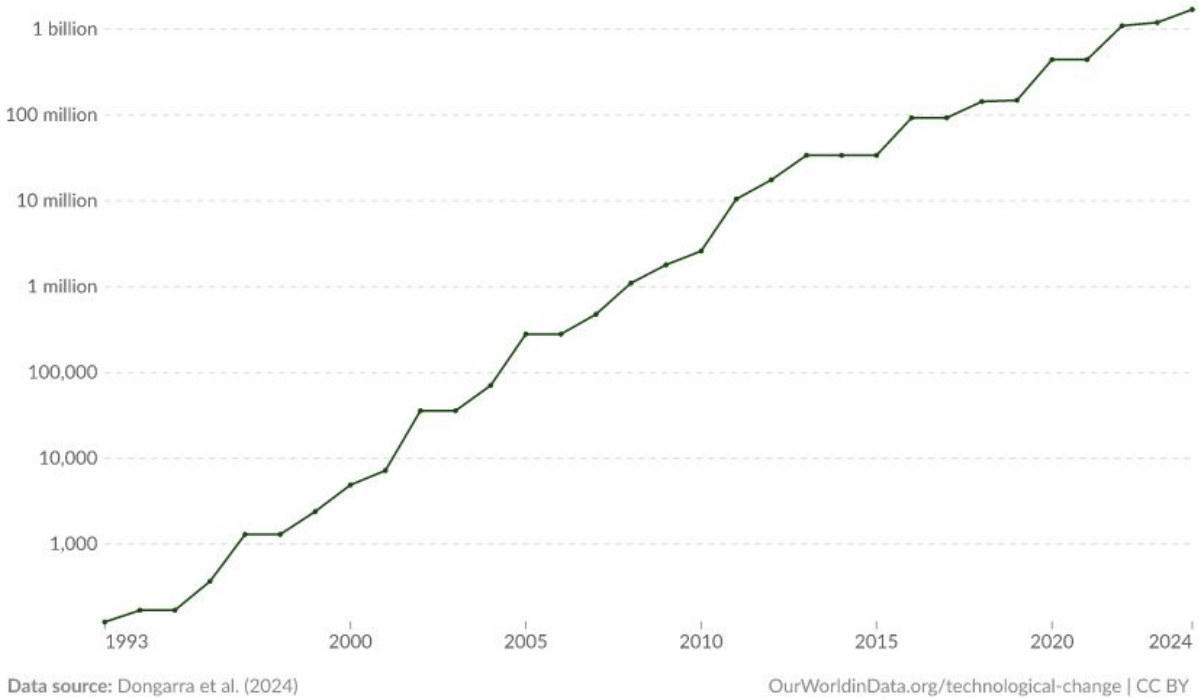

Quantum x AI demise or savior?
WORLD SUMMIT AI - SAN FRANCISCO
André König x Ilana Wisby

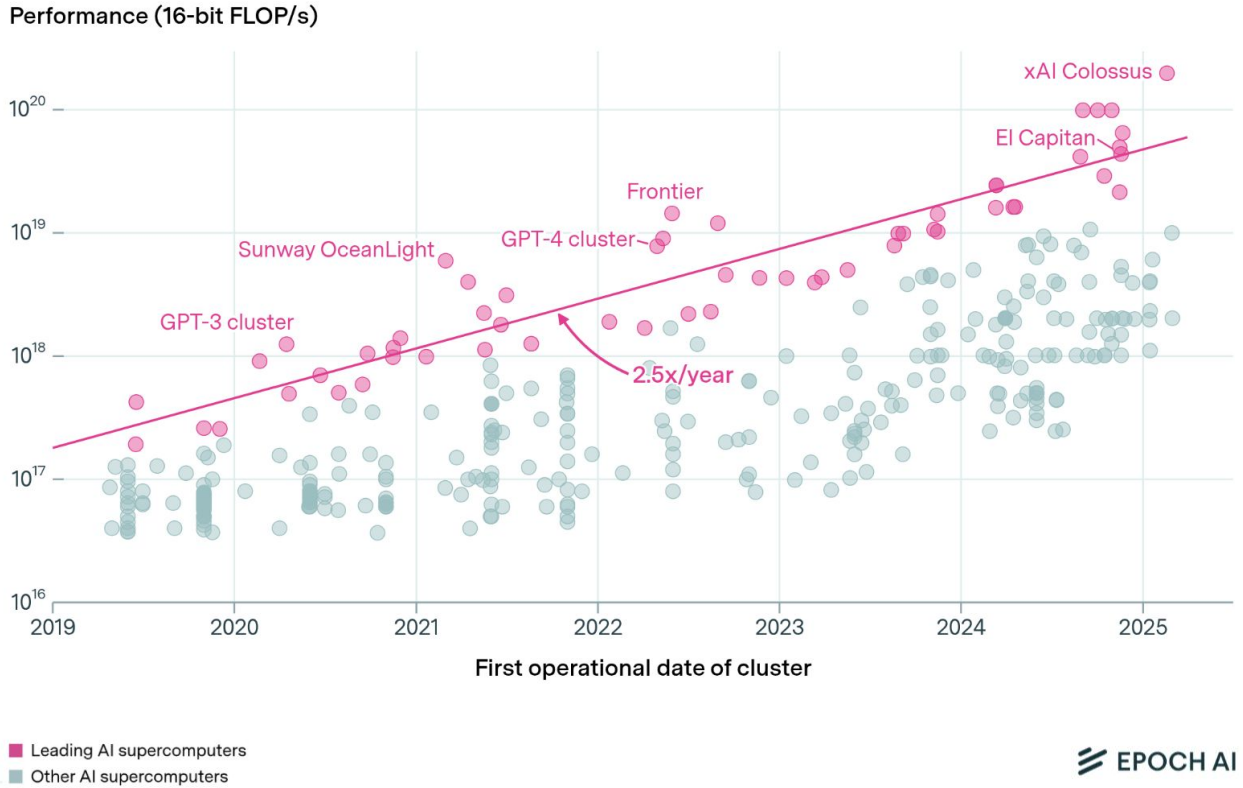
Computational capacity of the fastest supercomputers

The number of floating point operations carried out per second by the fastest supercomputer in any given year.

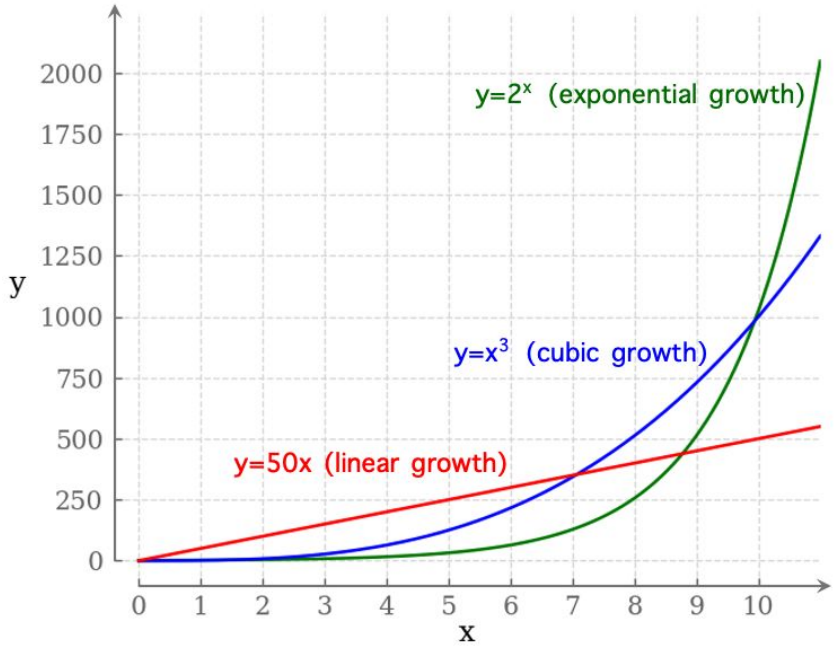
This is expressed in gigaFLOPS, equivalent to 10' floating-point operations per second.



