth. Enabling and upskilling the workforce to take full advantage of the digital and AI technology revolution will be vital in both a post-Brexit and post-COVID-19 world. However, there remains little consensus on the ways that AI should intersect with work, or the place of Ai in the wider political, economic and social discourse. Likewise, questions remain as to how Government will be able to support the investment in lifelong skills and training that will be required to shape AI for the benefit of all.

To begin to unravel these challenges, UCL and the British Academy held a two-part, virtual workshop to identify how researchers, policy professionals, employers and training providers can respond to the changing nature of work and support the labour market.

The workshop built on the impact of artificial intelligence on work, an evidence synthesis by the British Academy and Royal Society (2018), and addressed several areas of research interest (ARIs) identified by different government departments.

About these notes

These notes summarise discussions at two roundtable events hosted by the British Academy and UCL Public Policy and the UCL Grand Challenge of Transformative Technology on Monday 22 and Monday 29 June 2020. This document is not intended to represent the views of the British Academy or UCL, nor does it represent the views of individual attendees of the event.

Part 1: What do we know, and what do we not know?

Context

Purpose of Part 1 and background briefing paper

Dr Jack Stilgoe, UCL

The aim of this workshop is to get a picture of what we know and what we don't know about the ways in which AI and work interact. We are not presuming that the causal relationship between advances in technology and changes to work is simple or unidirectional. Rather, we are interested in understanding how they are entangled, and in identifying gaps in that understanding.

In order to support discussion, all participants received a copy of a background briefing paper drafted by Em O'Sullivan, a PhD student in the Department of Science and Technology Studies, UCL. The briefing paper takes a wide range of information about AI and the future of work, and identifies a set of questions to enable a sharp discussion. Today's discussion will focus on two of the sections identified in the paper:

- *Future skills* – How do individuals view the challenges and opportunities of advancing AI technology for decision making about careers and skills development?

- *Quality and equity* – How might advancing AI impact the quality, equity and suitability of work?

Our aim is to address these questions, and in the process to tease them apart, expand them, and add new questions. Some of the directions that we might take the discussion in include:

- What skills might be required in a world in which AI is a ubiquitous feature of our lives? What will good work look like in a work with ubiquitous AI?

- What might the public be expected to know about AI and work? What might the public be expected to tell decision-makers about AI and work?

- How might advancing technology reinforce or disrupt existing economic systems? How might it change who has power in labour markets?

- Which policy areas will be affected by advancing technology and its interaction with work? For example, will it be relevant to immigration policy, or tax policy?

The briefing paper also includes a discussion on roles and responsibilities. This will be addressed in the second part of this workshop, next week. In that discussion, we will also look at more radical propositions that respond to advancing technology, such as a universal basic income or robot taxes.

The impact of artificial intelligence on work

Jessica Montgomery, The Royal Society

In 2017, the Royal Society convened a series of public dialogues on AI and the future of work. In these dialogues, two visions of AI and the future of work emerged, each occupying an extreme: AI will either be the end of employment, or it will enable a utopian society in which work problems are solved. In 2018, the Royal Society and the British Academy commissioned an evidence review to test the strength of the evidence behind these two extreme predictions.

The resulting publications, the impact of artificial intelligence on work, found that the evidence suggests that neither prediction is likely. Instead, it is much more likely that AI will have a disruptive effect on work – some jobs will be lost, some will be create, and others will change. It found that technology is not a unique or overwhelming force, and we can expect political, economic and cultural factors to all shape what type of change we see. Learning from the history of technological advances, the evidence synthesis also found that while technologies generally contribute to an increase in population-level productivity, employment and economic wealth, these benefits are only felt over quite long timelines. In the transition period there is disruption, and some people lose out.

