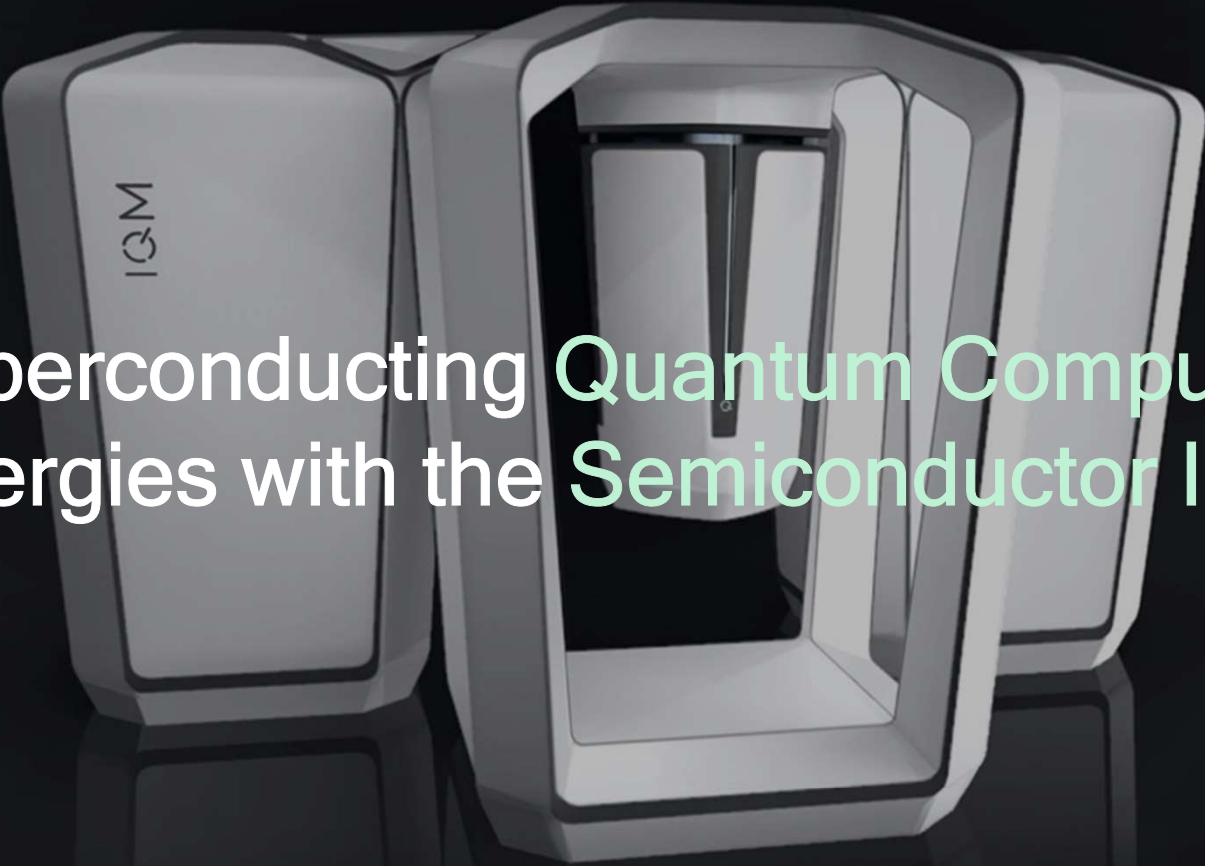




IQM

WWW.MEETIQM.COM

Superconducting Quantum Computers & Synergies with the Semiconductor Industry

Dr. Kuan Tan, CTO & Co-founder
info@meetiqm.com

Mission:
We build world leading quantum computers for the well-being of humankind, now and for the future.

Why Quantum Computing?

