

Outcomes report for the ESRC and DSTL workshop on “Automation of future roles”

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1 Introduction

This short report provides the key recommendations of the ESRC and DSTL Automation of Future Roles Workshop. The workshop was commissioned by the ESRC and DSTL, developed by the ESRC Ways of Being in a Digital Age scoping project and facilitated by KnowInnovation. The original workshop proposal can be found in Annex 2. The invited attendees were a deliberately interdisciplinary mix of academics from a variety of disciplines covering social sciences, psychology, business studies, humanities and computer science. A list of attendees can be found in Annex 4.

The event consisted of a set of facilitated activities, designed to elicit ideas, thoughts opinions, and research questions from the attending experts. Details of the facilitation plan can be found in Annex 3. The core goals of the workshop activities were:

1. To Identify key research clusters and questions
2. To identify priority areas for research.

Section 2. provides an overview of the key outcomes from the workshop. Section 3 notes the recommendations for research clusters and prioritisation of topics developed at the workshop. Tables 3 and 4 lay specific topics and questions by research cluster, 'level' and priority as recommended by the workshop.

2 Overall outcomes

The workshop identified 10 research clusters:

1. Social and cultural attitudes to automation
2. Community and social issues
3. System design for being (in) digital/augmented/automated work
4. Organisations, professions and work and automation
5. Trust and accountability of automated systems
6. What is human? – What is the role of humans in a future automated society?
7. Technological limitations of automation
8. Research methods
9. Education and training in the context of automated and augmented work roles
10. Theory

Further details of these ten clusters are presented in Annex 1, Section 1. Clusters 1-8, or aspects of them, were prioritised and further questions were developed for each priority. At all times a range of cross-cutting and overlapping aspects to these research questions/clusters were identified in the workshop. It was recognised that many of these clusters and questions are interdependent, and any overarching research programme would need to address this. Six recommended priority areas were identified by two teams from the clustering work, the timeline exercise and discussion of definitions. Details of these are presented in Annex 1, Section 2. These priorities were:

1. Trust in automated systems
2. Meaningful life roles
3. Roles, system design and economics
4. Oversight and governance
5. Social impacts
6. Research methods

All areas were deemed to need interdisciplinary working. There appeared to be three levels of research focus within clusters and the priority areas:

- Wider social impacts
- Community and organisational level impacts
- Individual experiences and understandings

From this we have developed a potential project matrices by research cluster and priority (see Table 1 and Table 2).

Table 1: Project matrix by research cluster and level

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Social and cultural attitudes to automation			
Community and social issues			
System design for being (in)digital			
Organisations, professions and work			
Trust and accountability			
What is human? – What is the role of humans in a future society?			
Technological limitations			
Research methods			

Table 2: Priority areas by level

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Trust in automated systems			
Meaningful life roles			
Roles, system design and economics			
Oversight and governance			
Social impacts			
Research Methods			

2.1 Definitions

One of the initial foci of the workshop was the discussion of definitions. There were two key aspects to this discussion:

1. Automation vs/alongside Augmentation?
2. How to distinguish between “Automation” and “Digital”?

It was noted that “Automation” and “Augmentation” marked points on a spectrum of technological interventions in human action. Some systems remove all human intervention and are fully “Automated” in others the automation of aspects of a task or activity “Augment” human abilities. In any call for research both aspects need to be addressed.

It was noted in the workshop that ideas of “Digitisation” and “Automation” appeared to both overlap and sometimes be synonymous. Importantly it was recognised that digitisation provides the opportunity for considerable automation of tasks or augmentation of human actors, as it opens the data or activity to computational processing. For the purposes of this report the focus is therefore on systems that Automate tasks or Augment human action – where digitisation is in many cases a necessary but not sufficient condition for the Automation or Augmentation.

2.2 Other issues

It was also argued that there is a need to address, support and understand research *impacts* around:

- Beliefs and experiences
- Development and implantation of systems
- Government and organisational policy and strategy
- Overall socio-economic impacts

The workshop also noted that any next steps needed to address:

1. The need for systematic literature reviews across multiple disciplines to ensure that existing knowledge and finds are well documented
2. Given the breadth of the topic the appropriate funding models needed to be addressed.

Suggestions included:

- a. Seed-corn funds for specific case studies
 - b. Cross council interdisciplinary sandpits or co-ordinated calls
 - c. Dedicated PGR provision.
3. It was also noted that the topic raised key questions for Humanities and that the involvement of the AHRC might be appropriate.

