

The logo for IQM, featuring the letters 'I', 'Q', and 'M' in a stylized, teal-colored font. The 'Q' is composed of two overlapping circular segments, and the 'M' is a simple, blocky letter.

**WE BUILD QUANTUM COMPUTERS**

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# WHY QUANTUM COMPUTING

## INTRACTABLE PROBLEMS

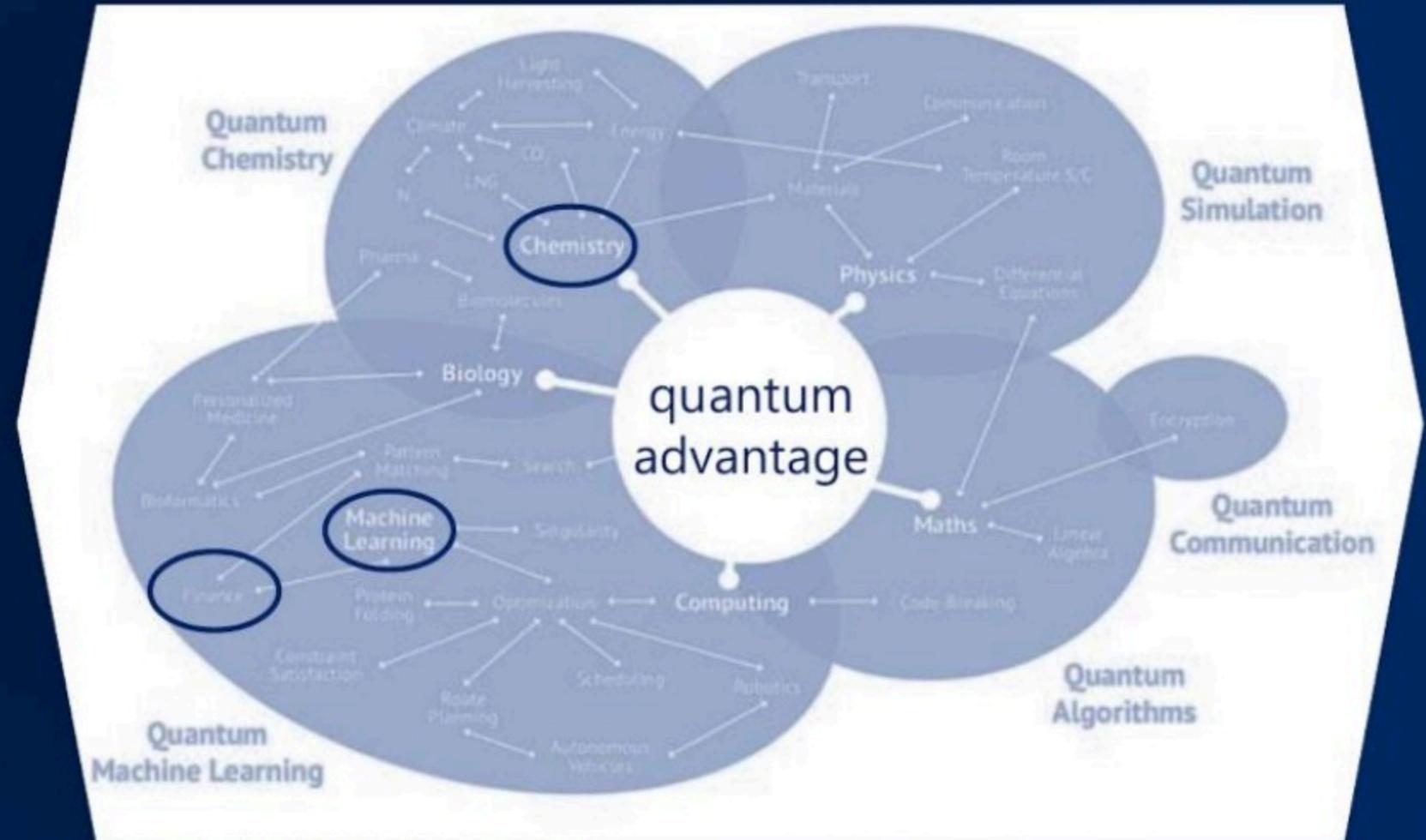
There is a class of commercial problems that can never be solved with classical computers

## FUNDAMENTAL LIMITS

There are not enough atoms in the universe to build a large enough memory

## TIME & POWER LIMITS

Computing the answer would take billions of years with MWs of power consumption



<https://www.alumni.ox.ac.uk/quad/article/quantum-computing-oxford>

# EUROPE BECOMING A QUANTUM LEADER

## Emerging market

The quantum market is emerging *now* granularly in different verticals. There is a race for quantum advantage.