INTRACTABLE PROBLEMS

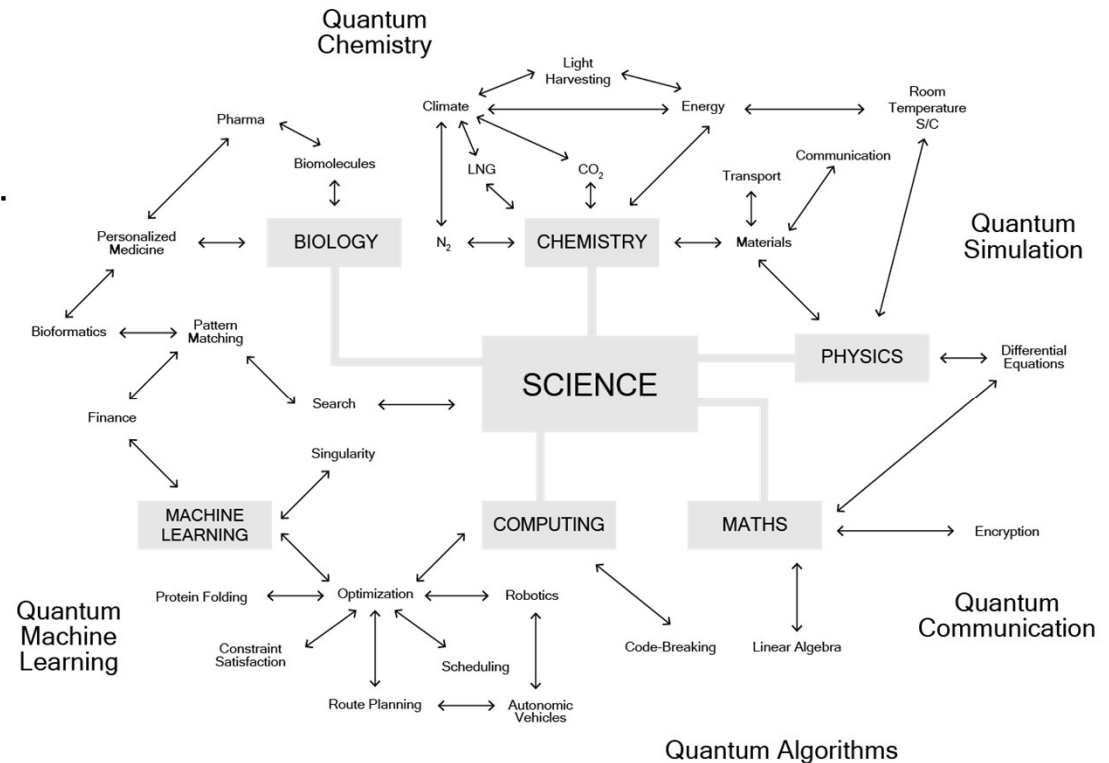
There is a class of commercial problems that can never be solved with classical computers.

FUNDAMENTAL LIMITS

There are not enough atoms in the universe to build a large enough memory and computing the answer would take thousands of years.

DISRUPTIVE USE CASES

New paradigm: quantum computers can tackle these intractable use cases with speed and efficiency, creating new industries of tomorrow

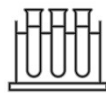


Why we need more computing power

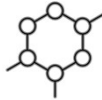
Supercomputing centers solve the challenges of tomorrow ...



*Climate change
& natural disasters*



*Drug discovery, simulations
& molecular dynamics*



Quantum computing will partly replace the USD 40 Billion* market:
76% of global HPC centers will use quantum computing by 2023**

Painpoints to be solved:

- ↳ HPC centers must scale their computing power to stay competitive
- ↳ Next generation HPC hardware is too expensive, too large footprint, and consumes too much power
- ↳ Even with the best next-gen HPCs, some problems are still intractable
- ↳ **Quantum computing** is the most promising alternative to CPU and GPU clusters currently used in HPC centers