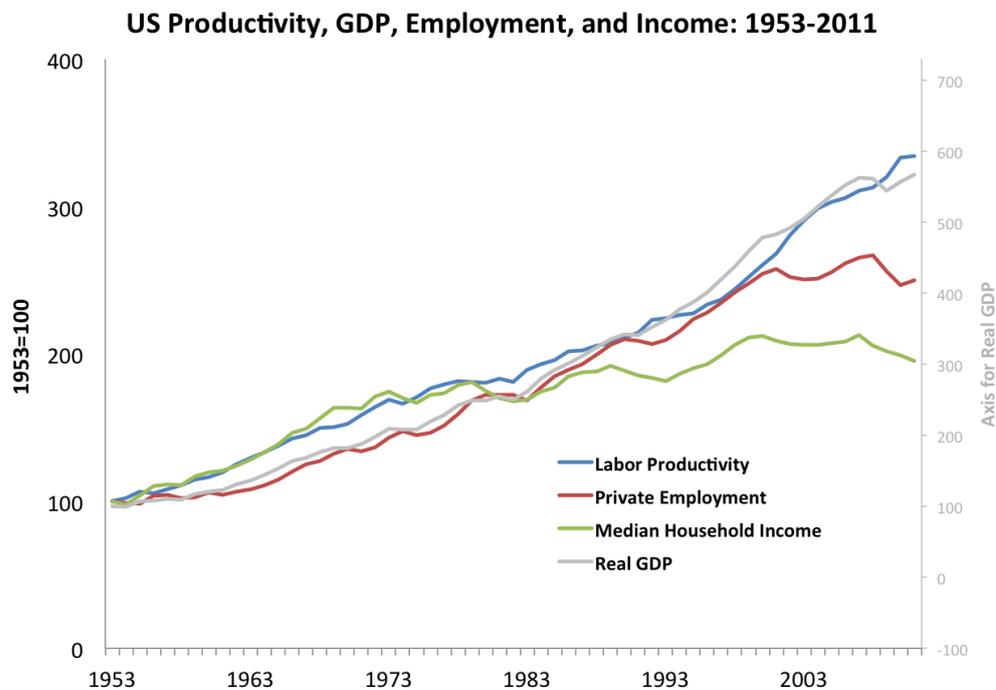
3 Recommendations

We have constructed more detailed versions of Tables 1 and 2 that integrate specific research questions developed at the workshop (see Tables 3 and 4 below). We are not recommending that any future funding call should cover all possibilities. Rather the tables provide a set of options that ESRC and DSTL can look to address.

3.1 Not so hidden elephant in the room

The issue of the impact of Automation on employment levels and types, as well as the implied social impacts was a constant undercurrent throughout the workshop. This issue also appears in the project and priority table. As Figure 1 indicates Though productivity per work has increased consistently over the last two centuries, for the first time there is a break between productivity growth and private employment. This is the first indication that changes in the technologies of production and productivity are not leading to growth in new forms of employment. This break coincides with the rise of the Internet and growing

automation of white collar work. Much has been made of this in popular works. This concern may drive both policy makers and research organisations concerns with the issue of Automation. The workshop discussions often took this as a starting point or raised questions about it. One important potential research investment area would be a *systematic review of the evidence for this breaking of the link between productivity and employment*.



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Sources: Census Bureau, Bureau of Labor Statistics

Figure 1: Productivity graph

3.2 Research and priority topic matrices

Tables (3 and 4) in below define potential areas identified by the workshop for research investments to focus on. These would be scalable depending on the available funding or chosen funding instruments.

- If funding instruments were small, it would be possible to call for initial scoping studies, case studies, or analyses of available data sets that addressed one or more of the “boxes”.
- For larger funding instruments projects, could cut across row or columns, or a coherent set of matrix “boxes”.

The matrices could also be applied to different specific contexts and institutional settings, such as:

- Manufacturing
- Office work
- Domestic work
- Health and social care
- Security
- Etc.

The two matrices therefore provide a basis for targeted research calls that address either the specific questions identified in the workshop or for other questions and issues that academic and policy researchers may identify within that context.

3.3 Specific questions within project matrix by research cluster and level

Table 3: Specific questions within project matrix by research cluster and level

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Social and cultural attitudes to automation	<ul style="list-style-type: none"> • Does everyone benefit equally from automation? • Do differences between national cultures affect attitudes to automation? • What can we learn about historic debates and controversies about automation? 	<ul style="list-style-type: none"> • How to attitudes to automation vary by social class, age and ethnic background? • What can we learn from social/cultural anxieties about automation concerning regulation and accessibility of automated systems? 	<ul style="list-style-type: none"> • How do attitudes towards technology/automation shape the development and implementation of technology (acceptance/rejection)?
Community and social issues	<ul style="list-style-type: none"> • Is automation going to make inequalities worse? • Which communities are going to be most affected and/or effected • Addressing impacts on places? • Are there gender/age/other impacts? • Also – domestic vs/and work/roles 	<ul style="list-style-type: none"> • Understanding in context of social challenges/issues? • Might automation free up people to focus on social actions? • What parts of community/social eco-systems are damaged by automation? 	

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
System design for being (in)digital	<ul style="list-style-type: none"> • How do we design 'roles' in an automated society that can withstand or resist commodification and the profit motive? • What ethical considerations should be 'built into' systems prior to automation? 	<ul style="list-style-type: none"> • How can we design ways of being digital that respect alterity and difference? • What are the effects on 'being' in digital spaces? 	<ul style="list-style-type: none"> • Why should tasks (as opposed to roles) be automated in a socio-technical system? • What are the benefits of replacing or augmenting or evading automation of tasks? • What are the theoretical and practical contingencies in the move from operator to operated?
Organisations, professions and work	<ul style="list-style-type: none"> • How does technological change impact existing jobs, lead to the emergence of new ones and the disappearance of others? • How can we include the non-human in our social theorizing? 	<ul style="list-style-type: none"> • How will technology transform organisations, their tasks and decision-making process? – implications • How can one manage (semi-) automated teams? • How do these technological changes affect the boundaries between professions? 	

