

# LEAPS AND BOUNDARIES



Artificial intelligence (AI) has the potential to transform the nature of scientific inquiry and lead to innovations in engineering, but it also brings real and imminent concerns. **Leaps and Boundaries** examines the opportunities, challenges, and implications of using AI technologies to enable scientific and engineering research design and discovery in Canada.

## AI IN SCIENCE AND ENGINEERING



AI is already used for a range of tasks, such as analyzing and interpreting data, but it may be used to develop scientific hypotheses and experiments, and create new engineering design processes, with minimal human involvement.



### NEW CHALLENGES

The science and engineering R&D environment in Canada will face new epistemic, methodological, and ethical challenges for the assessment of research and researchers using AI.



### A FOCUS ON REDESIGN

AI systems will likely disrupt the science and engineering labour market, but through the **redesign** rather than the **replacement** of tasks and jobs.

### TOWARDS A TRANSDISCIPLINARY FUTURE

AI in research is blurring disciplinary boundaries among science, technology, engineering and mathematics, and the social sciences, humanities and health sciences.



### MORE THAN A QUESTION OF IF



The question is not **whether** AI will have a role in science and engineering R&D, but rather, **how quickly?**

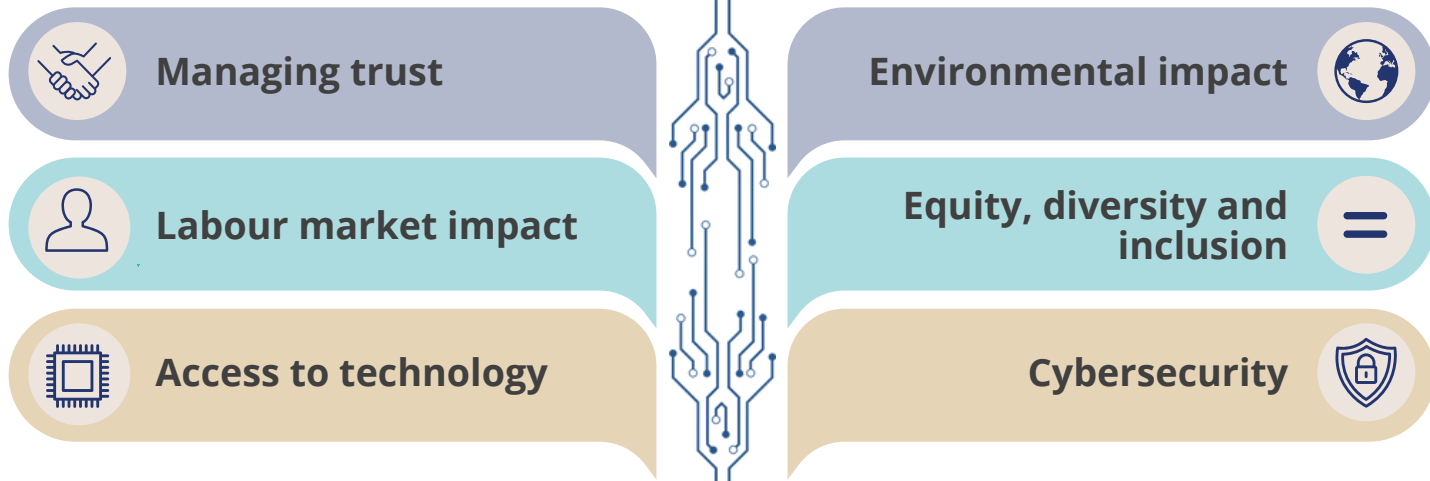
### PRIORITIZING HORIZONTAL GROWTH

Canada is a well-established leader in several fields of AI, but has largely focused on vertical growth within these silos. Maximizing the opportunities of AI for science and engineering will require **horizontal growth that crosses disciplinary and sectoral boundaries** to better integrate diverse knowledge and skills.

# AI MAY HAVE UNINTENDED CONSEQUENCES



If used irresponsibly, AI could deepen existing inequities, perpetuate human biases, and even create new ones. Potential unintended consequences of the use of AI range widely and should be managed carefully.

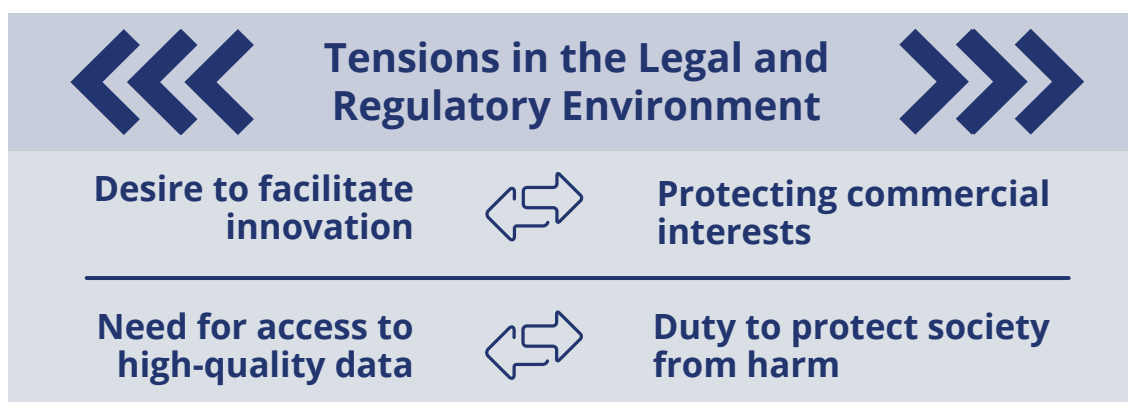


To prevent unethical or unintended outcomes, future scholars and engineers will require training to understand and appreciate ethical and social dilemmas.

## AI BRINGS LEGAL AND REGULATORY CHALLENGES



Technological development is outpacing the legal and regulatory frameworks that govern AI systems in Canada, leading to uncertainty with deployment and commercialization.



### AI GOVERNANCE

The diverse priorities across government may lead to a **flexible but fragmented** regulatory environment. Canada's regulatory approach to AI governance will require harmonized federal and provincial/territorial action.