Possible sustainability use cases

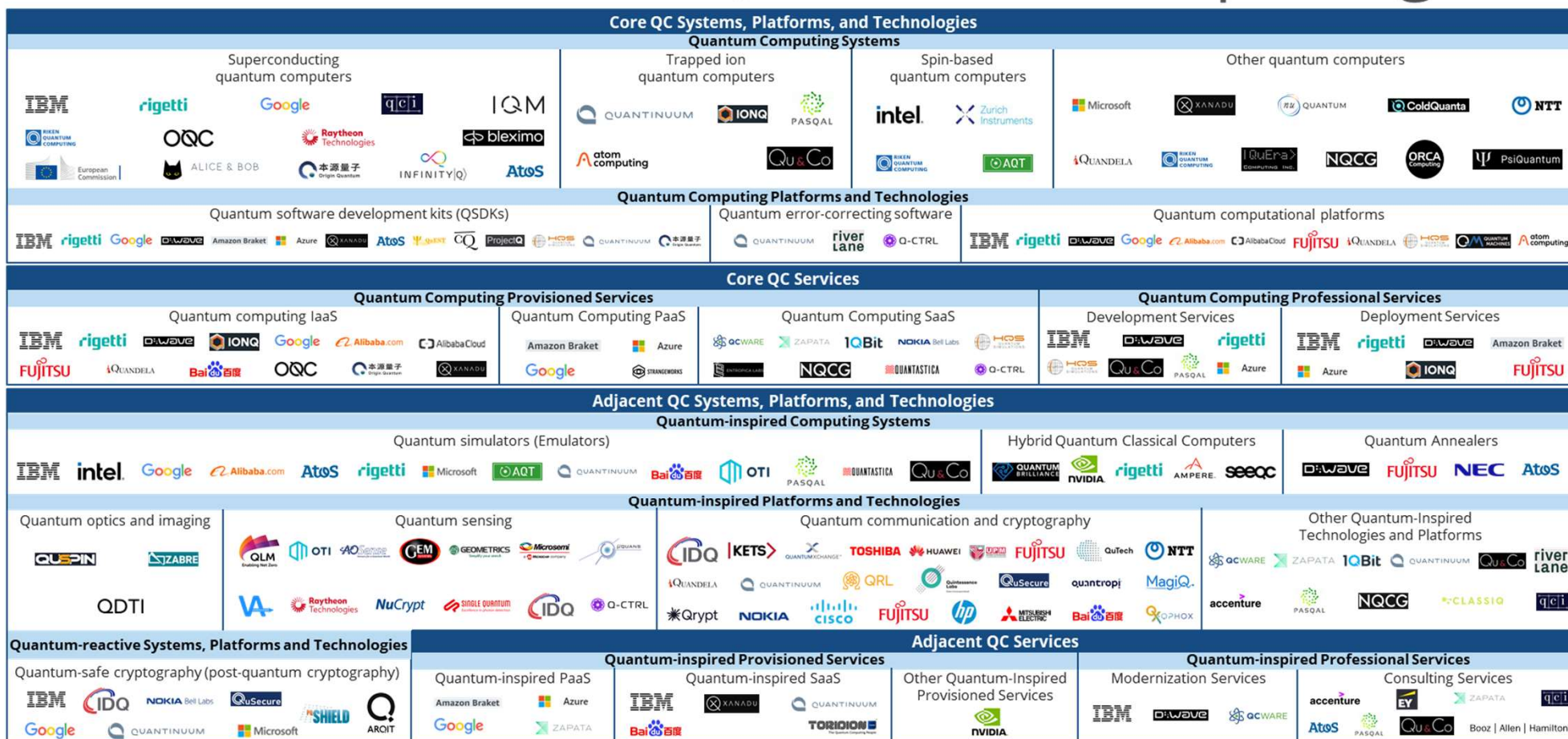
Ammonia based fertilizer

Logistics intelligence improvement

Energy grid optimization

Battery simulation

IDC Market Glance: Quantum Computing



IQM is the European leader for quantum

200+ experts

90+ PhDs

7 Professor-level tech leaders

40+ nationalities



~180 M€ investment

On-premises & full access

2 systems sold, 1 delivered



EIB President Werner Hoyer & EIB Vice-President Thomas Östros handing over funding documents