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Trust and accountability	<ul style="list-style-type: none"> • What automated systems need to be certified in the future to ensure true accountability for autonomous entities? 	<ul style="list-style-type: none"> • What is the responsibility versus accountability of automated systems? 	<ul style="list-style-type: none"> • How does trust in automated systems develop? • Do the human-to-human trust models translate to the human-to-artificial intel interactions?
What is human? – What is the role of humans in a future society?	<ul style="list-style-type: none"> • How are different groups of people affected by automation? E.g. those whose jobs are replaced vs. those interacting with the automated system? 	<ul style="list-style-type: none"> • To what extent and what elements of work do we want to be automated? • How will the value of human labour change in an automated economy? 	<ul style="list-style-type: none"> • What does it mean to have meaningful/fulfilling life in an automated world? • To what extent is it desirable/acceptable to have automated systems make 'objective'/'value-free' decisions about daily lives?

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Technological limitations	<ul style="list-style-type: none"> How do we ensure that future AI is not unknowingly biases in its analysis – ensure systems behave in an unbiased manner? 	<ul style="list-style-type: none"> How do we predict that people may ‘game’ the system? What could possibly go wrong? How do we anticipate potential crises? What is the relationship between quantity of data and quality of decision making? And understanding. 	<ul style="list-style-type: none"> How do we verify a system that is self-learning What can we learn from those who resist the imposition/deployment/use of automated systems?
Research methods	<ul style="list-style-type: none"> Which are the most appropriate methods to address questions at this level? 	Which are the most appropriate methods to address questions at this level?	Which are the most appropriate methods to address questions at this level?

3.4 Specific questions within priority areas by level

Table 4: Specific questions within priority areas by level

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Trust in automated systems	<ul style="list-style-type: none"> Essential – trustworthy systems, politics and cohesion? 	<ul style="list-style-type: none"> How will technology transform organisations, their tasks and decision-making process? – Implications (including structural and processes) Who do this Trust and accountability AND organisations, professions and work? 	<ul style="list-style-type: none"> How does trust in automated systems develop?
Meaningful life roles	<ul style="list-style-type: none"> Need a social definition of automation 	<ul style="list-style-type: none"> In a range of sectors (not focus on manufacturing White collar/service roles? 	<ul style="list-style-type: none"> What does it mean to have a meaningful/fulfilling life in an automated world?
Roles, system design and economics	<ul style="list-style-type: none"> How do we design ‘roles’ in an automated society that can withstand or resist commodification and the profit motive? 	<ul style="list-style-type: none"> How to reflect a range of values in design of systems both in the transition to automation and in system sustainability 	

	Wider social impacts	Community and organisational level impacts	Individual experiences and understandings
Oversight and governance	<ul style="list-style-type: none"> • What are the appropriate oversight models for an automated world? 	<ul style="list-style-type: none"> • What are the appropriate oversight models for an automated world? 	<ul style="list-style-type: none"> • What are the appropriate oversight models for an automated world?
Social impacts	<ul style="list-style-type: none"> • How will automation impact inequality? 	<ul style="list-style-type: none"> • How is life changing in an automated society? • How will automation affect community and identity? 	<ul style="list-style-type: none"> • How will automation affect community and identity?
Research Methods	<ul style="list-style-type: none"> • Understand what methods might we use to implement automation systems and understand their adaption? 	<ul style="list-style-type: none"> • Understand what methods might we use to implement automation systems and understand their adaption? 	<ul style="list-style-type: none"> • Understand what methods might we use to implement automation systems and understand their adaption?

Annex1: Details of research clusters and priority areas

1 Research clusters and questions

1.1 Social and cultural attitudes to automation

1.1.1 Question set 1: Social benefits and attitudes

- Does everyone benefit equally from automation?
- How do attitudes to automation vary by social class, age and ethnic background?
- Do differences between national cultures affect attitudes to automation?
- What can we learn about historic debates and controversies about automation?
- What can we learn from social/cultural anxieties about automation concerning regulation and accessibility of automated systems?

1.1.1.1 *What evidence will this generate? What could this be used for?*

- Policy regarding education/skills training
- Design insight into automated systems that need to oppose e.g. across national cultures
- Inform public debates about accountability of automation
- Regulation and investment decisions regarding automation

1.1.1.2 *Which disciplines need to be involved?*

- Economics
- Sociology
- Media and communications
- Social history
- HCI
- Design
- Computer science
- Law

1.1.2 Question set 2: Technology implementation attitudes

- How do attitudes towards technology/automation shape the development and implementation of technology (acceptance/rejection)

1.1.2.1 *What evidence will generate this? What could it be used for?*

- Inform business how technology is made, how it can be more inclusive

1.1.2.2 *Which disciplines need to be involved?*

- Business
- Information systems/computer science
- Sociology
- Media and communications
- Economics
- Design

1.2 Community and social issues

1.2.1 Question set 1: Macro-level issues (Society)

- Is automation going to make inequalities worse?
- Which communities are going to be most affected and/or effected
- Addressing impacts on places?
- Are there gender/age/other impacts?
- Also – domestic vs/and work/roles

1.2.1.1 *What evidence will this generate? What could this be used for?*

- Social and economic impacts
- Data for policy planning

1.2.1.2 *What disciplines need to be involved?*

- Sociology
- Economics
- IMF/CS
- Social policy
- Urban regeneration

1.2.2 Question set 2: Meso-level issues (Community)

- Understanding in context of social challenges/issues?
- Might automation free up people to focus on social actions?
- What parts of community/social eco-systems are damaged by automation?