The performance of leading AI supercomputers **has doubled every 9 months**



e^x


y=2^x (exponential growth)
y=x^3 (cubic growth)
y=50x (linear growth)
y
x
2000
1750
1500
1250
1000
750
500
250
0
0 1 2 3 4 5 6 7 8 9 10

Quantum Computing Concepts

Richard Feynman postulates need for quantum computers in 1981

Noisy Intermediate Scale Quantum

Systems of qubits yet to error corrected. Companies still in the lab

Enterprise Ready Quantum (ERQ)

Quantum moves out of the lab. Quantum supremacy demonstrated

Broad Based Quantum Advantage

High fidelity qubits. Creation of $1.3tn value for specific industries

Full Scale Fault Tolerance

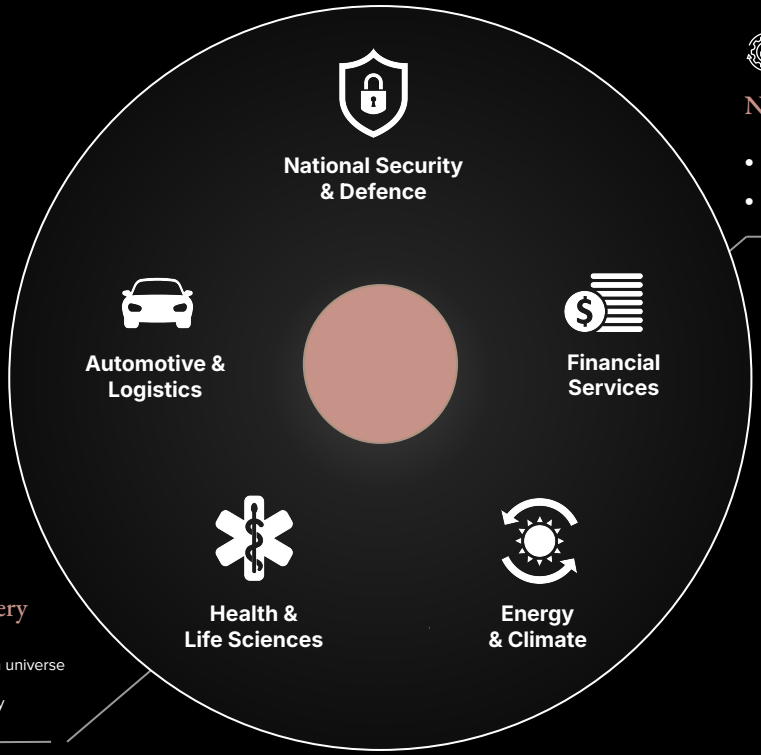
Modularise and scale most advanced architectures. Transformational impact

CONCEPTUAL | NISQ | ENTERPRISE READY | BROAD QUANTUM ADVANTAGE | FULL SCALE FAULT TOLERANCE

Global Quantum Intelligence

Quantum Computing Use Cases

- Quantum Optimisation
- Quantum Machine Learning
- Quantum Simulation
- Quantum Factorisation



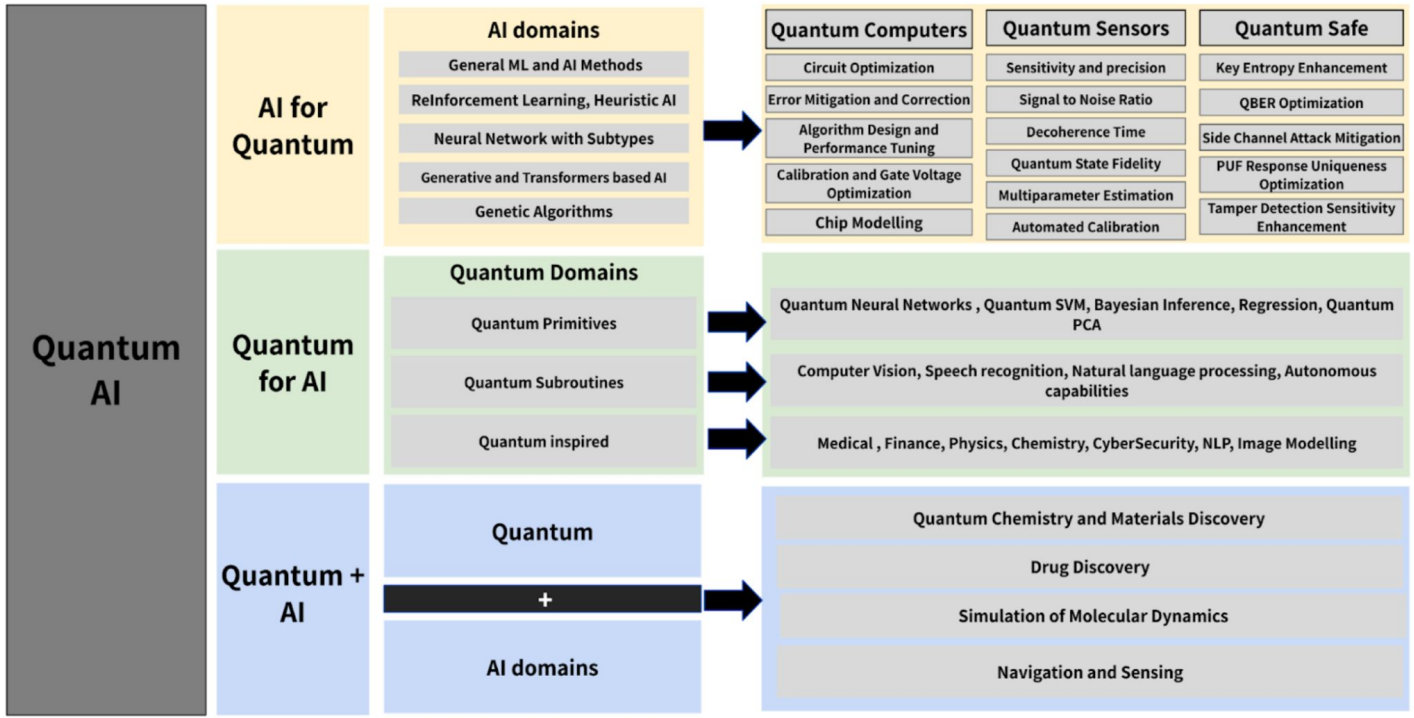
Near-term adv: Portfolio Optimisation

- Optimal risk-adjusted portfolio
- Faster, more accurate decision making

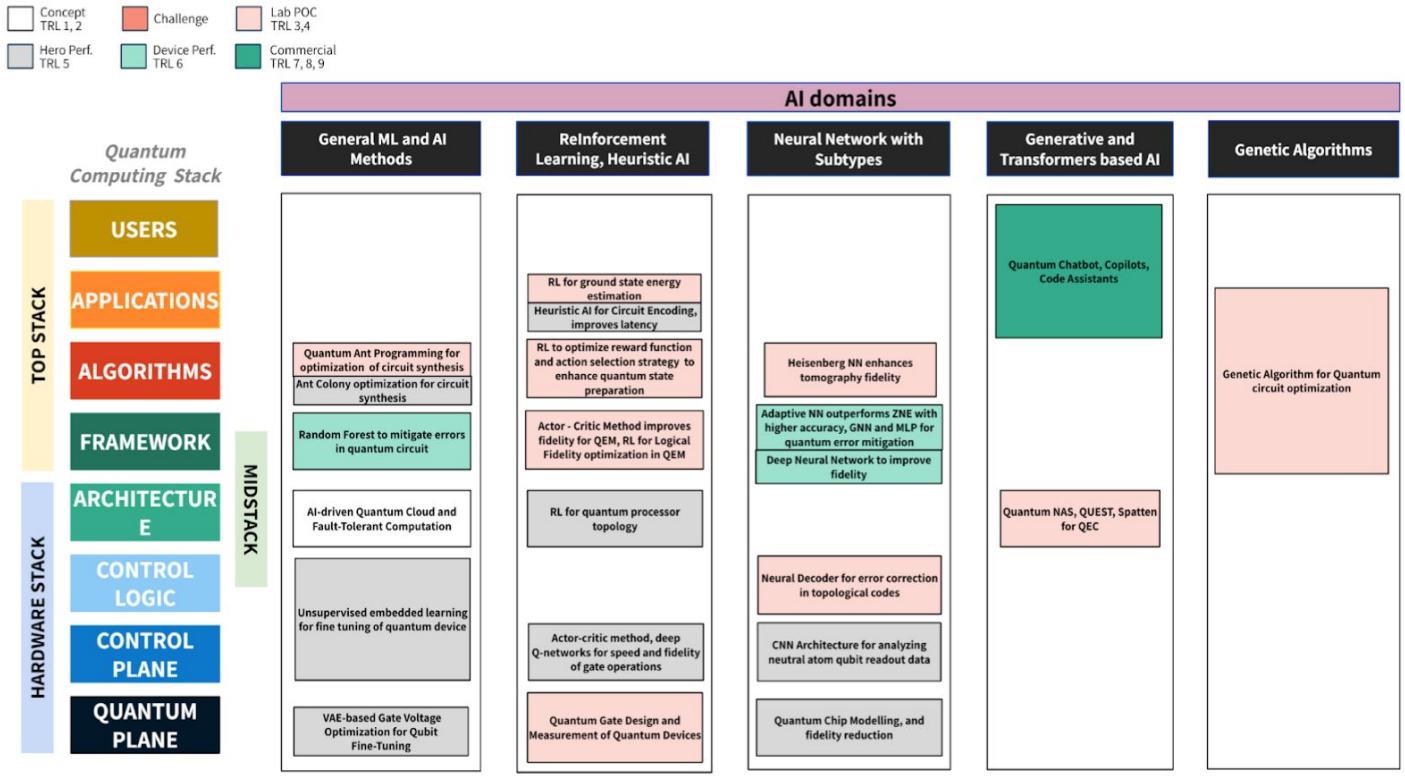
Near-term adv: Drug Discovery

- Classical - more transistors than atoms in universe
- Quantum - 200+ qubits at >99.9% fidelity