## Close to market

The customers in most valuable markets are in *Europe* and want direct hardware access to quantum advantage.

## 1<sup>st</sup> to market

IQM is uniquely positioned as European supplier to deploy on-premise machines for *quantum advantage*.

## Customer oriented

IQM identifies and solves problems directly with the customers. The IQM Business Club has over 30 participants from all over the world.

## Collaborative Innovation

IQM has strong partners from industry, RTOs and academic groups from Europe's leading ecosystem.



# Secret of success

TECH TRADITION  
GREAT PEOPLE  
NEW IDEAS

1965: LOW-TEMPERATURE RESEARCH  
STARTS IN HELSINKI

1997: MICRONOVA CLEAN-  
ROOM OPENED BY VTT

Chief  
Scientist

2001: JUHA VARTIAINEN AND MIKKO MÖTTÖNEN  
WORK TOGETHER AS SCIENTISTS IN HELSINKI

COO

2007: QCD LABS FOUNDED BY MIKKO  
MÖTTÖNEN AT AALTO UNIVERSITY

CTO

2009: MIKKO MÖTTÖNEN AND KUAN YEN TAN  
WORK TOGETHER AS SCIENTISTS IN SYDNEY

CEO

2016: 1<sup>ST</sup> PATENT ON QCR FILED

2017: JAN GOETZ JOINS QCD LABS

2019: LARGEST SEED INVESTMENT IN THE  
HISTORY OF FINLAND SECURED (€11.45m)

2020: ENRIQUE SOLANO JOINS IQM IN MUNICH

1. APPLICATION-SPECIFIC PROCESSORS
2. QUANTUM ELECTRONICS
3. UNIQUE CHIP TECHNOLOGY

# Leadership

**Dr Jan Goetz**  
CEO  
Co-Founder



- Marie-Curie Fellow with docent title and >10 years experience in quantum computing
- European Quantum Industry representative for Finland
- Frequently invited to speak at quantum events, tech conferences and in front of politicians
- Attracted several key hirings to IQM
- Gathered ~30 multinationals in IQM Business Club



**Prof Enrique Solano**  
**CEO of IQM Germany**  
Quantum Pioneer with ~ 250 published articles.  
Creator of renowned quantum centers in Bilbao and Shanghai.  
Link between quantum hardware and user applications.

**Dr Juha Vartiainen**  
COO  
Co-Founder



- 13 years experience in product development
- Scaled IQM to >70 people and previously from 30 to 80 people in SSF
- PhD in quantum computing plus extensive industry experience
- Expert in standardization and project management

## Competent management ready to scale



**Minna Blomqvist**  
**Head of People and Culture**  
Energetic change leader with extensive global experience from various industries and functions.

**Dr Kuan Yen Tan**  
CTO  
Co-Founder



- Former Research Team Leader in Microsoft Quantum
- Experience in scaling production-ready fabrication facilities
- Quantum expert with over 2500 scientific citations
- Successful grant writer and manager
- Knows how to build quantum computers across different platforms



**Raghunath Koduvayur**  
**Head of Marketing and Communications**  
People leader with a passion for building teams, products, customer experience, sales, and marketing.

**Prof Mikko Möttönen**  
Chief Scientist  
Co-Founder



- Professor of Quantum Technology in Aalto University & VTT Research Center
- More than 6 patent families
- Over 100 scientific articles published including Science & Nature
- Founder of QCD Labs with more than 20 members
- Collected >€10m public funding for QCD Labs



**Rasmus Lindman**  
**Head of Business Development**  
Rolled out Uber in Finland, Startup experience from Rocket Internet.