1.2.2.1 *What evidence will this generate? What could this be used for?*

- Social policy
- Resilient communities
- Ideas for social action

1.2.3 Question set 3: Micro-level issues (Individuals and workplaces)

- Understanding roles, employee perceptions of role and what can/should be automated?
- Understanding from workers perceptions of automated impacts?
- Is there variations in perceptions by occupation?
- What remains of value to the human/of the human?

1.2.3.1 *What evidence will this generate? What could it be used for?*

- Help design
- Policy
- Consequences
- P/R
- Job design
- Workplace conduct

1.2.3.2 *What disciplines need to be involved?*

- Occupational Psychology
- Sociology
- Management

- Studies
- Info studies/CS

1.3 System design for being (in)digital

1.3.1 Question set 1

- Why should tasks (as opposed to roles) be automated in a socio-technical system?
- What are the benefits of replacing or augmenting or evading automation of tasks?
- How do we design 'roles' in an automated society that can withstand or resist commodification and the profit motive?
- How can we design ways of being digital that respect alterity and difference?
- What ethical considerations should be 'built into' systems prior to automation?
- What are the effects on 'being' in digital spaces?
- What are the theoretical and practical contingencies in the move from operator to operated?

1.3.1.1 *What evidence will this generate? What could this be used for?*

- Design rules and approaches, and the consequences of such design with socio-technical systems
- Inform industry practice by highlighting visible as well as invisible automations of roles
- Insight into the effects of automation in/between tasks and roles

1.3.1.2 *Which disciplines need to be involved?*

- Artificial intelligence
- Designers
- Information systems
- Legal
- Psychology
- Management and business
- Human geography
- Philosophy of technology
- Data science
- Marketing and consumer science

1.4 Organisations, professions and work

1.4.1 Question set 1

- How will technology transform organisations, their tasks and decision-making process? – implications
- How can one manage (semi-) automated teams?
- How does technological change impact existing jobs, lead to the emergence of new ones and the disappearance of others?
- How do these technological changes affect the boundaries between professions?
- How can we include the non-human in our social theorizing?

1.4.1.1 *What evidence will this generate? What could this be used for?*

- Inform workforce policy and planning
- Update professional jurisdiction

- Align education with (new) job market demands
- To better understand organisational and team boundaries and their processes
- Update out theoretical 'toolkits'

1.4.1.2 Which disciplines need to be involved?

- Informational systems
- Organisational/psychology
- Organisation science
- Data/computer science
- Sociology
- Economy
- Anthropologist
- Industrial relations
- Philosophy

1.5 Trust and accountability

1.5.1 Question set 1

- How does trust in automated systems develop?
- Do the human-to-human trust models translate to the human-to-artificial intel interactions?
- What automated systems need to be certified in the future to ensure true accountability for autonomous entities?
- What is the responsibility versus accountability of automated systems?

1.5.1.1 What evidence will this generate? What could this be used for?

- Allow us to engineer systems where trust develops appropriately Enable us to develop legal and governance processes and procedures for future automated systems

1.5.1.2 Which disciplines need to be involved?

- Law
- Psychology
- Sociology
- Safety engineering
- Educationalists
- Computer scientists
- Policy makers
- Regulators
- Manufactures (including software engineers)
- Science providers
- Cluster

1.6 What is human? – What is the role of humans in a future society?

1.6.1 Question set 1

- How are different groups of people affected by automation? E.g. those whose jobs are replaced vs. those interacting with the automated system
- What does it mean to have meaningful/fulfilling life in an automated world?

- To what extent and what elements of work do we want to be automated?
- How will the value of human labour change in an automated economy?
- To what extent is it desirable/acceptable to have automated systems make 'objective'/'value-free' decisions about daily lives?

1.6.1.1 What evidence will this generate? What could this be used for?

- Could be used to inform policy and governance around automation
- Facilitate public conversation around automation
- Improve efficiency and productivity through workforce optimism

1.6.1.2 Which disciplines need to be involved?

- Philosophy
- Psychology
- Sociology
- Political science
- Economics
- Medicine
- Management and business studies
- Anthropology

1.7 Technological limitations

1.7.1 Question set 1

- How do we predict that people may 'game' the system?
- How do we ensure that future AI is not unknowingly biases in its analysis – ensure systems behave in an unbiased manner?
- How do we verify a system that is self-learning
- What could possibly go wrong? How do we anticipate potential crises?
- What is the relationship between quantity of data and quality of decision making? And understanding.