Espoo - Finland



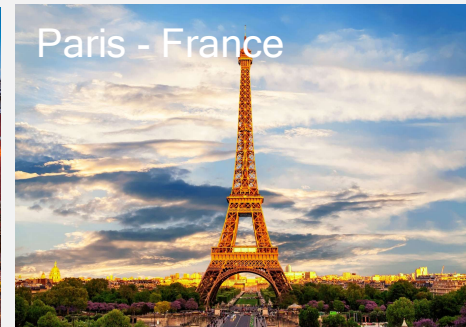
Munich - Germany



Madrid - Spain



Paris - France

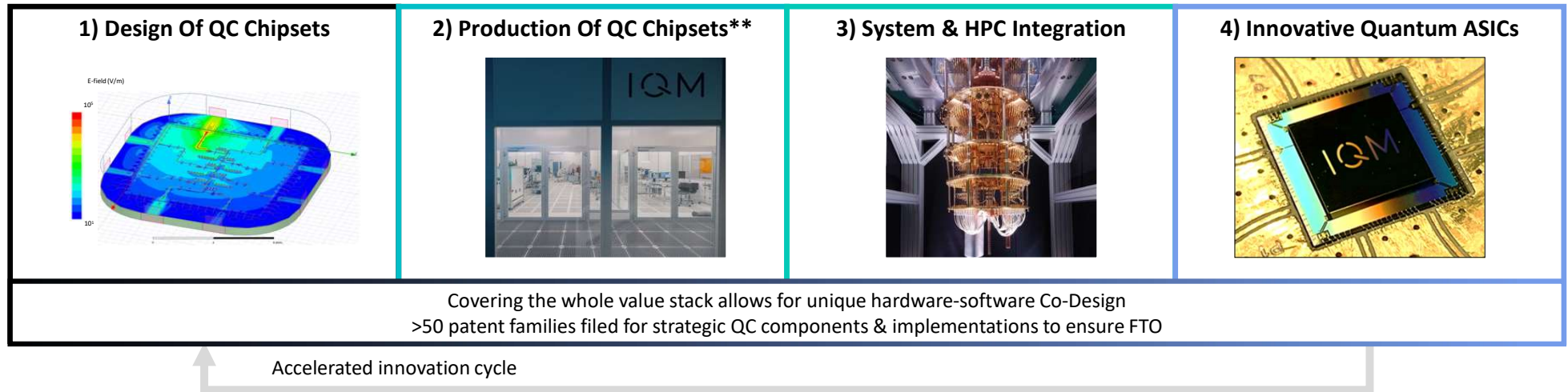


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A business strategy to accelerate innovation

Building full-stack systems and delivering them to HPC centers
Re-invest the revenue to critical parts of the value chain

IQM's strategic value chain:



Example: Scalability

IQM owns key IP for cryogenic control of quantum processors:

Cryogenic reset of qubits

[Nature Physics 15, 533 \(2019\)](#)

Cryogenic creation of microwaves

[Nature Electronics \(2021\)](#)

Cryogenic readout of microwaves

[Nature 586, 47–51 \(2020\)](#)

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** Strong public support: Europe is start a [European Chips Act](#) from the EUR 120bn which was [set aside for the semiconductor supply chain](#) as part of [Europe's EUR 800bn Covid recovery plan](#).

Strategic Advantage: Private Quantum Foundry in Europe

Drivers

Quantum processors are too complex for public or university cleanrooms.

Low availability, chip shortage

AUTOS APRIL 9, 2021 / 7:52 PM / UPDATED 2 DAYS AGO

White House convening summit with top execs on chip shortage

By David Shephardson

3 MIN READ

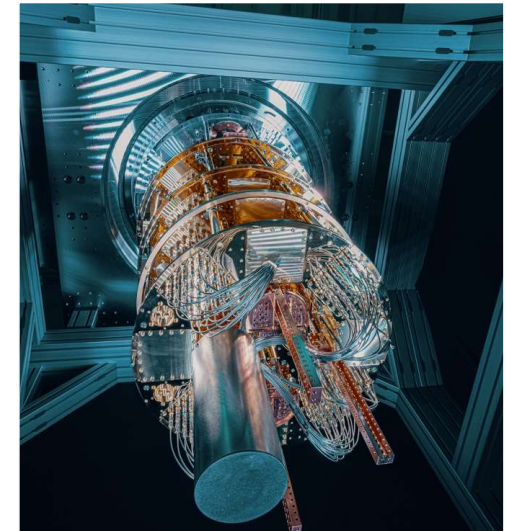


WASHINGTON (Reuters) -Almost 20 major companies worried about a global semiconductor chip shortage that has roiled the automotive industry will send senior executives to a White House summit Monday, a senior official said on Friday.