Sources: IDC Worldwide Quantum Computing Forecast 2021-2027; Evercore; McKinsey & Co - Quantum Technology Monitor, Apr 2023

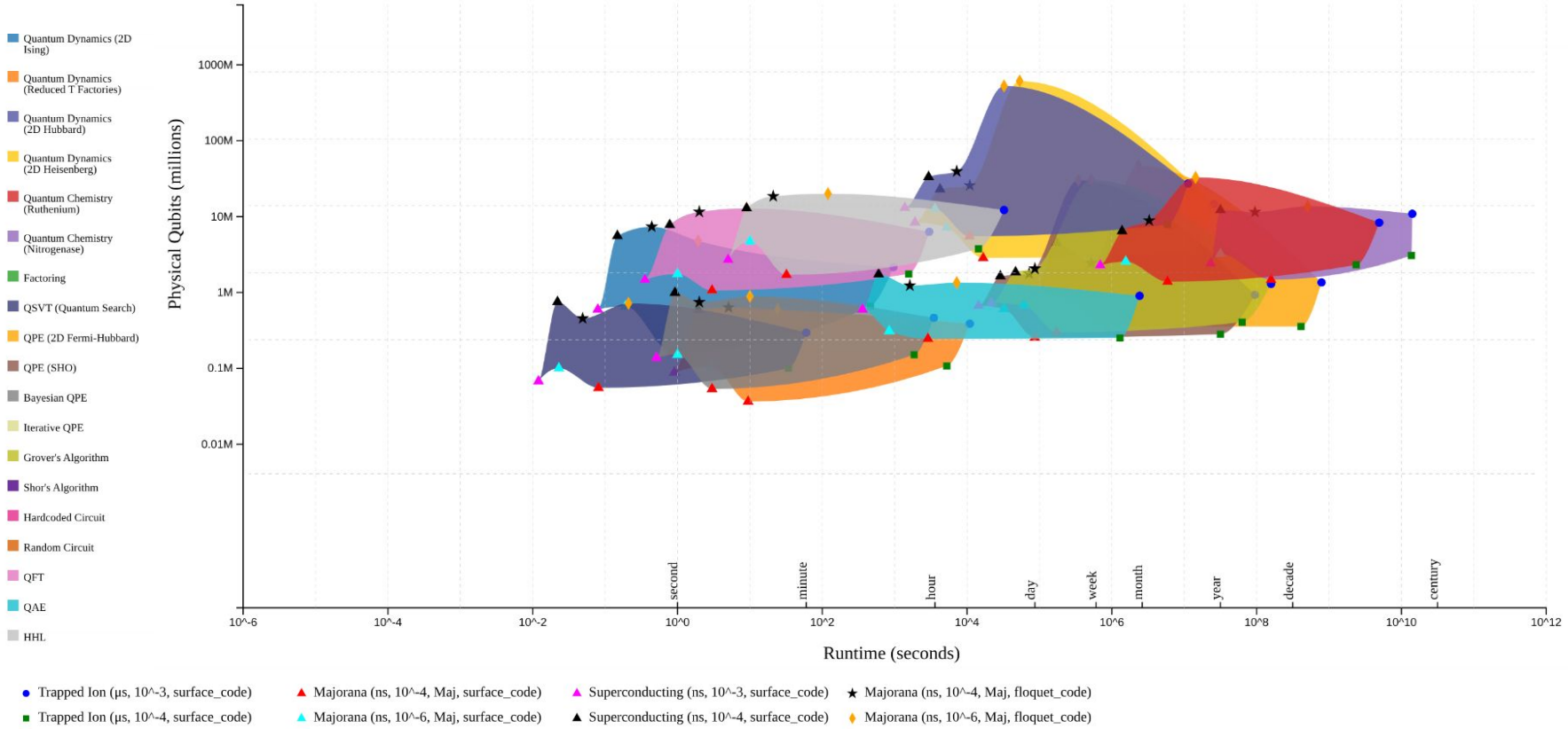


GQI: Quantum x AI framework


Concept TRL 1, 2
Challenge
Lab POC TRL 3,4
Hero Perf. TRL 5
Device Perf. TRL 6
Commercial TRL 7, 8, 9
AI domains
Quantum Computing Stack
TOP STACK
HARDWARE STACK
MIDSTACK
USERS
APPLICATIONS
ALGORITHMS
FRAMEWORK
ARCHITECTURE
CONTROL LOGIC
CONTROL PLANE
QUANTUM PLANE
General ML and AI Methods
ReInforcement Learning, Heuristic AI
Neural Network with Subtypes
Generative and Transformers based AI
Genetic Algorithms
Quantum Ant Programming for optimization of circuit synthesis
Ant Colony optimization for circuit synthesis
Random Forest to mitigate errors in quantum circuit
AI-driven Quantum Cloud and Fault-Tolerant Computation
Unsupervised embedded learning for fine tuning of quantum device
VAE-based Gate Voltage Optimization for Qubit Fine-Tuning
RL for ground state energy estimation
Heuristic AI for Circuit Encoding, improves latency
RL to optimize reward function and action selection strategy to enhance quantum state preparation
Actor - Critic Method improves fidelity for QEM, RL for Logical Fidelity optimization in QEM
RL for quantum processor topology
Actor-critic method, deep Q-networks for speed and fidelity of gate operations
Quantum Gate Design and Measurement of Quantum Devices
Heisenberg NN enhances tomography fidelity
Adaptive NN outperforms ZNE with higher accuracy, GNN and MLP for quantum error mitigation
Deep Neural Network to improve fidelity
Neural Decoder for error correction in topological codes
CNN Architecture for analyzing neutral atom qubit readout data
Quantum Chip Modelling, and fidelity reduction
Quantum Chatbot, Copilots, Code Assistants
Quantum NAS, QUEST, Spatten for QEC
Genetic Algorithm for Quantum circuit optimization

