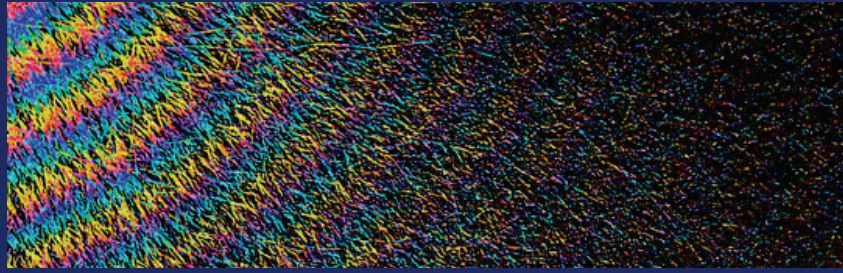


# QUANTUM POTENTIAL



**Quantum technologies hold transformative potential for Canada.** Fully achieving that potential, however, depends on their adoption in a range of industries. *Quantum Potential* details the opportunities and challenges presented by quantum technologies and strategies for encouraging their responsible adoption.

Quantum technologies apply the principles of quantum mechanics to the ways in which we handle information, expanding the boundaries of what is possible.



**Quantum computers** may solve more complex problems than classical computers.



**Quantum sensors** enable measurements of unprecedented precision.



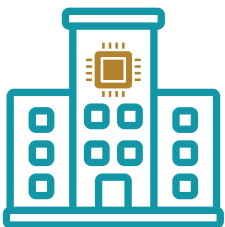
**Quantum communications** establish new frontiers in cryptography and support enhanced data security.

## CANADA AND THE QUANTUM LANDSCAPE

Canada has **strong foundations in quantum research**, hosts **numerous quantum technology firms**, and enjoys **high rates of industry and international collaboration**.



However, **Canada's quantum expertise is clustered**, posing challenges to access. Canadian companies hold **fewer quantum-related patents**. Other countries have begun to surpass Canada's quantum research output. And there are **minimal programs to encourage the adoption of quantum technologies** by potential end-users.



## ETHICAL, LEGAL, SOCIAL, AND POLICY CHALLENGES



Detrimental hype,  
loss of trust



Regulatory  
uncertainty



Threats to  
data security  
and digital  
infrastructure



Job losses,  
skill gaps,  
digital divide



Abuse of market  
power,  
anticompetitive  
behavior

The **responsible adoption** of quantum technologies  
**takes these and other challenges into account.**

## STRATEGIES FOR ENCOURAGING ADOPTION



### Public-private cooperation

- Government procurement
- Specialized programs and agencies
- Advisory boards



### Regulatory oversight

- Pro-competition policy reforms
- Security and privacy requirements
- International technology standards



### Industry-led initiatives

- Professional services
- Regional hubs
- Industry consortia



### Quantum-ready workforce

- Diverse experts
- Increased STEM recruitment
- Immigration of skilled workers

## A RESPONSIBLE APPROACH

Predicting the impacts of a disruptive technology is difficult. Realizing the benefits of quantum technologies involves more than encouraging their development and adoption; it also involves **anticipating the outcomes of technological change**.



A variety of measures – including **quantum impact assessments, data protection and governance, controlled access to some quantum technologies, soft-law mechanisms, and responsible research and innovation** – can help maximize the benefits of quantum technologies while mitigating risks.