

The Journey to Quantum Advantage

INTERNET QUANTISTICO SFIDE E OPPORTUNITÀ': LE IMPRESE E LA RICERCA

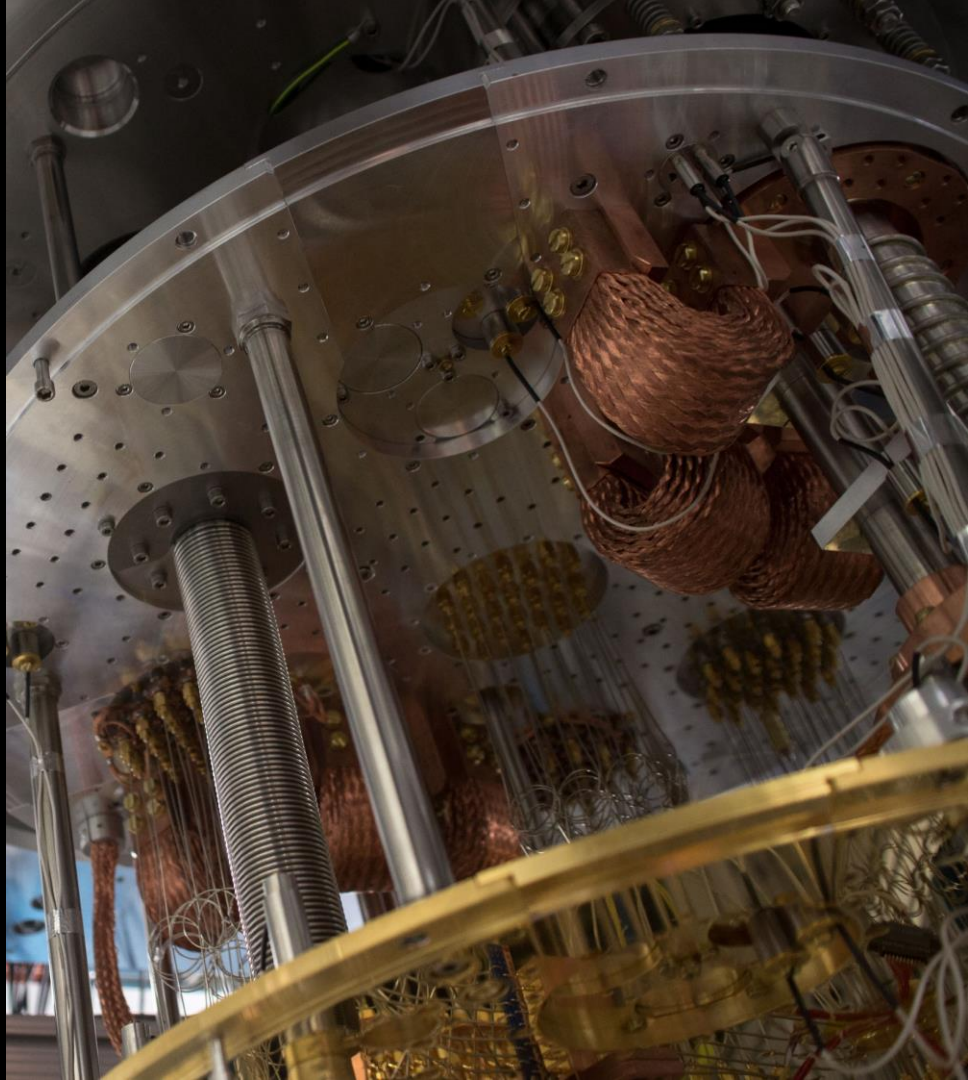
Alberto Fietta

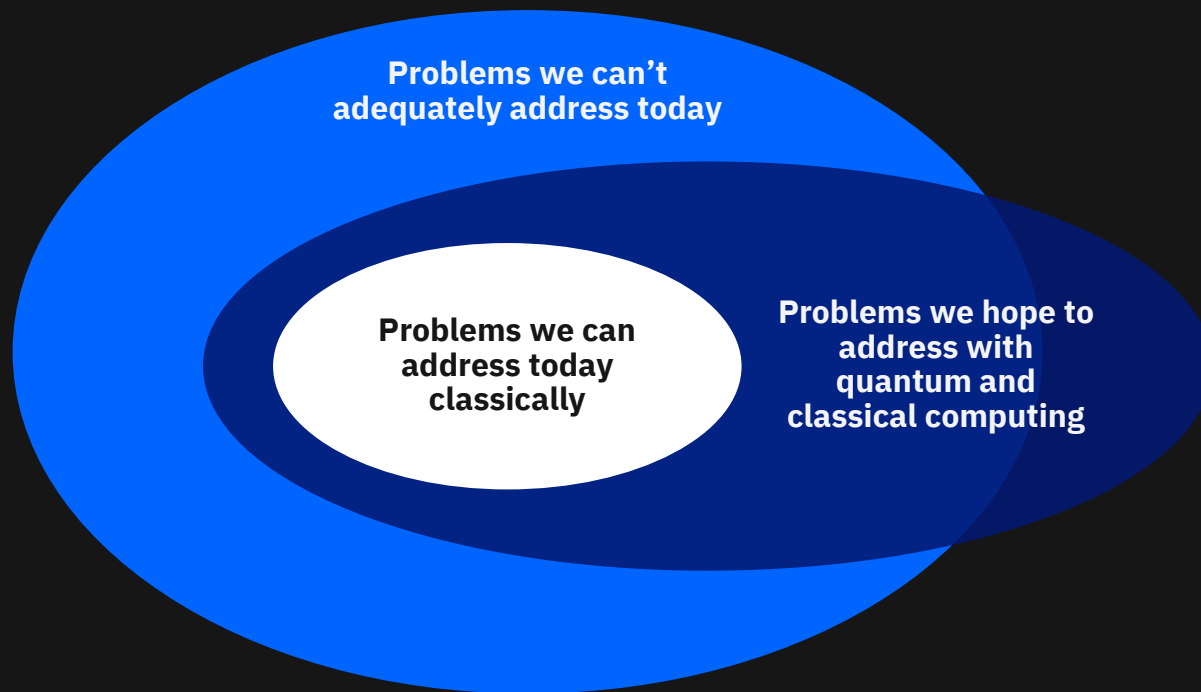
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Despite how sophisticated digital “classical” computing has become, there are many scientific and business problems for which we’ve barely scratched the surface



Our Quantum Computing Vision: A Quantum Hybrid Architecture

- Leverage on the computational power of Quantum Computers alongside the traditional one to:
 - solve **unmanageable problems** with current technological stack (e.g. prime number factorization)
- bring **speed up** and **higher accuracy** over classical computation to a **specific subset of enterprise-related problems**

Five different industries will be mostly impacted by Quantum Computing

NOT EXHAUSTIVE

Energy &
Chemicals



Financial
Services



Industrial &
Manufacturing



Distribution &
Logistics



Healthcare &
Life Sciences



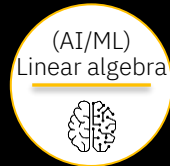
Financial Services | Sample Quantum Use Cases*



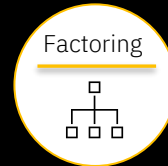
Monte Carlo
Simulation for
derivatives pricing
and risk
management



Collateral and
Portfolio
optimization
Transaction
settlement
Trading-strategy
optimization