The evidence synthesis also looked at the kinds of policy interventions that have been proposed in relation to AI and work. These include:

- *Education* – such as interventions into lifelong learning and upskilling

- *Working life* – such as social security reform to provide support to low-income workers disadvantaged in the short- and medium-term

- *Local growth and supporting businesses* – such as providing advice on businesses on how to make sure of AI technologies

- *Research and development* – such as policies to steer the development of particular technologies

Since the publication of the evidence synthesis, we have seen an evolving public discussion about AI. In 2017, we were at the peak of the hype cycle, with press coverage of AI focused on extreme scenarios. Now, in 2020, there has been a significant shift towards more nuanced discussions of how AI will change workplaces, through, for example, bias or surveillance. We have also seen an increased interest in international comparisons, and the UK Government's AI Sector Deal, which has 'good jobs and greater earning power for all' as one of its five foundations of productivity.

Since 2018, we have also seen significant changes in our wider political and social context, including the Government's 'levelling up' agenda and the current COVID-19 pandemic, both of which have the potential to have a significant impact on technology policy.

Future skills

What do we know?

What do we know about how individuals view the challenges and opportunities of advancing AI technology for decision-making about careers and skills development?

- It can be very easy to overestimate what people know about AI. Greater outreach is needed, with a clearer focus on what the challenges and opportunities of AI mean for individual workers.

- It can also be very easy to overestimate what organisations know about AI, as well as the required technical capabilities of employees. Many organisations – including educators and employers – either do not think about AI, or the range of skills and competencies required, or are nervous about it. There may be a role for government (national, regional, local) in coordinating efforts.

- Gaining skills in AI can mean a wide range of things, including opportunities across the lifecycle of AI from design to use, as well as the softer skills that are required for translating and explaining technologies.

- All interventions with workers, employers and educators (to better articulate the opportunities of AI, or to retrain and upskill) should create space for a wide diversity of experiences, and should aim for co-design and co-production.

- The current COVID-19 pandemic may create a unique opportunity to engage workers, employers and educators with AI due to an increased engagement with technology and the widespread disruption to the labour market.

- The development of skills in the future will depend on generations with digital skills and a sound understanding of the application of AI. Ensuring this, and ensuring equity with these generations (see below), requires that we ensure that all children have access to the equipment and infrastructure necessary for developing digital fluency.

- Improved access to lifelong learning is needed across the board, this is not a problem unique to AI skills.

- The pace of change in AI presents a challenge for education, retraining and upskilling, as skills rapidly become obsolete. A focus on adaptable curricula, transferable skills and continuous learning will be important.

- AI skills alone are not enough, and they are not necessarily easily transferable without sector-specific depth knowledge. Retraining and upskilling interventions will need to take this into account.

What don't we know?

What don't we know about how individuals view the challenges and opportunities of advance AI technology for decision-making about careers and skills development?

- There is little research comparing different countries.

- As AI gets more complex, the barriers to entry into an AI-related career may increase. There may be significant limits on how meaningful shorter upskilling and retraining opportunities can be, and AI-related careers may become even more exclusive.

- What are the differences between retraining or upskilling later in life for individuals with less and more digital skills and competence? How will this be different for 'digital natives'?

- What exactly are the skills gaps in the UK economy? Where are they located – by sector and geography? What skills are most in demand now, and which are most likely to be in demand in the future?

- What are the impacts of the increasing presence of 'ed tech' companies in public education systems?

- What 'no code' and 'low code' jobs will be needed as AI technology develops? What skills will be needed for roles which understand the application of technologies, but do not work directly on development?

- What do we know about how adaptable different job types and sectors are, or might be through retraining and upskilling?

- How will public trust in developing technologies and data change?

- What will the impacts of COVID-19 and exiting the EU be?

Quality and equity

What do we know?

What do we know about how AI might impact the quality, equity and suitability of work?

- The digital skills gap is a significant problem, and there is a deep gap between people who are comfortable with technology and/or who are digitally fluent, and people who do not use or have access to infrastructure like computers and broadband internet connections.

- There may be opportunities to close some parts of the digital skills gap because changing AI technologies require lots of different skills. For example, there are many roles that digital fluency is required which deep technical skills are not, that would open up work to a wider range of people.