1.7.1.1 What evidence will this provide? What could this be used for?

- Data that can help understand how fair/good outcomes are. Feedback loops checks and balancing
- Informs engineers on how systems can improve

1.7.1.2 Which disciplines need to be involved?

- Law
- Psychology
- Sociology
- Safety engineering
- Educationalists
- Computer/data scientists
- Policy-makers
- Regulators
- Manufacturers
- Service providers

1.8 “Refuse-nicks”

1.8.1 Question set 1

- What can we learn from those who resist the imposition/deployment/use of automated systems?

1.8.1.1 *What evidence will this generate?*

- Everything

1.8.1.2 *Which disciplines need to be involved?*

- Everyone

2 Priorities

2.1 Priority 1: Team 1

2.1.1 Trust in automation

2.1.1.1 *Questions and issues*

- How does trust in automated systems develop?
- How will technology transform organisations, their tasks and decision-making process? – Implications (including structural and processes) Who do this?
- Essential – trustworthy systems, politics and cohesion
- Trust and accountability AND organisations, professions and work

2.1.1.2 *Any dependence on other things?*

- Language
- General governance
- Interdisciplinary working
- Culture and context

2.2 Priority 1: Team 2

2.2.1 Meaningful life

2.2.1.1 *Questions and issues*

- What does it mean to have a meaningful/fulfilling life in an automated world?
- In a range of sectors (not focus on manufacturing)
- White collar/service roles
- Need a definition of automation

2.2.1.2 *Why do this?*

- Need to include historical perspectives
- Gets us to think about automation in new sectors
- Need to generate new/different scenarios ‘engineering the human experience’
- Beyond just work – holistic experience of being human

2.2.1.3 *Any dependence on other things?*

- Multidisciplinary approach

2.3 Priority 2: Team 1

2.3.1 Roles, system design and economics

2.3.1.1 Questions and issues

- How do we design 'roles' in an automated society that can withstand or resist commodification and the profit motive?
- How to reflect a range of values in design of systems both in the transition to automation and in system sustainability

2.3.1.2 Why do this?

- Take up and responsible use
- Informs cycle
- Use and take up and attitudes
- Social and cultural attitudes AND system design

2.3.1.3 Any dependence on other things?

- Language
- General governance
- Interdisciplinary
- Culture and context

2.4 Priority 2: Team 2

2.4.1 Oversight and governance

2.4.1.1 Questions and issues

- What are the appropriate oversight models for an automated world?

2.4.1.2 Why do this?

- Enables us to understand the trust issue
- It is society positive
- Ensures we consider the human/tech interface
- Facilitates automation inclusion
- Balanced assessment of the risks
- Transparency and accountability

2.4.1.3 Any dependence on other things?

- Multidisciplinary approach

2.5 Priority 3: Team 1

2.5.1 Social impacts

2.5.1.1 Questions and issues

- How will automation impact inequality?
- How is life changing in an automated society?
- How will automation affect community and identity?

2.5.1.2 Why do this?

- Social and community issues
- What is human?
- Supporting automation?

- Supporting creativity?
- Supporting sustainability?

2.5.1.3 *Any dependence on other things?*

- Language
- General governance
- Interdisciplinary
- Culture and context

2.6 Priority 3: Team 2

2.6.1 Methods

2.6.1.1 *Questions and issues*

- Understand what methods might we use to implement automation systems and understand their adaption?

2.6.1.2 *Why do this?*

- Enables verification
- Maximises the potential of automation
- Recognise the complexity
- Enables evaluation of automation
- Fills method gaps
- Learning from non-adaptors or [r8fvsniks ??]

2.6.1.3 *Any dependence on other things?*

- Multidisciplinary approach

2.7 Other recommendations

2.7.1 Systematic literature review

2.7.1.1 *Questions and issues*

- A SLR (systematic literature review) of automation discovering new themes and memes which will inform future research challenges

2.7.1.2 *Why do this?*

- Insight into cross-cultural experiences of automation
- Immediately relevant to multidisciplinary debates
- Provides a range of historical perspectives

2.7.1.3 *Any dependence on other things?*

- Databases
- Range of methods (archives, surveys, narrative analysis, coding)
- Specialist advice throughout the projects

2.7.2 Funding

2.7.2.1 *Questions and issues*

- Consider small scale responsive funding
- Calls that can get to the field quickly and report quickly
- May need abbreviated review process to ensure data to be captured now on key issues that are rapidly changing

2.7.2.2 *Why do this?*

- Provides foundation for iterative research design
- Capture of fast moving trends
- Helps shape larger funding calls

2.7.3 Humanities – for AHRC?

2.7.3.1 *Questions and issues*

- (Digital) heritage and automation –
- What is/are the changing roles(s) of cultural heritage in fast-automating societies?
- What work tasks and types of experience will be automated in 5/10/15 years time?