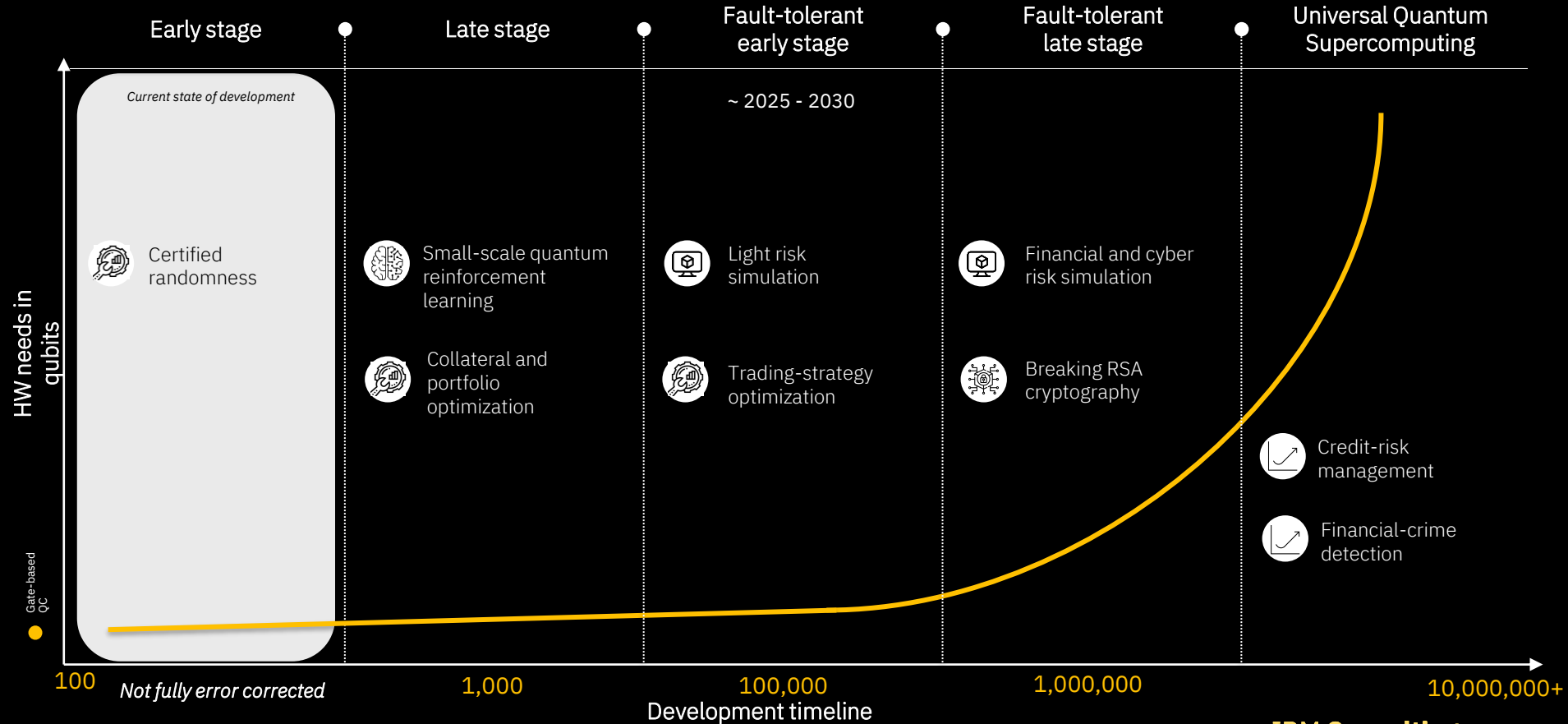
Dimensionality
reduction for market or
enterprise risk mgmt
Classification for
binary options
reduction and
credit/asset scoring
Fraud Detection



Quantum-safe
encryption for
cybersecurity

* SOURCE: IBM Institute for Business Value

The Journey to Quantum advantage requires a strict use case prioritization based on business value potential and Quantum technology maturity



SOURCE: «Quantum computing use cases are getting real—what you need to know», (McKinsey, December 2021)

**“We have chartered a path to Quantum Advantage for
business and science and, while it’s hard to predict the day,
I’m telling you, it is going to happen
EARLIER THAN YOU EXPECT”**

*Dario Gil, SVP
Director of IBM Research*

Convergence among Academia, Industry Organizations and Technology Players is a pivotal factor to succeed



Technology Player

- **Manages collaboration** between **partners**; promotes and encourages the extension of the partnership to an enlarged ecosystem according to the strategic objectives to be achieved
- It is the **primary player** in training **specialist skills**
- **Contributes to research and experimentation initiatives**, providing **knowledge** and **expertise**
- **Raise Quantum awareness** through the evaluation of the use case business value and insights



Academia & Research

- **Defines scientific and academic guidelines**
- **Proposes, promotes, prioritizes and guides themes** of **study and research** related to quantum technologies
- **Contributes to the promotion** of the initiative on the **territory** and at **national** level



Industry & Economy

- It provides **specialist expertise**, e.g., in the **financial services** sector, which is essential for identifying areas and cases of adoption
- **Brings expertise on quantum technologies** when an internal competence center is in place
- It is the **primary actor** in defining the **size of value**, and in particular the return on investment
- **Helps to determine the criteria** to promote **experimental initiatives** along the path that leads to a real use with industrial characteristics