- We know a lot about inequalities in the wider economy, even if we do not always know how AI might exacerbate or alleviate them.

- While the risks are often overstated, there is still a risk of creating an underclass of low-paid, low-skilled work. A recent report from Turing has pointed to an economy in which it is the middle-skilled jobs that are most affected, leaving highly paid, highly skilled work on the one side, and low-skilled work on the other. This will vary significantly by sector.

- Algorithms built by people display bias. Addressing this will be crucial to ensuring that we do not build inequities into systems that have the potential to become very powerful.

What don't we know?

What don't we know about how AI might impact the quality, equity and suitability of work?

- What kind of society do we want to live in? If we do not articulate this, we may find that inappropriate targets are set, for example based purely on GDP. A wide range of perspectives, including from the humanities and social sciences, should be engaged in the discussions about the kind of society and economy that advancing AI can be pointed towards.

- How much do we know about what people think constitute 'good work'?

- How can we best communicate the benefits of AI? How can we accurately communicate the risks and limitations, and stimulate informed public debate about the trade-offs?

- What is the role for government in coordinating, communicating and intervening?

- How can we involve people with very little interest or skill in technology with conversations about technology policy? These people risk being significantly impacted by advancing technology, but rarely have a seat at the table.

- What will the impacts of COVID-19 and exiting the EU be?

Part 2: What should we do?

Context

Summary of Part 1 and purpose of Part 2

Professor Rose Luckin, UCL

The first part of the workshop focused on the questions of what we know and what we don't know about AI and the future of work (summarised above). We identified a wide range of useful questions, focusing on future skills and quality and equity. Most importantly for the second part of the workshop were questions such as:

- *Quality and equity* – What kind of society do we want to live in? What constitutes 'good work'?

- *Future skills* – Where are the skills gaps in the UK economy – by sector, by geography? What kinds of non-technical skills will be needed to enable people to work well with technology?

The second part of this workshop will consider these questions, asking what should be done to address them, and whose responsibility it is to address them, considering geographical and sectoral variations.

Provocations

The wider political and policy landscape

Anna Bradshaw, The British Academy

Our conversations today take place in the wider political and policy context. Four key issues in that wider landscape to keep in mind during our discussions are: (1) the policy ambitions of the (still relatively new) government, including 'levelling up' and, possibly, changes to the civil service; (2) the ongoing process of leaving the EU; (3) the current COVID-19 pandemic and the coming recovery and expected recession; (4) major global protest movements including the Black Lives Matter movement and the youth strike for climate.

The role of employers

Rob McCargow, PWC

A recent survey by PWC of over 20,000 adults in 11 countries found more than half expect AI to change their job, and over 60 per cent are positive about the impact of technology on their work. However, while most (77 per cent) respondents would re-train in order to improve their employability, only one third are given the opportunity to develop their general digital skills. It is the responsibility of employers to upskill their workforce, providing opportunities to their employees; PWC has looking to upskill its entire workforce. However, the unilateral action of individual businesses will not be sufficient. We can look to examples of good practice, like the Digital Skills Bridge in Luxembourg that brings together businesses, government and third sector organisations to develop a national strategy and a support mechanism for employers.

The role of education

Vanessa Wilson, University Alliance

One of the key purposes of education is to prepare learners for work. This purpose will be of increasing importance in the short and medium term as we move out of the immediate COVID-19 crisis into a possibly terrible recession, and in the long term as we see an ever-increasing role for technology at work. Key questions to ask include: (1) At what level – primary, secondary, tertiary – should preparation begin? (2) How do the curricula and teachers' skills keep pace with developing technology? (3) How can we equip current workers to survive and thrive? (4) Whose responsibility is it to ensure that the workforce of the future is appropriately skilled? (5) How can we make AI an technology attractive to current and prospective students? (6) How can we ensure that technology is harnessed to level up and create parity of opportunity, instead of repeating or even exacerbating the inequities of the past?

Discussion

Policy and education

What might be the responsibility of different groups in advancing action on AI and the future of work related to education?