2.7.3.2 *Why do this?*

- Global terrorism is destroying physical sites of unique cultural and spiritual significance at an unprecedented rate
- Automation/digitalisation/systems of preservation and communication of tasks associated with heritage are therefore urgently required

2.7.3.3 *What's its priority?*

- Essential for humanities well-being and ethnic/cultural identity

2.7.3.4 *Any dependence on other things?*

- Political governance

Public mobilisation

Annex 2: Workshop Proposal

Automation of future roles scoping workshop: Proposal

Simeon Yates: PI ESRC Being Digital project

July 2016

1 Introduction

The proposed topic is very broad and complex. There has been varied and extensive discussion of this issue across multiple disciplines for much of the last half-century. From the more utopian visions of an "end to work" (Gorz, 1985), to detailed more critical studies of the impact on organisations (Zuboff, 1988) through to more contemporary accounts and predictions (Anderson & Rainie, 2010). Other work has had a more socio-economic focus on the implications for employment and inequality (Davidson, 2013; McIntosh, 2013) through to the development of specific technologies (e.g. in social care, Broekens, et. al., 2009).

It is also an area fraught with challenges, not least understanding the unintended consequences of technology change and the need to think beyond current social assumptions (See Appendix). The key questions also require interdisciplinary and multidisciplinary working. We therefore suggest that the goal of the workshop should be to identify the main concepts and relevant results from research, to develop a typology of research, knowledge gaps and questions. This would provide a basis for further research and discussion.

3 Focus

3.1 Aim

- To assess the potential implication of continued 'automation' of human tasks, roles and jobs.
- To assess major challenges and knowledge gaps and discuss how research could help in addressing those.

3.2 Objectives

- To identify and assess prior academic and stakeholder predictions of the impact of new technologies on human tasks, roles and jobs.
- To identify and assess methodologies by which impacts and effects can be assessed, in particular on:
 - tasks, roles, and jobs.
 - human, knowledge, skills and attributes.
 - organisational structures and cultures.
 - organisational development.
 - workforce training, recruitment, engagement and motivation.
 - decision making in organisations

4 Participants

The workshop is to bring together academic experts (various disciplinary backgrounds) and practitioners (representing various industries and sectors). This will include both direct and open invites. A balanced mix of between 40 and 50 invitees will be selected.

- Academics will be invited from the following disciplines:
 - Sociology – especially sociology of technology
 - Economics – especially economics of technological change
 - Psychology – especially organisational technology
 - Information systems – especially business information systems
 - Computer science – especially robotics and automation
 - Data science – especially artificial intelligence and machine learning
 - Engineering – especially ‘human-in-the-loop’ engineering solutions
 - Visual arts – especially interactive design and digital humanities
 - Philosophy – especially ethical technology innovation
- Practitioners will be invited from a range of industries and government departments

Open academic invites will be distributed via appropriate academic networks, professional bodies and email lists. Open industry invites will be distributed via the Digital Leaders network, which also includes a number of industrially engaged academic researchers.

5 Potential discussion topics

5.1 Definitions

Unless there is a tight definition of 'automation' to be provided by ESRC or DSTL we expect the workshop to first focus on the scope of the following discussions:

- Definitions of 'automation' and relevant technologies, such as:
 - Robots - in manufacture, social care?
 - Business - process systems, analytics?
 - Everyday life – memory and finding (Siri, GPS)?
 - Medicine – expert systems?

5.2 Research gaps or questions

Identifying the pressing research questions:

- Academic – where are the gaps in current disciplinary and multi-disciplinary or inter-disciplinary work?
- Practitioner – which questions are most pressing for industry, policy or practice?

5.3 Research methods

Which methods or approaches are best to address and assess the key questions identified above:

- How to assess multiple, complex and often 'non-linear' impacts?
- How to best understand and document the unintended consequences of technological change?
- Which data and methods of analysis will best address the questions identified by the workshop?
- Which interdisciplinary or multidisciplinary mix is needed to address specific questions?

6 Format

6.1 Workshop length

Given the complexity of the topic a two-day workshop would be preferable. Though this may be limited by budget, timing and attendee availability. A short notice event would need to be one day to allow senior colleagues to make travel plans. A two-day event would be better if non-UK colleagues would like to attend.

6.2 Structure

We propose following a broadly 'un-conference' format of regularly changing working groups with professional facilitation support. The event would not therefore include presentations, but rather focused collaborative activities to elicit ideas and information relevant to the topics under discussion. We would agree a design for the event with the facilitation team that will hopefully deliver robust outcomes whilst also allowing the participants room to guide and direct the flow of the event. A proposed structure is presented in Table 1.

Time	Day 1	Lead	Day 2	Lead
Morning	Introductions	ESRC Being Digital Team	Research question and gaps working groups	Facilitators
Morning	Collective engagement activities	Facilitators	Feedback on question and gaps	Facilitators
Morning	Scoping of concepts working groups	Facilitators	Methods working groups	Facilitators
Lunch	Lunch break		Lunch break	
Afternoon	Feedback on scoping	Facilitators	Feedback on methods	Facilitators
Afternoon	Concepts and questions working groups	Facilitators	Open session/Next step working groups	Facilitators
Afternoon	Feedback on concepts and questions	Facilitators	Feedback on open session/Next step	Facilitators
Evening meal	Evening meal		Review of workshop and close	ESRC Being Digital Team
Evening	Evening speaker	ESRC Being Digital Team		

6.3 Facilitation

We would want to make use of KnowInnovation (<http://knowinnovation.com>) as the facilitation team. We have worked with this team on a number of prior occasions and they also have a track record of working with EPSRC and the ESRC.