# WORLD-CLASS TEAM

We have collectively published over 640 scientific articles with more than 27,000 citations (IQM h-index: 81)

We scaled the team to 43 exceptional experts in two countries in less than 9 months

**Docent Juha Hassel**  
**Team Leader System Integration**  
> 20 years quantum experience in quantum technologies.  
Ex OpenSuperQ PI at VTT.



**Dr Kok Wai Chan**  
**Team Leader Fabrication**  
Joined from Microsoft Quantum in Sydney.  
Expert in scalable fabrication.



**Jean-Luc Orgiazzi**  
Quantum Engineer with international experience.



**Bruno Taketani**  
**HPC integration**  
Experienced Assistant Professor with a demonstrated history of working in Quantum Computing.



**Dr Johannes Heinsoo**  
**Quantum Engineer**  
Joined from world renowned academic group at ETH Zurich.  
World-record in qubit readout speed.



**Dr Inés de Vega**  
**Head of IP**  
Quantum physicist with 6 years experience in patent prosecution.



**Dr Manjunath Venkatesh**  
**Quantum Engineer**  
Joined from world class research team in Delft.  
Fabricated 17 qubit processor for Intel.



**Olli Ahonen**  
**Team Leader Software**  
Experienced software developer and leader with extensive startup experience (Zalando, Futurice, Kivra).



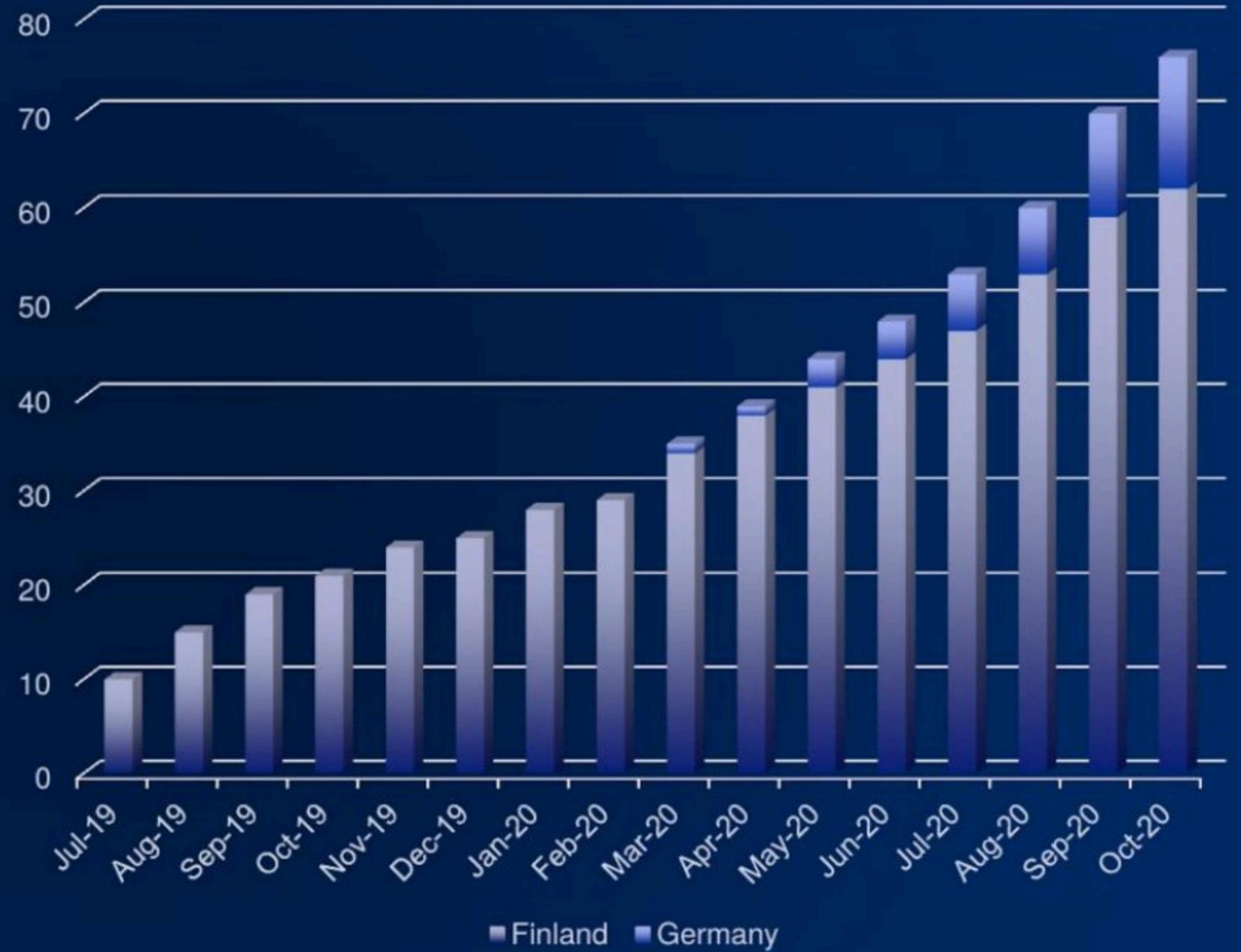
**Dr Pasi Lähteenmäki**  
**Team Leader Scalable Electronics**  
Founded and operated a startup for scalable electronics before joining IQM.