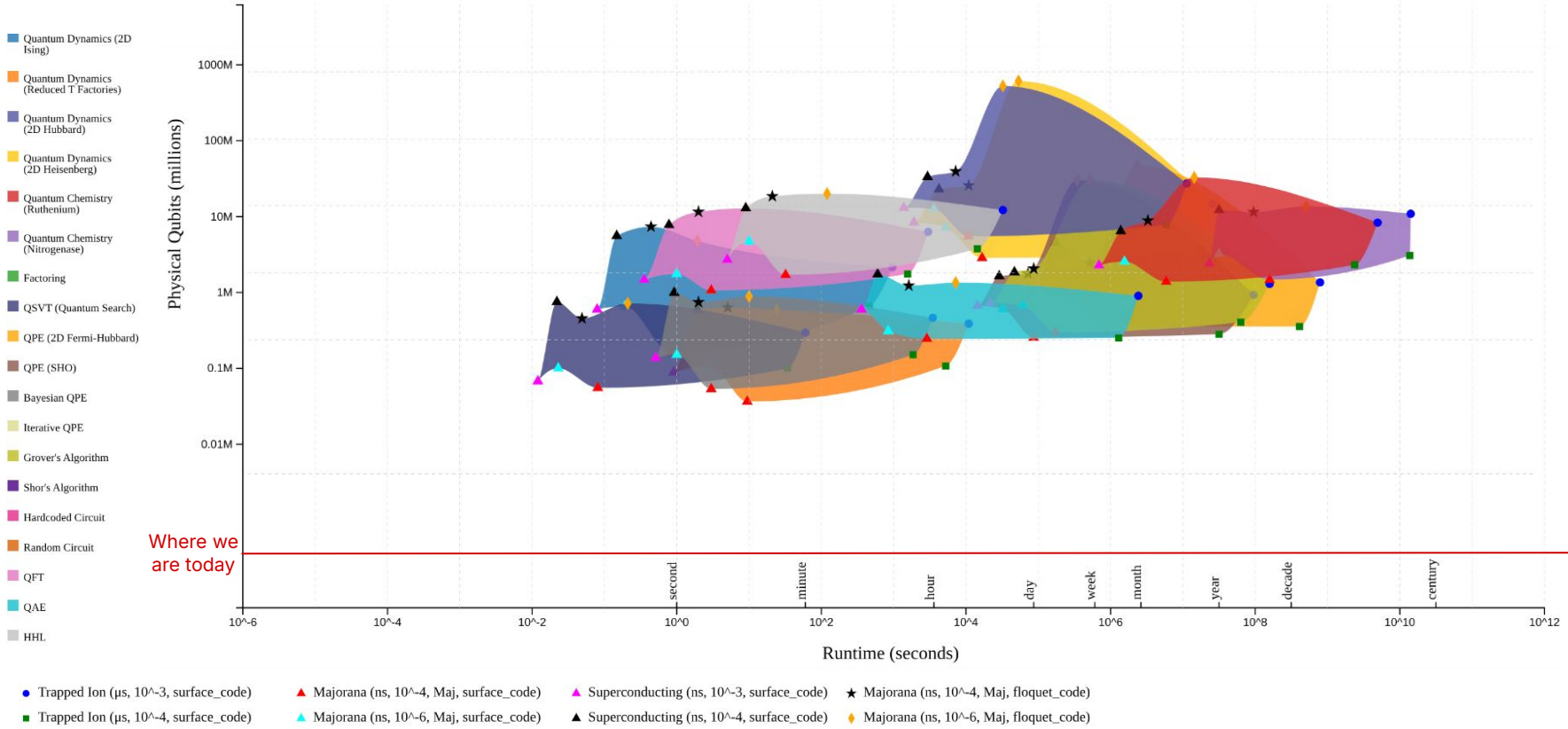
Quantum Resource Estimation

GQI platform



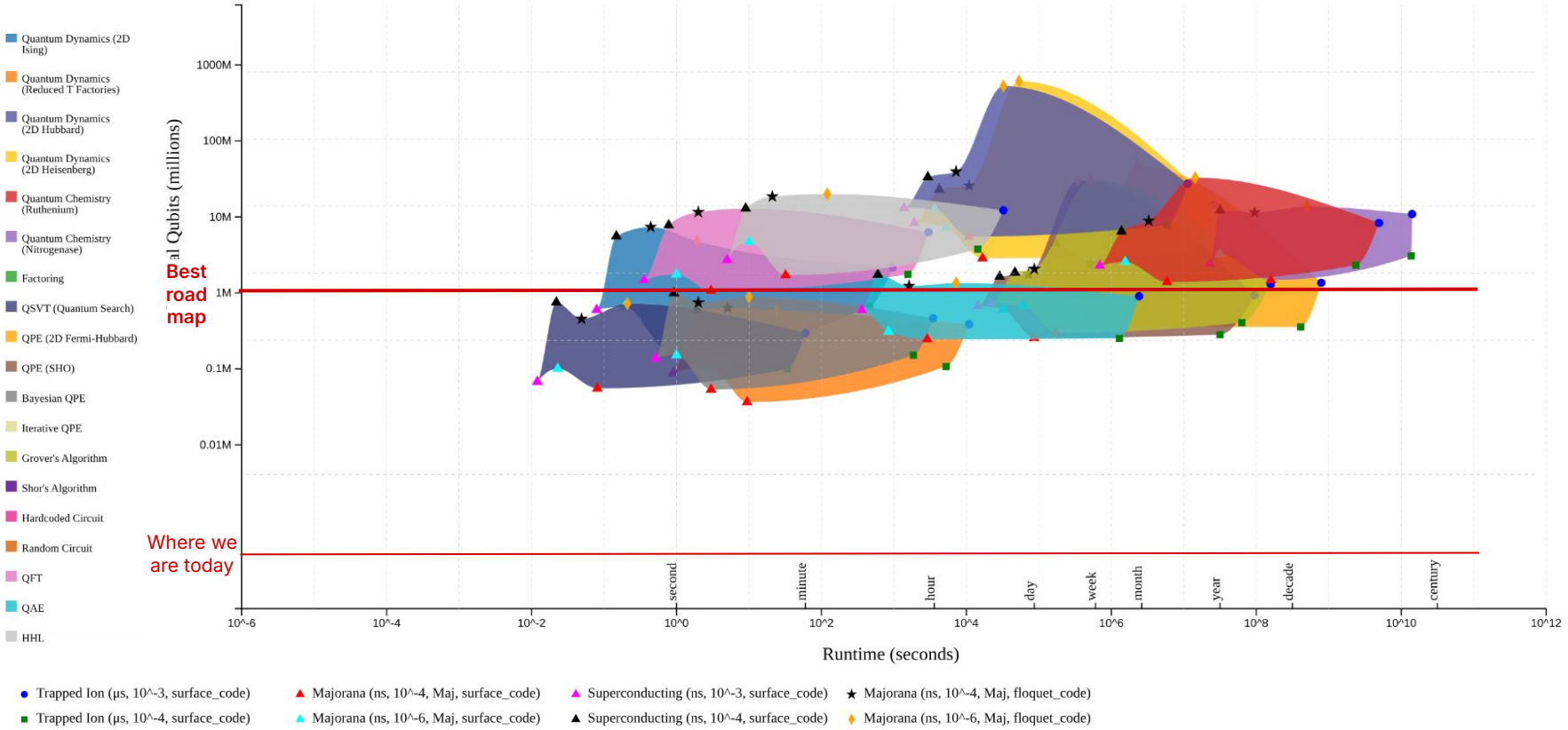
Quantum Resource Estimation

GQI platform



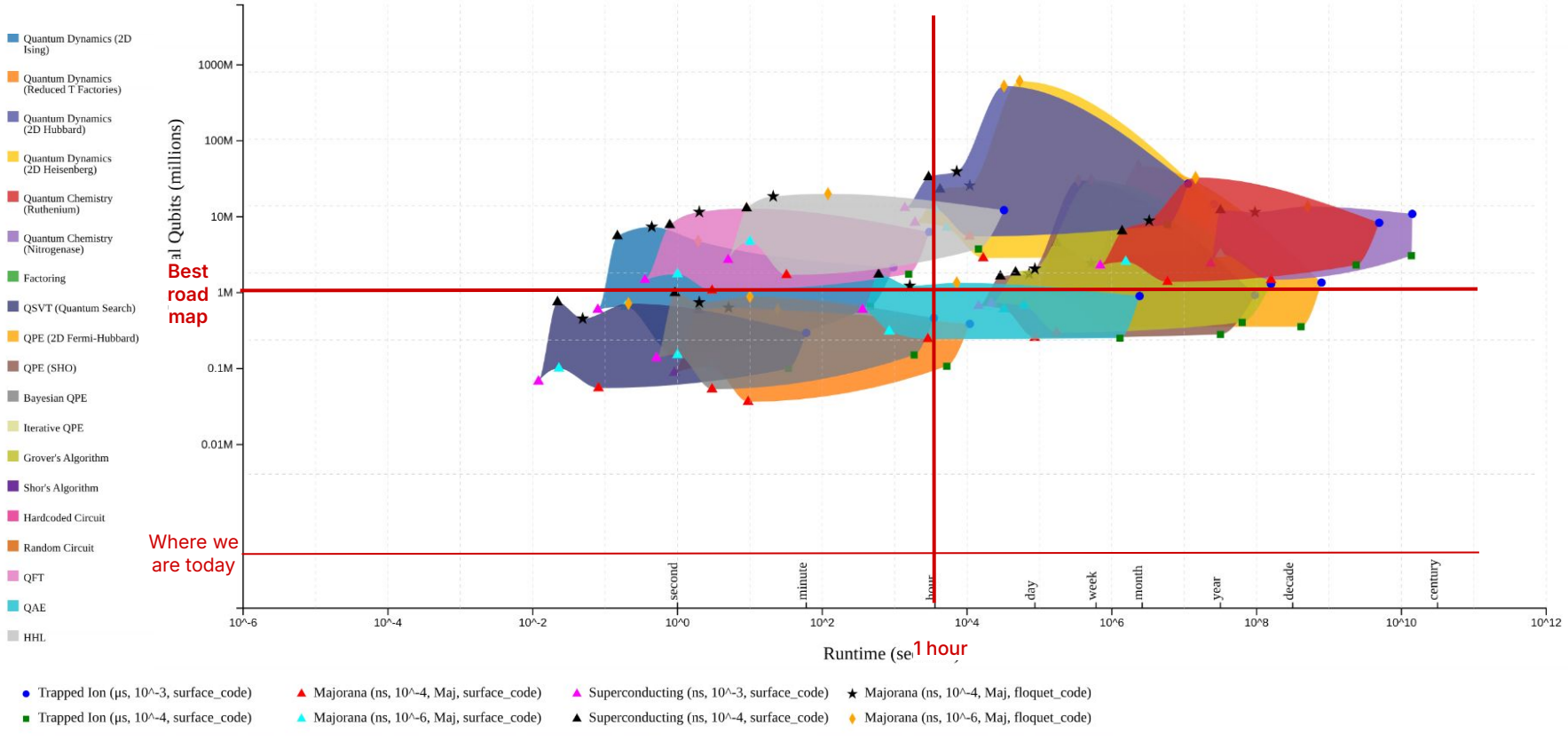
Quantum Resource Estimation

GQI platform



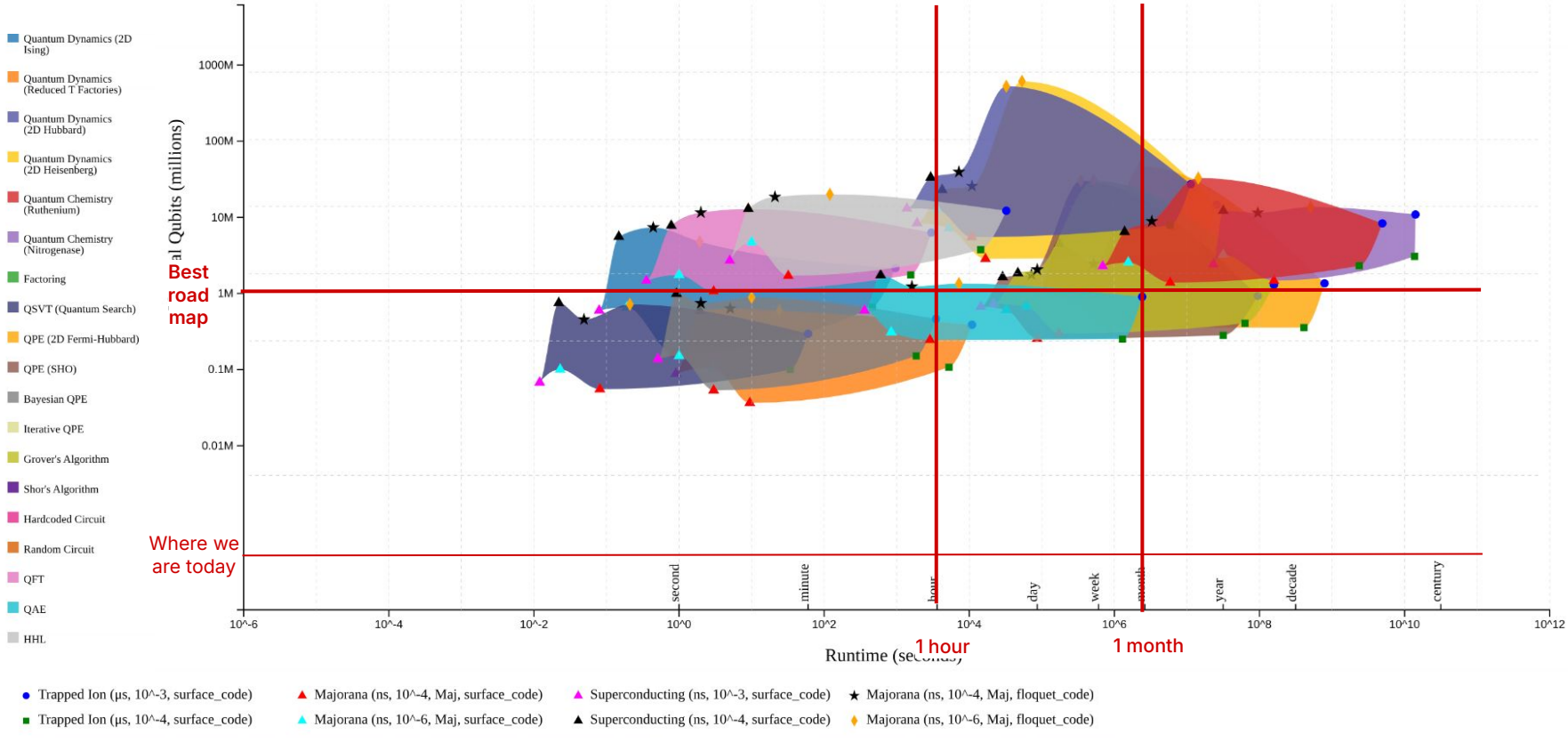
Quantum Resource Estimation

GQI platform



Quantum Resource Estimation

GQI platform



Potential as “savior”

Unmatched Computational Power
Quantum AI (QAI) harnesses quantum principles like superposition and entanglement to process massive datasets and solve problems classical computers can’t touch.

Transforming Industries

- Healthcare: Simulates molecules to accelerate drug discovery, vaccine development, and personalised medicine.
- Finance: Optimises portfolios, detects fraud, and improves predictions through deeper pattern analysis.
- Logistics: Enhances route planning, scheduling, and resource use — cutting costs and reducing waste.
- Materials Science: Designs next-gen materials (e.g. better batteries, catalysts) by simulating quantum properties.
- Climate: Improves long-term climate models and short-term weather forecasting.

Supercharging AI

- Quantum Machine Learning: Speeds up model training, pattern recognition, and reinforcement learning.
- Solving the Impossible: Tackles NP-hard problems in areas like scheduling and code analysis.
- Cybersecurity: Enables ultra-secure communication, quantum-resistant cryptography, and better threat detection.

Scientific Breakthroughs

QAI could unlock new energy sources, decode biological complexity, and push the boundaries of discovery.

Potential as “demise”

Cybersecurity Threats

- Breaks current encryption (RSA, ECC), endangering communications, finance, and infrastructure.
- “Harvest Now, Decrypt Later”: Encrypted data stolen today may be decrypted by quantum tech tomorrow.

Inequality & Power Concentration

- High costs and expertise requirements risk centralising power among wealthy nations and corporations.
- Could widen the digital divide and exacerbate global inequality.

Job Displacement

- While new roles will emerge, QAI’s advanced automation may replace many existing jobs.

