



QUÉBEC QUANTIQUE

Enabling the Quebec Quantum Ecosystem

quebec-quantique.ca

USE CASE
Drug Discovery



SECTOR
Health

The global market for protein-based drugs is currently valued at 200 billion USD and could increase by 50 to 100% in the medium term, thanks to the advancements brought by quantum technologies.



Applicable Quantum Technologies

- Quantum Computer
- Quantum Algorithms
- Hybrid Quantum Algorithms

Commercial Applications

- Drug Discovery
- Clinical Trial Assistance
- Molecule and Interaction Modeling
- Development Cost Reduction
- Time-to-Market Reduction



Opportunity Quantum computers will enable the simulation of more complex molecules than current computers, leading to faster and less expensive discovery of new drugs^{1,2}



Threat Once the tools are developed, a company that doesn't utilize them will face higher drug discovery costs compared to its competitors.

Examples of actors in the innovation chain



DEVELOPERS



ECOSYSTEM



Users

Created in collaboration with



Public partner





USE CASE : Drug Discovery

SECTOR
Health

Factors preventing adoption

The computational power of quantum computers is not yet sufficient to model the molecules and interactions required for drug discovery. Additionally, there will be very high startup costs in terms of both equipment and expertise. However, the continuous improvement of quantum computers and the development of new algorithmic solutions will facilitate the use of these technologies³.

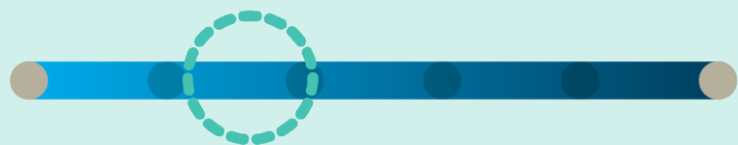
Risks of Status Quo

The pharmaceutical industry already spends 15% of its sales on research and development (R&D)⁴. This amount is so substantial that it accounts for 20% of all R&D expenditures worldwide⁵ across all industries. Moreover, out of 20 molecules discovered in the laboratory, only one will actually be commercialized and available to patients⁶. Thus, in the drug development cycle, R&D is the initial and one of the costliest stages, along with clinical trials. Quantum computers can indeed assist in better patient selection and modeling during clinical trials⁷.

Once quantum computers reach a sufficient level of performance, this way of working will become the new status quo.

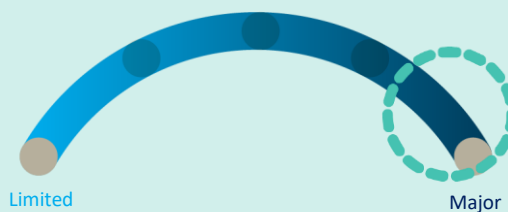
This technological wave will contribute to the growth of the global market for protein-based drugs. Currently valued at 200 billion USD, this market could increase by 50 to 100% in the medium term, thanks to the capabilities brought about by quantum technologies⁸.

OPPORTUNITY window



Major changes will occur in the medium term. However, it's important to start preparing for these changes in advance to avoid lagging behind in the market and against competitors. It's advisable to prioritize early adoption⁹, allowing time to develop the expertise required for the proper deployment and use of quantum technologies. The initial applications will be hybrid, while quantum computers mature and become ready¹⁰.

POTENTIAL impact for businesses



The impact will be significant across the entire pharmaceutical industry. Developing drugs and molecules will become much faster and less costly. The current methods being used will rapidly become obsolete, and companies that refuse to modify their work processes will face a substantial disadvantage in competition.

- <https://www.pharmaceutical-technology.com/analysis/quantum-brilliance-reimagining-drug-discovery-quantum-computing/>
- <https://cen.acs.org/business/informatics/Lets-talk-quantum-computing-drug/98/135>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/recalculating-the-future-of-drug-development-with-quantum-computing>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/pharmas-digital-rx-quantum-computing-in-drug-research-and-development>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/pharmas-digital-rx-quantum-computing-in-drug-research-and-development>
- <https://medium.com/cambridge-quantum-computing/the-future-of-quantum-drug-discovery-909aa5140b1f>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/pharmas-digital-rx-quantum-computing-in-drug-research-and-development>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/pharmas-digital-rx-quantum-computing-in-drug-research-and-development>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/pharmas-digital-rx-quantum-computing-in-drug-research-and-development>
- <https://www.mckinsey.com/industries/life-sciences/our-insights/recalculating-the-future-of-drug-development-with-quantum-computing>



QUÉBEC
QUANTIQUE

Québec Quantique aims to promote the adoption of quantum technologies by Québec businesses and organizations.

info@quebec-quantique.ca

[Join us on LinkedIn](#)

[Sign up to our newsletter](#)
quebec-quantique.ca