6.4 Online workspace

The team will provide a shared online workspace for pre and post event activities using "Well Sorted" (<http://www.well-sorted.org>) to support pre-workshop activities.

6.5 Capturing outputs

During the workshop all the paper materials from activities will be collected and archived. Other potential routes to capturing data include:

- photographing and audio-video recordings of key elements of the day
- dedicated note takers/scribes
- twitter handle and hashtag

For a more creative activity the team will engage an "artist/cartoonist in residence" for the workshop who will seek to visually capture discussions and ideas.

7 Outcomes

7.1 Report

The project team will use the data and materials recorded by the workshop to provide the following:

- a detailed report for the ESRC (10,000 words).
- a short report for non-academic partners and stakeholders (5,000 words)

Depending on the agreed goals of the workshop the report will provide detail of:

- identified research gaps and issues
- research methods recommendations
- research policy recommendations
- potential immediate next actions

7.2 Other potential outputs

7.2.1 Edited book

Given that this event will be a rare opportunity to bring together both academics and practitioners; capturing this debate in a published format would benefit both communities. The discussions could provide both materials for content or identify key areas to be reviewed. The ESRC Being Digital team believe that a number of publishers both UK and international would be interested in such a volume (Intellect, University of California Press).

7.2.2 Web site

A web site reporting on the workshop could be developed from the collected materials.

8 Next steps

Assuming the proposal is acceptable to the ESRC and DSTL:

- Engage facilitators
- Set up planning meeting with team, facilitators, ESRC and DSTL

9 Costs

Items		
<i>2 Day workshop</i>	100% (FEC)	80% (FEC)
Organising team - PI X 1	4200.95	3360.76
Co-I x 2 Discipline support	7264.72	7264.72
PDRA x 2	3767.38	3013.904
Estates and Indirect (Not requested)		
Facilitators (Know Innovation)	6000	4800
Refreshments and catering	3210	2568
Organizing team and Being Digital Steering Group T&S	8000	6400
Artist	1300	1040
Stationary and materials	400	320

Report preparation and printing	2853	2282.4
Total (excluding estate and indirect costs)	36996.05	29596.84

10 Appendix: The challenge of futurology

Over estimating the impact of a technology (plastic) and underestimating social change (feminism and changing domestic roles).



11 References

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Annex 3: Workshop plan

knowinnovation

Automation of Future Roles Scoping Workshop, 7/8th November 2016

University of Liverpool London Campus, Finsbury Square

DRAFT FACILITATION AGENDA - NOT FOR PUBLICATION

Aims:

1. To assess the potential implication of continued of human tasks, roles and jobs.
2. To assess major challenges and knowledge gaps and discuss how research could help in addressing those.

Required Outputs/Outcomes:

The project team will use the data and materials recorded by the workshop to provide the following:

- a detailed report for the ESRC (10,000 words).
- a short report for non-academic partners and stakeholders (5,000 words)

Target outputs for this workshop:

1. identified research gaps and issues
2. research policy recommendations
 - Research areas (to address current gaps)
 - Identified evidence base to inform policy
3. research methods recommendations

Participants:

- Invited participants - mixture of disciplines, academia and industry; 70 invited
- Project team members - 15, expect 2 or 3 to attend
- ESRC/DSTL stakeholders (8)
- Expect 35-40 on the day in total

Facilitators:

David Lomas, Caragh Dewis

Day 1

Time	Mins	Activity	Notes	Lead/Materials
08:30	60	KI Team Arrive	Materials on tables Seating Plan Soapbox Flipchart Coloured lanyards for participants vs stakeholders Evidence, Gaps and Research Questions flips	
09:30	30	Participant arrival / registration and coffee and pastries (as lunch quite late)	10am start to work on 1st day, 9.30am on 2nd, finish 4pm on 2nd day.	
10:00	10	Welcome from ESRC/DSTL	Thanks for coming	
10:10	10	Facilitator Welcome	Set tone Introduce soapboxes	
10:20	20	Who's in the room? Everyone completes a profile poster Discuss on tables Posters then collected and displayed around room	Four quadrants e.g. <i>Who am I?</i> <i>What do I bring to this event? (experience, knowledge, connections)</i> <i>In my view the biggest challenges in this area are...</i> <i>My greatest hope from today is...</i>	
10:40	15	Setting the context <ul style="list-style-type: none"> • Scope / scale of challenge • Specific objectives for this workshop 	Someone from DSTL / ESRC to set the overall context and objectives. Important for the group to hear "from the horse's mouth" what they want from the day - so we can hook back onto it DSTL/ESRC to agree how tightly/loosely to define scope	
10:55	20	What do we mean by automation of roles?	(Mixed tables?)	