Ethical Risks

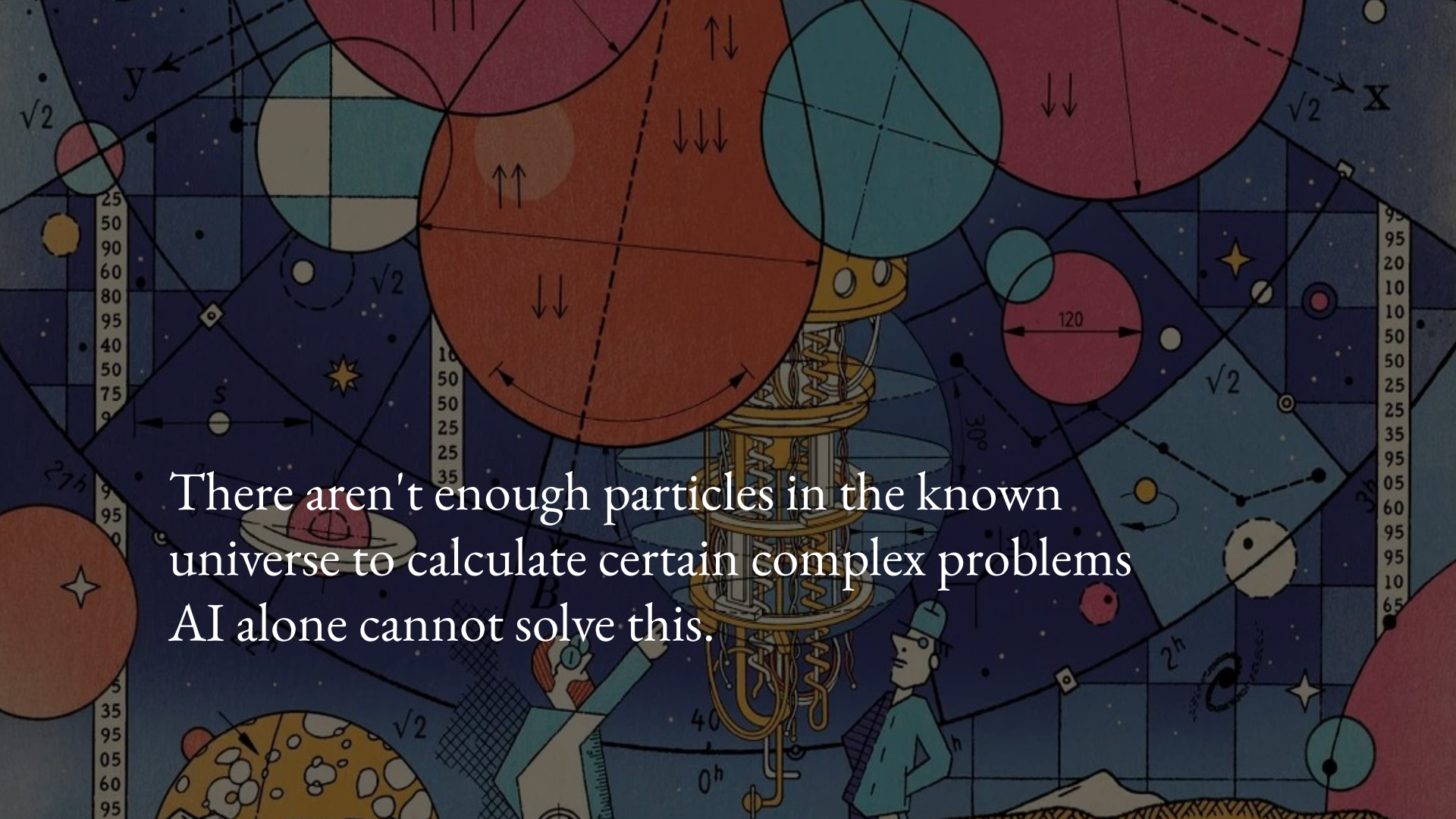
- Data Privacy: Massive processing power increases the risk of large-scale data harvesting.
- Bias Amplification: If trained on flawed data, QAI could reinforce discrimination on a deeper scale.
- Autonomous Decisions: Delegating high-stakes decisions (e.g. in healthcare or defence) to QAI raises major ethical and governance concerns.

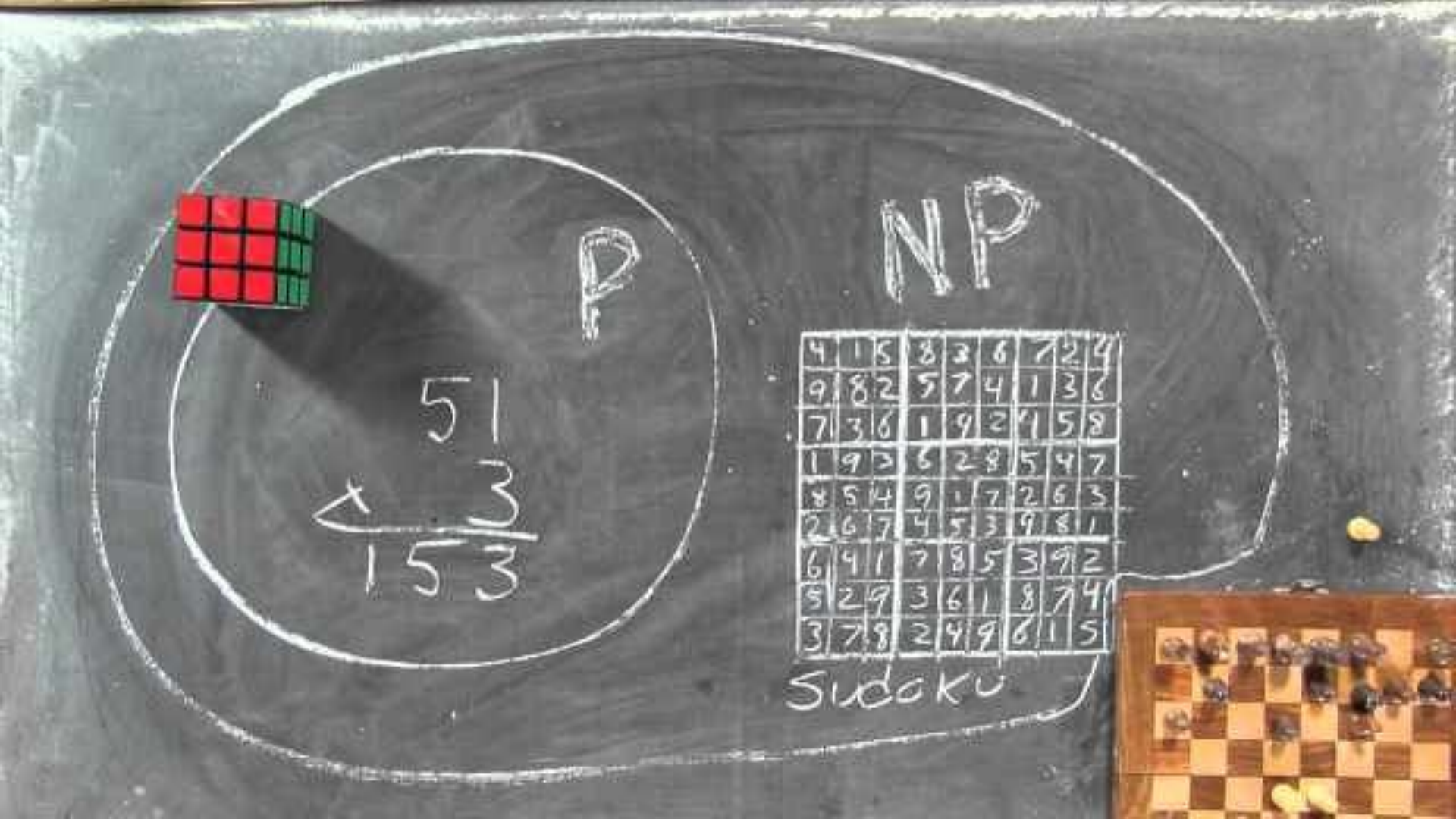
Geopolitical Risk

- A “Quantum Arms Race” could fuel global tension as nations compete for dominance and military advantage.

Technical & Unknown Risks

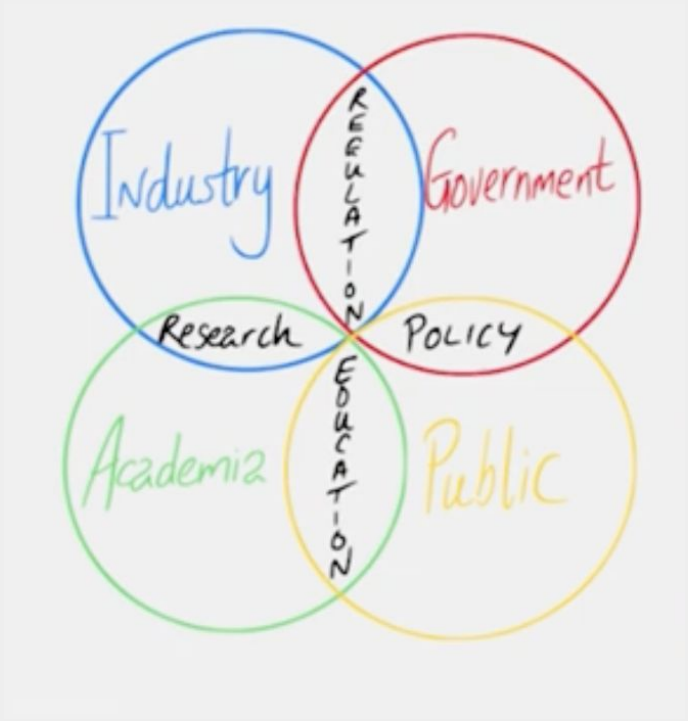
- Hardware still faces major hurdles: decoherence, error correction, and scalability.
- Unknown capabilities and unintended consequences pose long-term risks.


There aren't enough particles in the known universe to calculate certain complex problems AI alone cannot solve this.


P
NP
51
3
153
Sudoku

Policies & regulation

Whose responsibility is it anyway?



Global Quantum Intelligence

> We cannot solve our problems with the same thinking we used when we created them.
>
> ALBERT EINSTEIN

The systems we built to serve us are breaking

- More content, less meaning
- More connection, less trust
- More automation, less humanity

REALITY, REIMAGINED — QUANTUM x HUMAN

The real opportunity/risk?

