



Can human augmentation offer solutions to labour shortages in next 5 years?
Meeting note from roundtable chaired by Simon Whitfield, Government Office for Science
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Key points

- Defining human augmentation (HA) is not straightforward. For the purposes of this discussion, HA was defined as assistive technologies which can improve the quality and quantity of human labour without supplanting it.
- Many technologies, while offering a range of potential applications, remain embryonic and unfocused in terms of intended application, with limited market penetration. Overall understanding of their impacts is poor.
- In the UK's predominantly service and knowledge-based economy, cognitive augmentations have the potential to improve work-based training, widen access to labour markets, and allow humans to move onto higher skilled tasks. However, they can also be deployed to narrow human autonomy.
- There are common barriers to adoption and acceptance, including awareness, cost and the constantly changing nature of work.
- Implementation of any technology into a workplace needs to be approached using systems thinking.
- It is important to have dialogue and consent before implementing technologies and to carefully consider who will benefit and who may be adversely affected. Building trust and consent is time consuming.

1. Labour and productivity

- Different sectors face different skills gaps and labour shortages: one-size-fits-all technological solutions are unrealistic. A full understanding of reasons for economic inactivity is required before exploring what technologies could address these and how. Jobs continue to evolve, and few involve fulfilling a single task. It is hard to focus technologies to provide workplace solutions.
- There are different types of HA - primarily physical and cognitive – with potential to operate in the same domains.
- Many technologies, while offering a range of potential applications, remain embryonic and unfocused, with limited market penetration. Overall understanding of their impacts is poor: this represents a significant research gap. Impacts need to be understood at both the individual and organisational level.
- Different sectors would benefit from forward-looking scenarios, e.g., of future workplaces, so they might focus on potential use cases for various technologies.
- Some sectors are more suitable for HA assistive technologies in the short term, particularly manufacturing, construction, logistics, and potentially health and social care, where they are already in use.
- Augmented reality (AR) and virtual reality (VR) are already commonplace in the leisure and gaming sector. Technologies such as AR and VR can be used to support on-the-job learning cost effectively.



- Technologies also have the potential to widen access, e.g., digital braille and language translation tools, to improve the speed of workforce training, and allow humans to move onto higher skilled tasks. However, they can also be deployed to constrain labour and narrow human autonomy.
- In industrial contexts, and depending on use case, HA technologies can produce a range of improvements in efficiency.¹
- There was broad agreement that cognitive augmentations can enable jobs in the UK's predominantly service and knowledge-based economy to be carried out more efficiently and to broaden the base of the labour force.
- We shouldn't assume that HA technologies can solve particular problems without creating new ones, e.g., health-related problems. More longitudinal studies should be undertaken to understand these technologies.
- In addressing labour shortages, productivity is one metric of success, but others could also be considered, such reducing inequalities (by enabling more people to carry out highly technical or skilled work) and making jobs more interesting/fulfilling. With focus to reducing inequalities there needs to be a distinction between simple use of technology and 'human augmentation' alongside the question of ownership.

2. Implementation challenges

- There are common barriers to adoption, whether for embryonic or more mature technologies. These include awareness of and trust in technologies, cost (especially for SMEs), the complicated and continually evolving nature of sectors in which technologies may be deployed, ability and appetite to experiment, health and safety, regulation, and standards.
- Even when a business knows of a beneficial technology, it is challenging to identify a suitable vendor and to introduce the technology in a timely, safe, and efficient way.
- Implementation of a technology into any workstream needs to be considered in a systematic way, including determining how to reallocate time freed up by use of a given technology.
- Appetite for HA technologies could vary at different levels of an organisation, such as between business leaders and more junior workers. It is important to have dialogue and achieving consent before implementing technologies and to carefully consider who will benefit and who may be adversely affected. The question of who owns technology is important.
- Building trust and consent is time consuming and requires working with multiple stakeholders, including management, employees, unions, health and safety bodies.

Participants

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Annex: Government activity as of January 2023



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- HMG understanding of HA landscape is still developing: recent published analysis includes the Regulatory Horizons Council neurotechnology report and MOD's 'Dawn of a New Paradigm' report.
- Interests include adoption of HA technologies in frontline services; prosperity and trade opportunities; ethical and regulatory oversight; monitoring and responding to defence and security uses of HA.
- HA applications in the military space are better understood in government.