		<ul style="list-style-type: none"> • What does this look like in different contexts? (e.g. business, healthcare, manufacturing) • Anything we would consider out of our scope? 	Table discussion - capture on mind map	
11:15	20	Feedback from groups and plenary reflection	Headline from each group If ESRC/DSTL have not set a scope then we will use the output of this feedback to define it.	
11:35	20	BREAK - coffee and nibbles	Move tables	
11:55	30	PESTLE To get people thinking about what the world might be like - potential impacts	Need to agree time horizon that we are looking at. Work in small groups, one letter of PESTLE each. Include getting people to think about the evidence base for their predictions Could use Simeon's press headlines as stimulus here.	
12:25	30	Evidence - what do we know, where are the gaps? What do we know already? Where are the gaps?	Table discussion. Capture evidence on post its (one per post it) Capture gaps on post its (one per post it) Plus any research questions that emerge	
12:55	15	Feedback - start to build 'evidence and gaps' walls	Post-its notes added to 'walls'	
13:10	45	LUNCH	Buffet style lunch Time to look at profile posters and 'evidence and gaps' wall	
13:55	15	Welcome Back Soapboxes		

		Position the afternoon		
14:10	30	Active Listening	<p>In pre-planned trios, mix of disciplines and academia/industry to give varying perspectives</p> <p>In my opinion the biggest challenge in understanding the impact and effects of the automation of roles is....??</p> <p>Each person speaks uninterrupted for 5 mins</p> <p>Second person listens</p> <p>Third person notes down 'things we know' (evidence), 'things we don't know' (research gaps) and potential 'research questions' on post-its</p> <p>Brief review of post-its at end of each rotation</p>	
14:40	15	Add to Evidence and Research Questions walls		
14:55	25	Review Walls Then clustering	<p>Initial sense check - there may be things people think are gaps that other participants know are actually being addressed</p> <p>Clustering - How best to do this? Silent clustering then plenary review?</p>	
15:20	20	BREAK (could be a working break)	Review clusters with stakeholders - do we want to ask for any sense of priority?	
15:40	30	Stewarding the Research Questions Sourced from evidence gaps or clusters of research questions One cluster per group How could (interdisciplinary) research help address these challenges and gaps?	<p>Group discussion to develop research questions from the clusters</p> <p>Output is one-page poster</p> <ul style="list-style-type: none"> Key research questions / sub questions / links to evidence <p>Template for 1-page poster</p>	

16:10	30	Show and Tell <i>Timing depends on how many clusters there are!</i>		
16:40	20	Plenary Reflection <ul style="list-style-type: none"> • What do we think to what we have got? • Anything we think we have missed? • Any sense of priority or dependencies? 	Could include a prioritisation activity here? Or use as additional discussion/feedback time if needed.	
17:00	10	Wrap-up Day One, link to Day Two		
17:10	50	Drinks and networking	Facilitators to meet with project Team members and stakeholders Review day one and agree plan for day two Allows for us to adapt as appropriate	
18:00	90	Dinner and Speaker		
19:30		Close		

Day 2

Time	mins	Activity	Notes	
09.00	30	Facilitator check-in with project team and stakeholders Agree plan for Day Two	If we didn't manage to do this at end of Day One	
09:30	15	Welcome back Reflections from Day One, insights from dinner conversations etc. Soapbox reminder Position Day Two	Day one was about identifying the research questions Day Two is about how to approach that research	
09:45	10	Introduce the 'meta questions' and World Cafe Looking at the set of research questions we identified yesterday and in the context of the automation of roles: <ol style="list-style-type: none"> 1. How to assess multiple, complex and often non-linear impacts? 2. How to best understand and document the unintended consequences of technological change? 3. Which data and methods of analysis will best address the questions identified by the workshop? 4. What is and where do you get the best evidence to support policy? 	Going to have four stations around the room (or using breakout rooms?), one for each question One person will stay at each station all morning - continuity Everyone else will be in four groups that will rotate around the four questions Group discussion to be captured on a mind map Each group adds to the mind map so that it builds up over the morning (Last group may also distil and prepare for feedback) <i>Assign 'table coordinators' who will stay with the question from DSTL/ESRC stakeholders. Two per table. DSTL/ESRC to allocate themselves in pairs to each question and be prepared to do 1-2 minute intro to the question for each round of people and then capture conversation onto flipchart</i>	

09:55	30	Rotation One		
10:25	30	Rotation Two		
10:55	15	BREAK		
11:10	30	Rotation Three		
11:40	30	Rotation Four		
12:10	40	World Cafe feedback Feedback and plenary questions / consolidation across the 4 questions	Include time to distill into one-flipchart sheet output per meta question? Or this could be round 4?	
12:50	60	LUNCH	Meet with stakeholders to refine recommendation planning session - how best to structure?	
13:50	45	Development of Recommendations From what we have learnt over the last two days, what are the key take home messages that will help the ESRC/DSTL? (Remind of the target outcomes and overall aim of workshop) Template: What is the recommendation (Verb ... - e.g. Create a XYZ)) What's its priority (Essential, Important, Nice to have?) Are there any dependencies on other things?	Split into groups to do this? How many will depend on participant numbers. <ul style="list-style-type: none"> ● Prioritised research agenda - can we split this? ● Research approaches and methods - can we split this into 2? ● Research policy - <ul style="list-style-type: none"> ○ Research ○ Evidence base for policy development 	
14:35	40	Share draft recommendations for feedback	Builds and concerns	
15:15	30	Refine Recommendations for ESRC / DSTL		

15:45	15	Wrap up of event		
16:00		CLOSE		

Annex 4: Attendees

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