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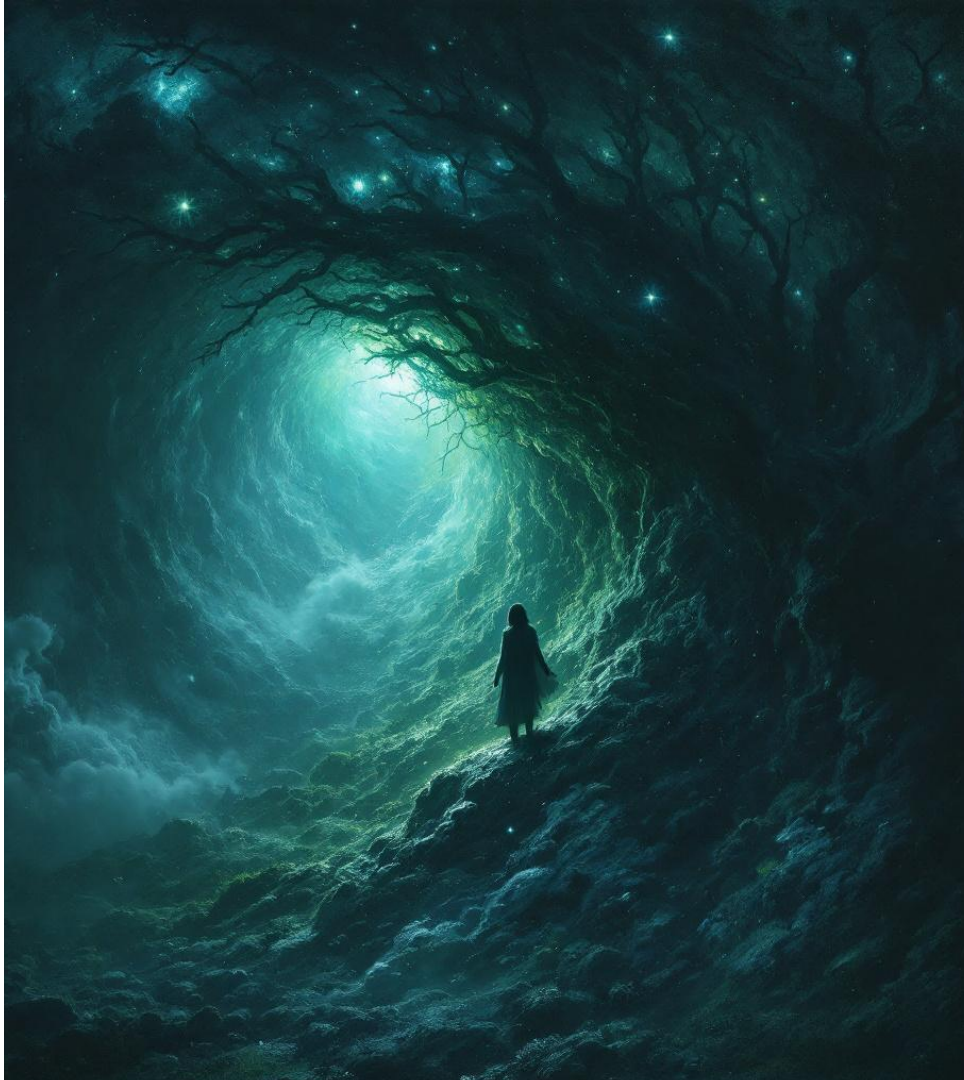
The unknown unknown



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A new future

GQI
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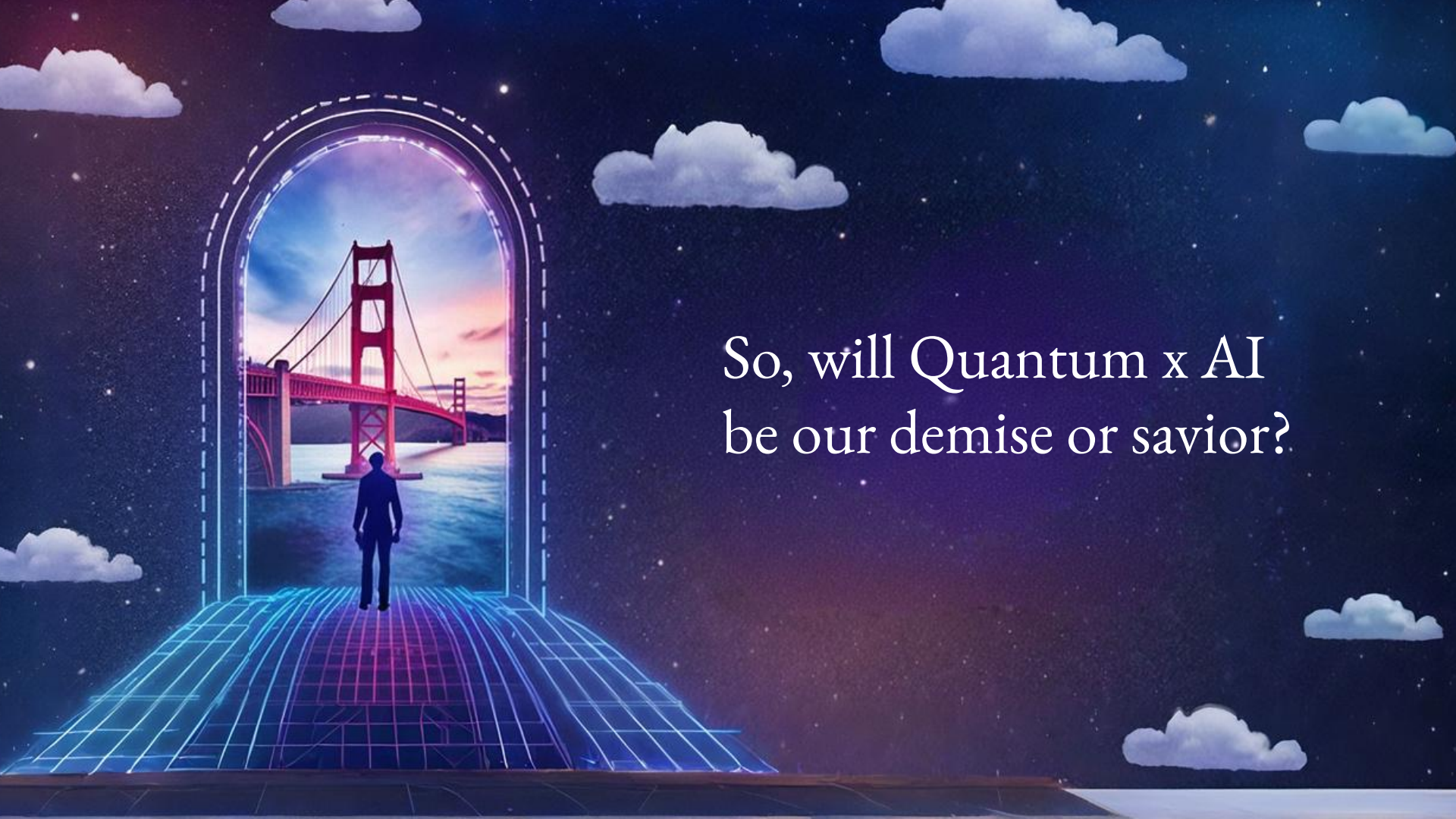
So, will Quantum x AI
be our demise or savior?

Achieving this kind of impact requires a “Stargate-level” effort — the scale, coordination, and ambition of a moonshot.

Only a select few companies and countries are positioned to make that leap.