- The skills that will be needed include both technical, STEM skills and the wider pool of adaptable critical thinking, analysis and communication skills that come from other disciplines. The comparatively extreme narrowing of the curriculum in the English education system may, therefore, be an obstacle to developing the skills required by the workers in the future.

- Educators need to think about how to train learners for jobs that do not yet exist. Educators need to be able to teach adaptability, critical thinking skills, how to learn, and make technology approachable.

- Any policy that seeks to educate future workers should start by asking what a good AI professional looks like, and what skills will be required for good jobs in the future. There may be a whole range of solutions, from basic foundational skills in digital literacy, through the ability to operate with machine learning systems, to advanced skills in building and understanding these systems.

- There is a significant piece of work to be done to consider how skills might be developed throughout primary, secondary and tertiary education. The greatest potential for closing inequities are in primary, but currently AI is rarely considered until much later.

- Any changes to education and training will have workforce implications for teachers, lecturers and trainers. This may be a particular challenge given how rapidly technology changes, but a focus on adaptable, transferable skills could provide a more stable starting point.

Policy and employers

What might be the responsibility of different groups in advancing action on AI and the future of work related to employers?

- Most businesses want to innovate, but the diversity of businesses means that policy should play an enabling role, not a prescriptive one. Larger big business and larger employer have much more capability to upskill their workforces than SMEs. Strategies for supporting SMEs will need to look very different, with consideration for differences across sectors.

- Engaging with SMEs may be difficult. In particular, it will be difficult to reach SMEs who do not think that AI has anything to do with them. Possible strategies for engagement could include utilising FSB and membership organisations, and providing tangible case studies of the benefits.

- There may be significant opportunity to engage regionally, as clusters of employers can work with local government, e.g. financial services in London or the car supply chain in the Midlands.

- There is a significant movement towards understanding how business should be driven by purpose, and the responsibilities of business towards the environment. An argument for businesses' role in building a digital skills base could made from the same starting point. This is not to say that businesses should not appreciate the potential financial benefits of AI.

- Workers should be empowered not only to develop their skills, but also to change their workplaces with the skills that they have gained. To do this well, workers need to understand their position in wider networks.

- There may be an interesting role for consumer preferences and public perception in changing AI practices, if consumers or the media demand greater transparency in AI supply chains in a similar way to has occurred over environmental sustainability or ethical labour practices.

Policy, education, and employers

- Once people are in employment, there is still a significant role for education and training, as technological change means that people will need to upskill and reskill throughout their working lives. This training should be well-integrated into work, and educators and employers should work together to develop training.

- There is a significant role of university-business relations and knowledge exchange, and how government can support this. There may be a role for government in supporting collaboration and ensuring that hard-to-reach employers and smaller teaching universities and colleagues can engage.

- A policy like the Apprenticeship Levy that applies more widely could be used to fund skills training across the entire workforce.

- It would be useful to look at international comparators for systems in which policy enables educators and employers to work together to provide workers with the skills they need and learners with opportunities to apply their learning.

Policy and individuals

What might be the responsibility of different groups in advancing action on AI and the future of work outside of educators and employers?

- AI is only one of the factors that will cause major changes in the nature of work over the next decades, and it is not the first time that work has undergone a transformation related to technology. For example, changes due to AI will sits alongside changes related to climate change, and many systems have already undergone significant shifts from paper to digital systems. The role of AI should be considered in this wider context.

- Ensuring that AI enables greater equity will require a basic standard of access, including minimum digital literacy and access to infrastructure including broadband internet.

- There is a significant role for academia, think tanks and other third sector organisations in innovation and challenge.

- There is a significant role for public culture and the arts in provoking and enabling a conversation about AI, encouraging people from all backgrounds and workers from all industries to contribute their thoughts.

