How can emerging technologies shape culture?

Insights from a deep-dive into the future information environment

The development of new technologies will likely drive profound changes in government and society. To navigate this complex and dynamic landscape of technological innovation, the UK government needs a robust understanding of the potential future impacts of new and emerging technologies on defence, security and other policy areas. A critical part of this is considering the evolving cultural contexts that shape the development, use and regulation of new technologies and the potential cultural changes they may generate.

In this context, a team of researchers from RAND Europe and Frazer Nash Consulting conducted a study for the Defence Science and Technology Laboratory (Dstl) to assess the cultural implications of future technological developments, focusing specifically on the information environment. The study aimed to help UK Defence better understand the cultural context of technological change and how cultural factors may mediate or reinforce the risks and opportunities of technological innovation.
To explore these issues, we used a multi-method approach combining literature reviews and expert interviews. We focused first on identifying a broad range of technological developments shaping the future information environment through reviews of literature and existing data on emerging technologies. We then assessed the cultural implications of the most relevant developments using targeted literature reviews and expert elicitation, basing our assessment on a bespoke framework developed in the study to capture the cultural impacts of technological change. 12

How can we understand the impact of emerging technologies on culture?

Though difficult to define and characterise unequivocally, we conceptualised culture as the dynamic and evolving socially constructed reality shared across members of a social group and mirrored in artefacts in the physical environment.3 As such, we defined cultural change as a transformation of shared societal ideas, values and behaviours that shape people’s ways of being in the world.4

To understand the cultural impact of technological change, we developed a framework contextualising the origins and intended uses of technological developments and their corresponding impacts on different aspects of a community’s culture. The framework follows four steps:

1. **Recognising the role of technology as an actant**: The first step considers the nature of technology in terms of its development, intended uses, expected users and how use cases may evolve. This step helps characterise a technology’s potential agency in creating societal change, i.e. its role as an ‘actant’. At this stage, it is also important to consider a technology’s potential regulatory context, e.g. its alignment with ethics, legal regulations and the legislative environment.

2. **Developing a cultural topography**: The second step focuses on understanding the cultural landscape of a population of interest, across four key areas: cultural identities (how a population identifies itself), cultural norms (a population’s accepted, expected or customary behaviours), cultural values (what a population considers desirable, proper and good), and perceptual lenses (how individuals and societies determine facts about themselves and others).

3. **Ecological interactions between technology and culture**: The third step assesses how technological change might affect culture at four levels of interaction between people and their lived environment: people as individuals (the ‘self’), interpersonal or human-machine interactions, interactions in broader environments (e.g. the state, physical infrastructure) and societal domains (e.g. education and law enforcement).

4. **Cultural influence versus integration**: The final step considers whether a new technology might stimulate cultural change or be integrated within existing cultural frameworks. This consolidates the previous three steps in the framework.

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1 Rottger & Vedres (2020).
3 Hudelson (2004).
4 Aranzadi (2018).
What does the information environment tell us about the cultural impact of emerging technologies?

We identified various technologies expected to significantly impact the future information environment, including technologies that may change how people access, consume, store and communicate information to others. We then conducted an in-depth analysis of six such technologies to gain greater insight into the cultural implications of technological innovation. We found that adopting these technologies has implications for all four aspects of culture: cultural identities, norms, values and perceptual lenses. We outline these below:

Cultural identities:
As some technologies mature, the importance of demographic and geographic delineations of identity (e.g. nation-state identity) may diminish. In turn, the importance of transnational and subnational cultural identities may increase as technologies facilitate greater virtual communication and more immersive virtual interactions. Emerging technologies may also integrate within cultural identities, e.g. with technological enablement considered a more important aspect of one's identity. Additionally, cultural identities may be shaped by different communities’ norms and values relating to technology use.

Example vignette
Human augmentation technology and cultural identities

Human augmentation refers to technologies that enhance human capabilities, either physically or cognitively. In the future, these technologies may find use cases for improving physical and psychological performance (e.g. augmenting memory and other mental functions), improving service the quality and accessibility of services (e.g. workplace assistive technologies), and facilitating human-machine connectivity through brain-computer interfaces. As these technologies embed more directly into human cognitive, physical and psychological functions, they may fundamentally change notions of personhood (i.e. ‘what makes us human’) and culture as a human or interpersonal construct. Human identity may be increasingly intertwined with artificial, technology-enabled elements, raising questions about the extent to which technological augmentation represents a human right. As communities build different ethical and cultural viewpoints on this and other issues relating to human augmentation, new cultural divides may emerge between communities that accept human augmentation to differing degrees.
Cultural norms and values:
Technological change presents multiple challenges to cultural norms and values, particularly in three key areas: privacy, equity and accountability. Some communities already see increasing tension between adopting new technologies and preserving privacy. This is driven by the increasing collection and sharing of data by and between technological tools that facilitate connectivity, communication and other services. From an equity perspective, there are concerns that new inequities may arise between communities in their access to advanced technologies. Accountability challenges also arise from the obfuscation of end-user identity facilitated by some technologies. This blurs lines of responsibility and accountability for risks and harms in digital spaces.