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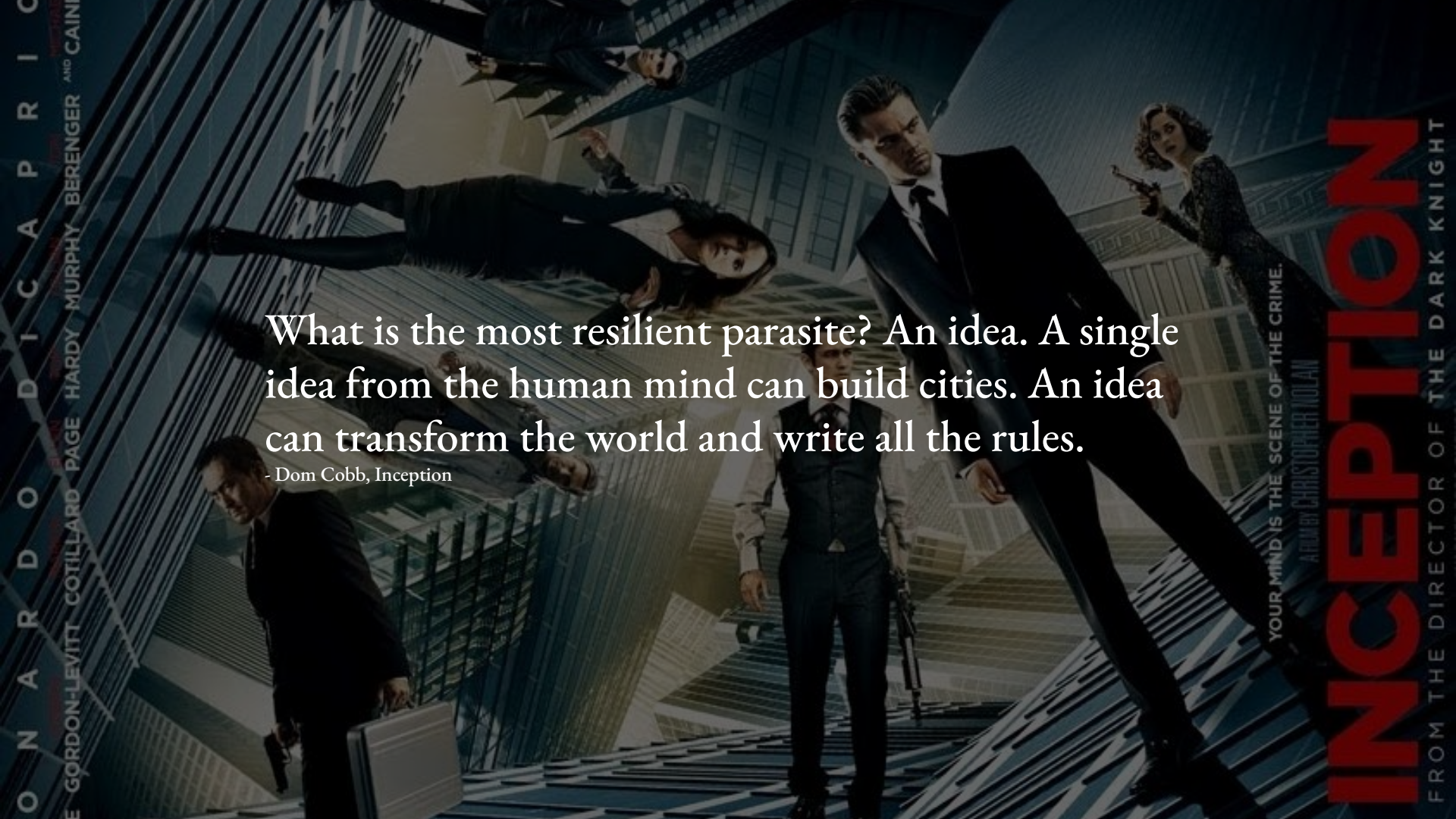
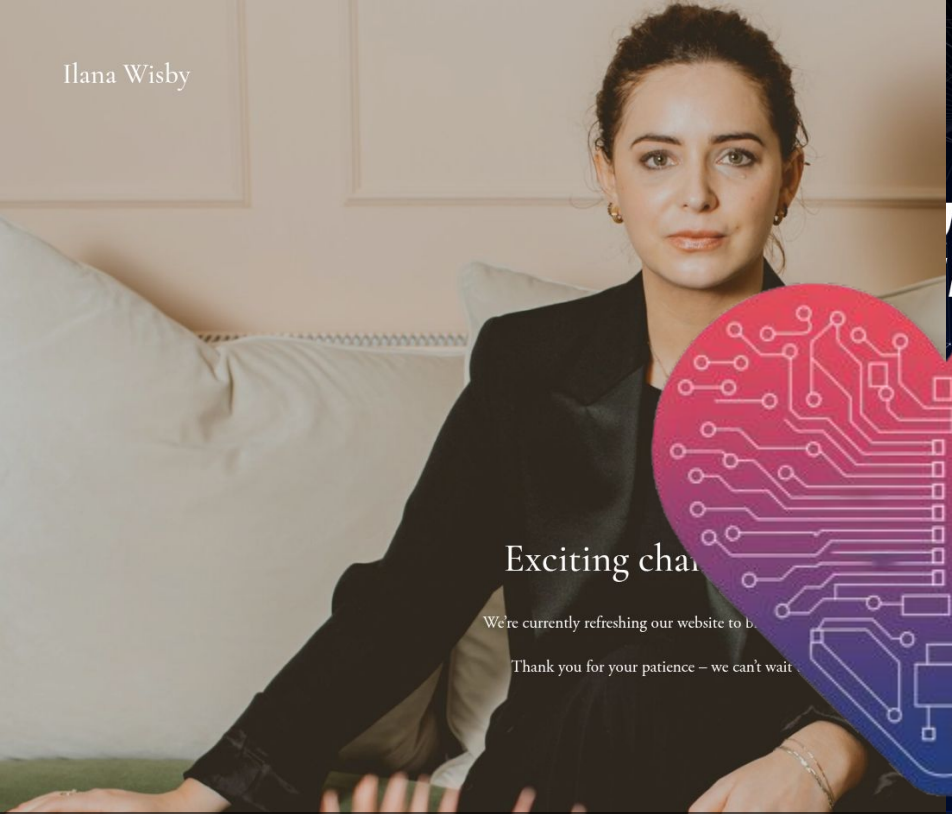
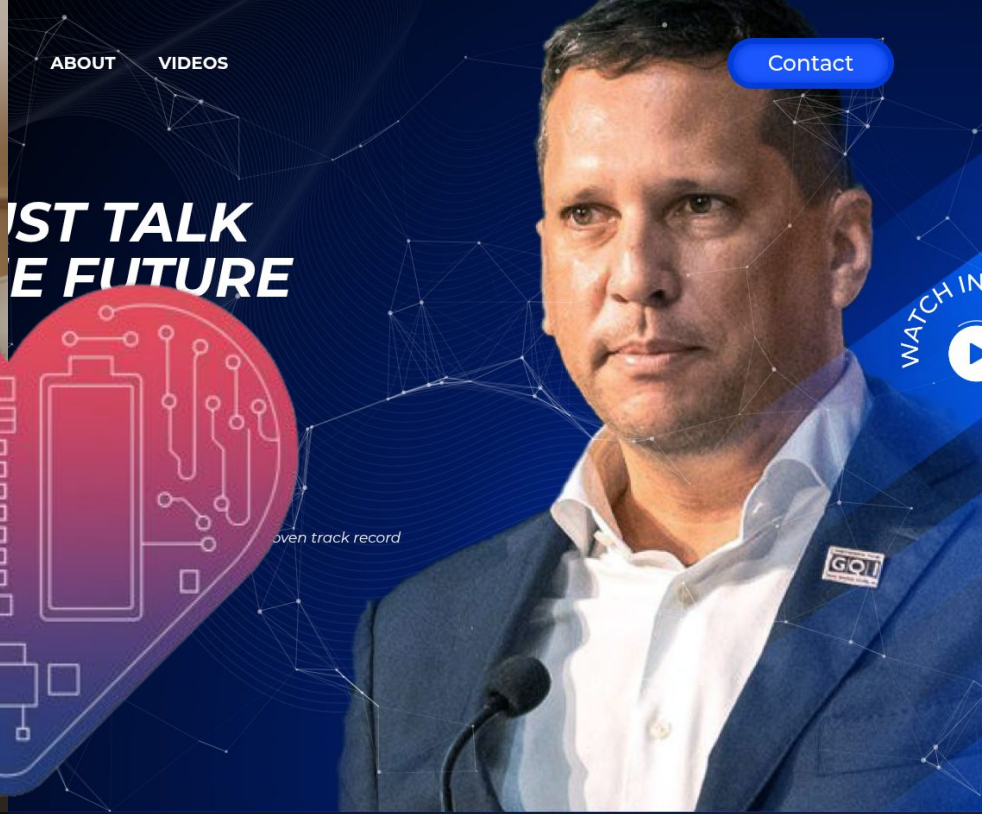

What is the most resilient parasite? An idea. A single idea from the human mind can build cities. An idea can transform the world and write all the rules.
- Dom Cobb, Inception
INCEPTION
FROM THE DIRECTOR OF THE DARK KNIGHT
YOUR MIND IS THE SCENE OF THE CRIME.
LEONARDO DICAPRIO
GORDON-LEVITT COTILLARD PAGE HARDY MURPHY BERENGER AND CAINE





Dr. Ilana Wisby

CEO MOTH

Founding CEO, Oxford Quantum Circuits

www.ilanawisby.com

André M. König

CEO, Global Quantum Intelligence

www.andrekonig.com