Closing remarks

Reflections and next steps

Dr Jack Stilgoe, UCL

This discussion has, in many ways, made the questions we were asking helpfully less clear. The roles and responsibilities of policy, educators, employers and individuals are complex and overlapping. It reminds me of a quotation from Carl Sagan that I use with my first-year students:

> *We've arranged a global civilisation in which most crucial elements profoundly depend on science and technology. We have also arranged things so that almost no-one understands science and technology.*

While many people take this quote to mean that we need to become better scientists, I don't think that Carl Sagan would have agreed. Rather, better understanding science and technology also means understanding a whole range of issues, from data quality and the hidden labour of AI to bias, equity, and ethics. What today's discussion has clarified is that our approach to understanding AI and the future of work needs to be interdisciplinary and inclusive.

Our current moment of crisis presents a risk and an opportunity. In order to maximise the opportunity, we need to do two things. Firstly, we need an approach that is interdisciplinary, intersectoral, adaptable and thoughtful. Secondly, we need to know where we are going. We need to know what good work in a world with ubiquitous AI looks like.

UCL and the British Academy will take all of the discussion over this workshop to start to flesh out a larger project that, we hope, will begin to do these things, and to answer some of the fascinating questions we have raised

Annex 2

Artificial Intelligence and the Future of Work:

Background Briefing Paper

There is a widely acknowledged digital skills gap in the UK, with the potential for profound impact on the future growth of the UK economy. Enabling and up-skilling the UK workforce to take full advantage of the digital and artificial intelligence (AI) technology revolution will be vital in both a post-Brexit and post-COVID world, however there remains little consensus on the impact of AI on the nature of work in the UK, as well as its place in the wider political, economic and social discourse.

Likewise questions remain as to how Government will be able to support the investment in lifelong skills and training that will be required to harness this opportunity to its full for the entire UK.

The UK's Industrial Strategy names AI & Data as one of its four Grand Challenges[1]. The challenge of AI includes the questions:

- What opportunities does AI offer for the future of work?
- What problems does it raise?
- How can the prosperity created by AI and automation be used to benefit society?

There are many possible "futures"[2] of AI and work, and policy will play a key role in shaping the future work landscape of the UK. There is a need for researchers, policy makers and industry to pro-actively guide AI policy to meet this challenge.

This briefing paper provides a review of current evidence from academic and policy literature around AI and its potential impact on the future of work in the UK.

Key questions

- How do individuals view the challenges and opportunities of advancing AI technology for decision making about careers and skills development?

- How might advancing AI impact the quality, equity and suitability of work?

- What are the roles and responsibilities of Government, employers and educators in improving outcomes for individuals and society to meet the evolving work landscape?

- What are the knowledge and policy gaps that might meaningfully be addressed through collaborative multi-actor activity?

Future skills

How do individuals view the challenges and opportunities of advancing AI technology for decision making about careers and skills development?

While many people are aware of some everyday technologies that use AI, such as personal assistants on smart phones and targeted online advertisements, very few people are familiar with key AI terms such as "machine learning" or have a good understanding of how AI technologies work[3]. Sensationalist depictions of AI in the media, along with a lack of clarity from AI developers about what their technologies can and cannot do, has fed some of this confusion[4].

- A campaign of public engagement would improve general AI literacy, educate the public about the potential risks posed by AI technologies and encourage up-skilling by promoting the opportunities of AI.

- A long history of research in public engagement with science and technology highlights the fact that successful public engagement cannot be a top-down exercise. As well as educational activities, any AI engagement initiative must therefore involve a dialogue between policy makers, the public, and the AI industry, with opportunities for the public to share concerns about potential risks of AI technologies.

- The AI industry also has a key role to play in improving clarity about the capabilities and limitations of their products.

Decision making about careers and skills development is also strongly influenced by social factors such as gender, ethnicity, socioeconomic background and age.

- Increasing access to AI education and training will not automatically lead to take up of these opportunities. For example, despite several decades of initiatives to encourage more girls to study computer science, only 18% of those currently studying it at university are female[5].

The reasons behind technology skilling decisions are complex. Initiatives to reduce the AI digital skills gap will need to be informed by wider social research into technology engagement and the issues faced by members of under-represented social groups.