Example vignette
Cultural norms and values in virtual metaverses

A metaverse is a persistent and virtual environment comprising applications that give end users agency in real-time and fully immersive or simulated realities. These include facilitating immersive digital interpersonal communication through digital twins and avatars. Therefore, extending self-representation to virtual identities is an important functionality of virtual metaverses, presenting both sociocultural risks and benefits. While it may help reinforce values of privacy and freedom of expression, it may also present difficulties in establishing accountability for harmful, violent or undesirable behaviours. The evolving role of commercial companies in governing online spaces, including virtual metaverses, may reinforce these risks. While some technological advances promise to elevate end users’ agency and autonomy, others constrain it by enabling leading commercial actors to consolidate greater control over online spaces. This tension raises questions and concerns about keeping actors accountable for commercial strategies that might clash with cultural norms and principles, e.g. the right to privacy.
Automated information systems are computer-based systems that collect, process, store, distribute and/or produce information autonomously, including systems that can autonomously generate information ranging from written text to audio-visual formats. These systems pose multiple challenges to a person’s or a community’s ability to determine facts. Firstly, artificial models can produce information more quickly, increasing the quantity and complexity of information a person or community must navigate to distinguish between truth and fiction. Secondly, as the underpinning technologies mature, the information they generate becomes more authentic and thus challenging to differentiate from human-generated content. These two factors amplify people’s challenges in distinguishing between artificial and authentic information and facts and falsehoods. Without reliable and effective detection and evaluation frameworks, some experts anticipate a ‘truth crisis’ where the collective inability to distinguish between true and false information radically decreases the perceived value of objective facts. In this scenario, individuals may no longer value whether information is true, only engaging with information aligned with their existing attitudes and beliefs. The declining trust in institutions such as the government amplifies this challenge.

Determining facts about society and culture:
New technologies will likely amplify cognitive biases that affect individuals’ ability to process information. This may make it more challenging for individuals and communities to identify and agree on facts about themselves and their shared experiences, identities and cultural touchpoints. This trend stems from multiple factors: a) the increasingly tailored and personalised information environments technologies enable, b) barriers to content moderation in virtual or augmented reality spaces, c) closer integration of digital and non-digital realities that may affect end users’ abilities to distinguish between the two and d) the increasing prevalence of artificially-generated information in a person’s information environment.

Technologies and social movements:
New and emerging technologies can empower and constrain social movements, which are crucial in facilitating sociocultural change (e.g. through advocacy). While social movements may be able to leverage new technologies to engender sociocultural transformation (e.g. through digitally-enabled activism), political regimes or other actors may also weaponise technologies against social movements, hampering their ability to facilitate cultural change.
How might emerging technologies contribute to cultural change?

Though new technologies might have extensive cultural impacts, not all technologies will lead to cultural change. Indeed, some technologies will be integrated into existing cultural frameworks, with technology users drawing on existing cultural frameworks (e.g. norms and values) to interact with them. However, we identified several potential areas of considerable cultural change at different levels of individual and societal engagement with emerging technologies:

At the personal level:
Technological advances (such as human augmentation) may spark questions about the fundamental nature of human identity and the biological foundations of human experience. Some experts specifically flag the technological hybridisation of human identity, with perceptions of identity increasingly intertwined with technological enablement, leading to disruptive sociocultural effects.

Among people or between people and technologies:
Cultural change may arise from tensions between personalising human experiences or information flows and a community’s ability to define common cultural touchpoints. As emerging technologies help tailor information spaces to individual preferences, communities may increasingly struggle to collectively identify and agree on facts about our physical, societal, political and economic realities and, thus, culture.

Regarding a person’s interaction with their broader environment (e.g. a city):
Some emerging technologies will likely shift interpersonal interaction from the physical to the virtual world. In particular, the potential for widespread adoption of augmented, mixed and virtual reality indicates significant technological mediation of many or all aspects of a person’s interaction with their environment, affecting individuals’ interactions and relationships with physical spaces and infrastructure. This increasing relocation of human activity into virtual spaces may erode the cultural value of physical artefacts (e.g. architecture) while also changing the make-up of physical environments such as cities through technological integration and connectivity.

Across different technological areas:
Cultural change may also arise from the rapid pace of innovation and adoption of new technologies. Cultural integration of technology may become more complex as social institutions struggle to absorb technological changes into existing cultural frameworks or adapting norms and rules of behaviour to the capabilities and uses of new technologies. This may increase the likelihood that new technologies generate technology-mediated cultural change.
How should future research assess the impact of emerging technologies on culture?

This study aimed to provide an initial assessment of the cultural implications of technological changes in the future information environment. Many other policy areas may experience technological changes and require further research to understand their cultural contexts and implications. Since the framework developed in this study aims to support more robust analyses of the interactions between technology and culture, it can help guide any such research. Additionally, we recommend that researchers should:

- Apply the conceptual framework holistically through more in-depth analyses of selected technologies;
- Apply the conceptual framework to a series of studies to build a coherent evidence base;
- Iterate the framework to incorporate lessons learned;
- Embed analyses of emerging technologies in bespoke cultural topographies of defined populations of interest;
- Focus research on technology applications and capabilities;
- Examine historical examples of the cultural impact of technological innovation to understand the dynamics and circumstances of technology-mediated cultural change.

We include further information about the conceptual framework and additional recommendations in our report, *Cultural and technological change in the future information environment*. 
This research was commissioned by the Defence Science and Technology Laboratory (Dstl) through the Analysis for Science & Technology Research in Defence (ASTRID) framework. It was supported by RAND Europe’s Centre for Futures and Foresight Studies (CFFS).

This summary describes work done by RAND Europe documented in Cultural and technological change in the future information environment by Linda Slapakova, Abby Fraser, Megan Hughes, Maria Chiara Aquilino, Kristin Thue, RR-A2662-1, 2024 (available at www.rand.org/t/RRA2662-1). To view this summary online, visit www.rand.org/t/RBA2662-1. RAND Europe is a not-for-profit research organisation that helps to improve policy and decision making through research and analysis. RAND Europe’s publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark.

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