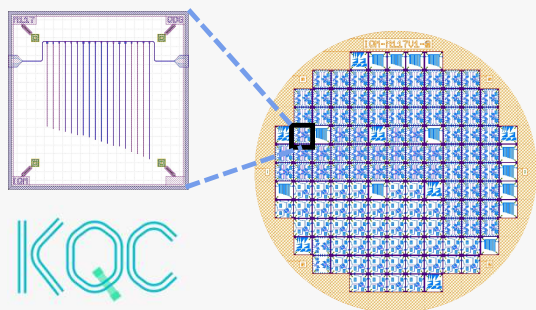
Efficient IP generation

Advantages

- Accelerates design & production cycle
- Guarantees production stability
- Know-how generation and possibility for foundry service
- Reinforces the in-house developed quantum design automation



KQCCircuits - IQM's Quantum Design Platform



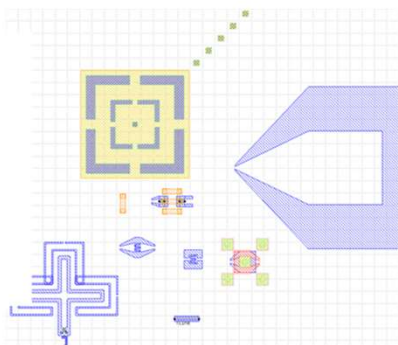
<https://github.com/iqm-finland/KQCCircuits>

Open-source quantum circuit design platform

- Seamless and automated superconducting circuit design based on primitive elements
- Wafer-scale photomask generation support
- Same technology used by IQM to generate QPU
- Active development and support from IQM Design and Software teams

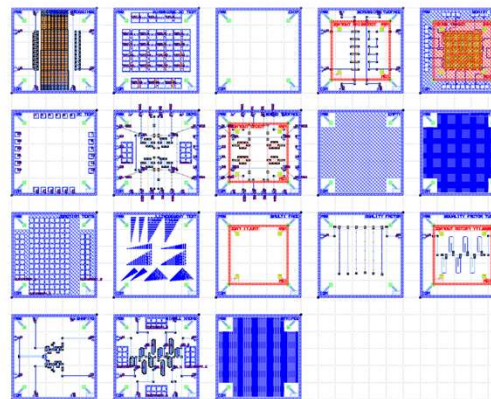
Element library

- | | |
|-------------------------------------|-------------------------------|
| ✱ Airbridge | ✱ Meander |
| ✱ Airbridge Connection | ✱ NoSquid |
| ✱ Chip Frame | ✱ QCD1 |
| ✱ Daisy_woven | ✱ QCD2 |
| ✱ Finger Capacitor Square | ✱ QCD3 |
| ✱ Finger Capacitor Square Multiface | ✱ SIM1 |
| ✱ Finger Capacitor Taper | ✱ Spiral Resonator |
| ✱ Flip Chip Connector Dc | ✱ Spiral Resonator Auto |
| ✱ Flip Chip Connector Rf | ✱ Spiral Resonator Multiface |
| ✱ Launcher | ✱ Swissmon |
| ✱ Launcher DC | ✱ Waveguide Coplanar |
| ✱ Marker | ✱ Waveguide Coplanar Bridged |
| ✱ Mask Marker Fc | ✱ Waveguide Coplanar Curved |
| | ✱ Waveguide Coplanar Straight |
| | ✱ Waveguide Coplanar TCross |
| | ✱ Waveguide Coplanar Taper |



Chip library

- Airbridge Crossings
- Airbridge Dc Test
- Chip
- Crossing Twoface
- Daisy Woven
- Dc Test
- Demo
- Demo Twoface
- Empty
- Junction Test
- Junction Test2
- Lithography Test
- Multi Face
- Quality Factor
- Quality Factor Twoface
- Shaping
- Single Xmons
- Stripes