Quality and equity

How might advancing AI impact the quality, equity and suitability of work?

Advances in automation capabilities as a result of AI risk the loss of jobs in certain employment sectors and the potential eradication of some occupations altogether. A general consensus has emerged on what jobs are most at risk in the next 10-20 years:

- Low-income and low-skill jobs involving highly structured tasks face the most immediate risk of automation, particularly in transportation, administration and data processing, manufacturing, construction, and the fast food and service industries, as well as middle-income jobs in accounting and paralegal work[6,7].

- Geographic areas with high employment in these sectors would be the most affected, with significant variation of vulnerability to automation across different areas of the UK[8].

- This problem may be compounded by the potential knock-on effects of disruption to the labour market caused by Covid-19, as workers from affected industries such as leisure and tourism compete for low-skilled jobs in other sectors. Additionally, the process of automation is likely to be hastened with the aim of reducing social contact in workplaces.

This raises considerable equity issues as these projections indicate that the benefits of AI and automation will not be spread equally across different segments of society, and its negative impacts are likely to be felt disproportionately by people who are already in relatively low-income occupations. Some possible policy interventions to reduce inequity are raised later.

What is less well understood is how the quality of future work may be affected. Since developments in AI will create new jobs that don't yet exist and radically alter existing jobs in unforeseen ways, to some extent it is impossible to predict the landscape of the future labour market. Discussions of some of the possible impacts range from optimistic to critical:

- Potential benefits of AI on work could involve freeing up humans to focus more on jobs involving a variety of skills and jobs that utilise creativity and emotional intelligence while relegating routine tasks to machines

- AI may also make existing jobs more effective by boosting human cognitive power with AI technologies.

- In contrast, potential negatives could involve less freedom at work due to the increased monitoring of workers via sensor devices, the recruitment of mass amounts of low-skilled tech workers to do the routine work of "training" AI machines, and an increasing proportion of the workforce taking on "gig economy" and temporary contract jobs with reduced job security and employment rights[9].

Roles and responsibilities

What are the roles and responsibilities of Government, employers and educators in improving outcomes for individuals and society to meet the evolving work landscape?

The question of roles and responsibilities is the least understood area in the current literature. While there is a consensus that there is significant risk of increased economic inequality if the benefits of AI are not redistributed throughout society, many diverse and occasionally conflicting strategies have been suggested for achieving this. This section briefly introduces some of these potential avenues to prompt further discussion.

The responsibility to boost productivity and economic growth:

- Increase public funding of AI research and support businesses to roll-out new AI technologies as rapidly as possible, for example by investing in superfast broadband infrastructure.

- Create a diverse national strategy for training and recruiting new AI talent, including:
    - School curriculum reform to cover more AI and data skills, as well as focus on increasingly in-demand creative and interpersonal skills.
    - Supporting adult education and retraining initiatives, both in further and higher education institutions and in the workplace.

- Ensure talent from outside the UK retain the right to work to help reduce the existing AI skills gap.

The responsibility to reduce inequality and ensure quality of life:

- Regulate the roll-out of new AI technologies at a manageable pace to minimise negative impacts on employment and a shift to precarious and low-quality work.

- Consider financial methods of redistributing gains from AI technologies, such as introducing a “robot tax” on companies adopting automation, introducing a universal basic income or minimum income, or nationalising AI services and infrastructure.

- Prioritise research into when and how different industries and geographic areas of the UK are likely to be affected by automation in order to guide policy priorities.

The responsibility to provide legal protection for groups and individuals:

- Update employment legislation to strengthen protection for workers in the changing labour market, such as gig economy workers and contractors.

- Introduce a framework of certification and registration for AI professionals. Ensure that work outsourced to suppliers outside the UK is held to the same ethical and security standards.

The capabilities of AI continue to advance rapidly. While this briefing paper provides a snapshot of research at this point in time, an ongoing assessment of the landscapes of the labour market and the AI industry will be required in order to inform policy.

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