

Preserving Human Skills and Agency in The Age of Intelligent Technologies

Maintaining meaningful human autonomy



This research initiative explores how Canadians can adapt to a future in which intelligent technology plays a more prominent role in daily life and decision making while preserving the skills, rights, autonomy, and social conditions required for individuals and communities to thrive.

Emerging technologies such as artificial intelligence (AI) and automation have the potential to improve productivity, accessibility, safety, and quality of life.

As their use becomes more widespread, these technologies are changing how people learn, make decisions, solve problems, communicate, and interact with the world around them.

Intelligent technologies also raise important questions about human capabilities and control. As people rely more on intelligent systems for everyday tasks, there is growing interest in understanding how this may impact human judgment, expertise, situational awareness, privacy, and the ability to exercise meaningful control in critical situations.

Canada has an opportunity to shape human-centred approaches to technology use and governance. This research initiative explores how Canadians can adapt to a future in which intelligent technology plays a more prominent role in daily life and decision making while preserving the skills, rights, autonomy, and social conditions required for individuals and communities to thrive. As technological capabilities continue to expand, this initiative seeks to better understand their potential impacts and identify approaches that help preserve and strengthen human skills, expertise, and decision making that are essential to Canadian society.



Prompt....



Future uncertainties

Over the next decade, the balance between increasingly capable technologies and maintaining human oversight and agency may be shaped by several important factors:



Advances in intelligent systems: AI, agentic systems, automation, and other emerging technologies continue to evolve rapidly. Future intelligent technologies may increasingly perform a range of cognitive and decision-making tasks with greater sophistication and autonomy. The [International AI Safety Report \(2025\)](#) highlights significant uncertainties about the capabilities and behaviour of future AI systems and stresses the importance of maintaining oversight and control over technologies.



Human control in safety-critical environments: Intelligent systems are supporting more decisions in [workplaces](#), [healthcare](#), [critical infrastructure](#), and [transportation](#). It remains unclear how humans will maintain situational awareness, expertise, and meaningful control as automation becomes more widespread. The International Labour Organization's (ILO) [report](#) identifies emerging workplace challenges including decreases in human oversight capabilities and increased risk through human-machine interactions.



Human skills and technology dependence: As intelligent systems become more capable and accessible, people may rely on them for a greater range of tasks. Although these tools can improve efficiency, there are ongoing questions about how sustained reliance on AI may negatively impact [learning](#), [memory](#), [decision-making](#), and [critical thinking](#) skills.



Governance and public trust: As intelligent technologies become more deeply integrated into daily life, governments, organizations, and communities will face growing challenges in shaping how these systems are designed, deployed, and governed. Many technologies used in Canada are developed and managed elsewhere, limiting direct influence over their development. However, governance frameworks and international partners need to keep pace with technology change while maintaining public trust and alignment with societal values. Discussions around agile AI governance underscore the difficulty of aligning [governance](#) mechanisms with rapid advances in the global technology landscape.



Transformation of education and learning: Educational institutions are adapting to a world in which generative AI is used more frequently in writing, research, and problem-solving. This raises questions about which human skills are most vital to maintain in the future and how expertise and competencies are developed. UNESCO recently released [guidance](#) for institutions to responsibly use human-centred generative AI in education and research.

Potential research topics

This research initiative will draw on insights from multiple disciplines to explore how individuals and communities across Canada can continue to develop, maintain, and exercise essential capabilities as technology becomes more capable and influential. The intent is to bring together researchers to explore solutions and generate actionable insights on issues such as (but not limited to):



Human skill development and expertise

As advanced technologies reshape how people learn and work, understanding how critical capabilities are developed and maintained is increasingly important. Potential questions may include:

- Which human skills are most critical to preserve and strengthen as intelligent technologies become more advanced?
- How might reliance on technology influence critical thinking, expertise, creativity, and decision-making?
- How can educational institutions and workplaces support the development and retention of expertise in increasingly automated environments?



Human agency, decision-making, and safety

As intelligent technologies increasingly support, influence, and automate decisions, new questions are emerging around oversight and meaningful human control. Potential questions may include:

- What constitutes meaningful human control in increasingly technology-mediated environments?
- How can people maintain effective decision-making and exercise sound judgment when working alongside autonomous systems?
- How can organizations mitigate overreliance on technology and skill atrophy to maintain safe and effective human-technology interactions?



Human-centred systems and social resilience

Emerging technologies are reshaping workplaces, institutions, and communities, creating new opportunities while testing social resilience and trust. Potential questions may include:

- How are intelligent technologies reshaping workplaces, public services, healthcare systems, and other institutions?
- What factors support human wellbeing, resilience, and meaningful social connection in increasingly digital environments?
- How can organizations and communities adapt to technological change while maintaining agency and participation in society?



Governance and responsible innovation

As technology becomes more deeply embedded into decision-making and daily life, governance approaches and safeguards will play an important role in supporting safe, trustworthy, human-centred outcomes. Potential questions may include:

- What governance frameworks may support human-centred and trustworthy technologies?
- How can Canada manage the use of intelligent technologies that are largely created and managed internationally?
- How might policymakers and industry balance innovation with safety and public trust?



About the CSA Explore Research Program



Explore is CSA Group's interdisciplinary, forward-looking research program, designed to respond to complex, emerging issues that transcend traditional boundaries. The CSA Explore Research Program convenes and supports experts from multiple disciplines to address systemic challenges on specific topics of relevance over the next decade and beyond. Individual research projects help advance discovery from the lens of their own disciplines. Together, their insights guide CSA Group's proactive response to future needs.

For more information on the program and how to apply, see: <https://www.csagroup.org/standards/csa-research-centre/csa-explore-research-program/>

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