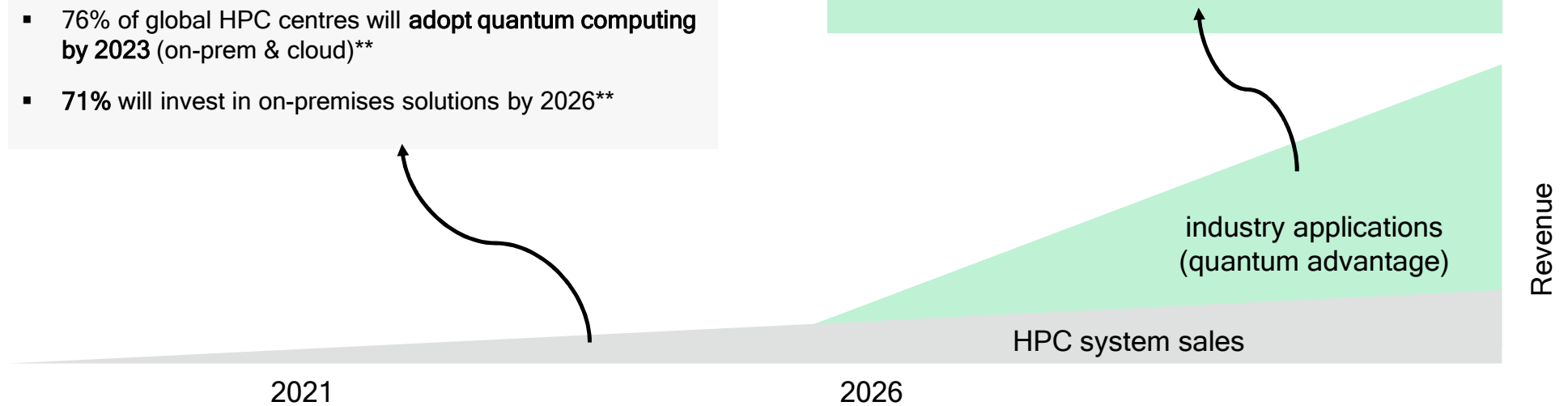
Why now?

There is a growing need of quantum computers in HPC centers, *today*

Very soon, we expect upside potential from the disruptive quantum application market

- Global HPC market (TAM): **>€45Bn in 2024** and growing*
 - [EuroHPC](#) alone is an €8Bn market
 - Only in Europe, 68 HPC projects ongoing in 2021***
- 76% of global HPC centres will **adopt quantum computing by 2023** (on-prem & cloud)**
- **71% will invest in on-premises solutions by 2026****

- IDC forecasts worldwide quantum computing market to grow to **\$8.6Bn in 2027 ******
- This market might expand up to **\$1Tn in total by 2035 *******



* HPC WIRE

** IQM, Atos, State of Quantum Research 2021

*** Handbook of European HPC projects

**** IDC Forecast report

***** McKinsey: The next tech revolution: Quantum Computing

In a Nutshell

- Quantum computing is [here](#)
- Opportunities and synergies for closing the quantum innovation cycle
 - Quantum Design Automation
 - Foundry business: equipment, processes, materials
 - Foundry services
 - System integrators & HPC
- Disruptive potential in pharmaceuticals, optimization, chemistry, AI, financial applications



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A photograph of two scientists, a man and a woman, wearing white lab coats and blue surgical masks. They are looking intently at a complex quantum device. The device consists of a cylindrical metal container with numerous gold-colored connectors and wires protruding from the top. The woman is wearing white gloves and is touching one of the connectors. The background is slightly blurred, showing more of the lab environment.

Thank you!

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We deliver what we promise:

- Strongly appreciated in the investment community ([link](#))
- More than €50M contracts signed ([link](#), [link](#))
- First quantum computer delivered ([link](#))
- Market study about HPC market published ([link](#))
- Grown to >200 employees, hiring one quantum engineer per week ([link](#))
- Operations in Finland, Germany, France, and Spain ([link](#), [link](#), [link](#), [link](#))
- Own **fabrication facilities** running ([link](#))
- Focus on HPC integration and Co-Design ([link](#), [link](#))
- Unique design software open-sourced ([link](#))
- Backed by strong supporters and advisors ([link](#), [link](#))