# IQM company growth



## Staff



# FAST LANE TO QUANTUM ADVANTAGE

FIRST TO QUANTUM  
ADVANTAGE

IQM

FIRST TO ERROR  
CORRECTION

near-term  
advantage



long-term  
advantage

## 1. APPLICATION-SPECIFIC PROCESSORS:

We develop processor architecture in a hardware-software co-design to be specifically optimized for quantum applications.

## 2. QUANTUM ELECTRONICS:

We combine experience in cryogenic and room-temperature electronics for scalable control of large-scale processors.

## 3. UNIQUE CHIP TECHNOLOGY:

We build 2<sup>nd</sup> generation quantum processors using proprietary on-chip components to increase the QPU clock speed for error correction.

# APPLICATION-SPECIFIC PROCESSORS

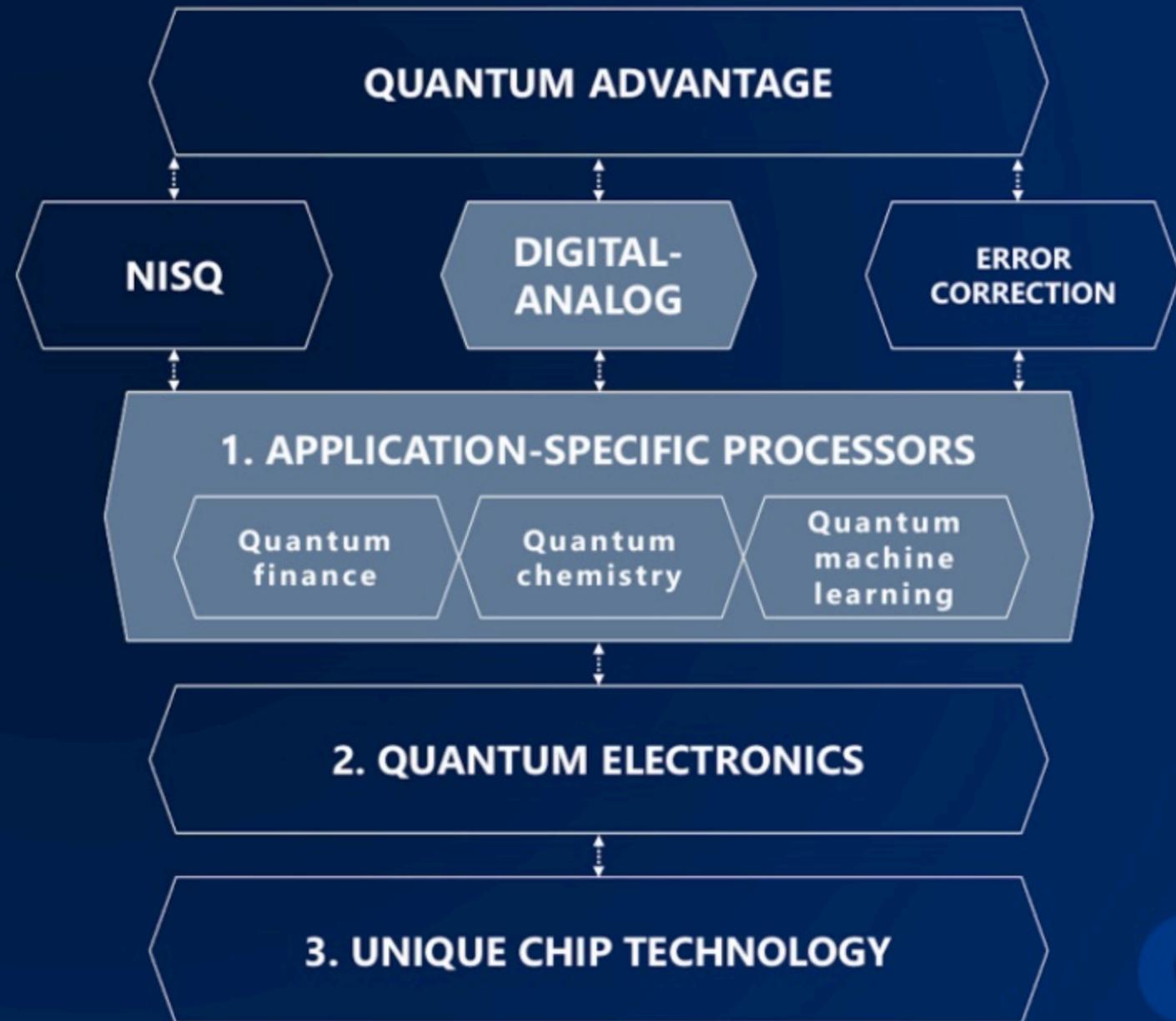
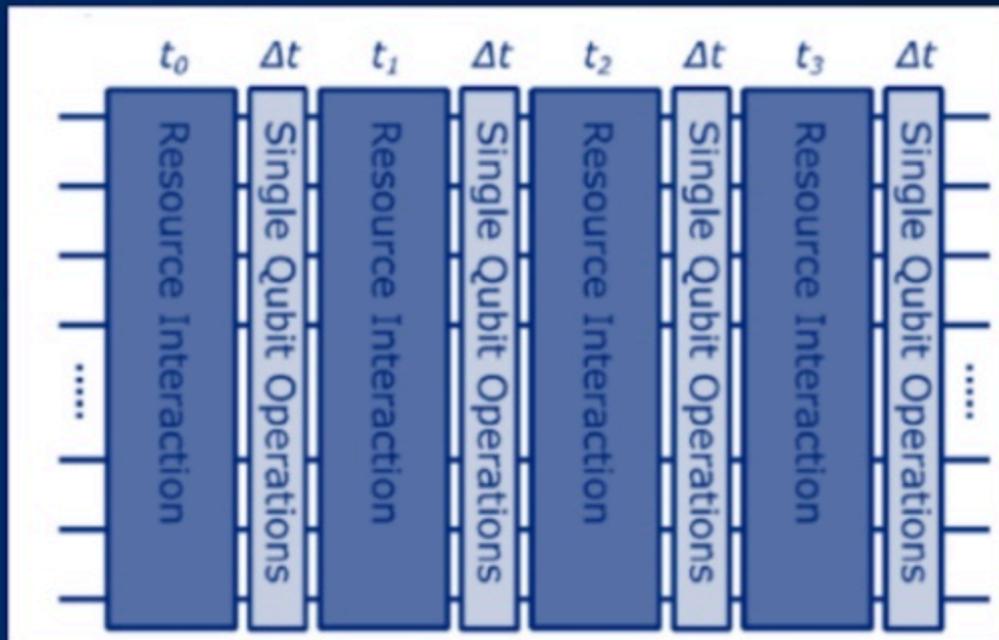
## PROBLEM

Universal quantum computers require millions of qubits, which are not expected soon.

## SOLUTION

IQM uses a hardware-software co-design approach for unique QuASICs based on digital-analog quantum computing. We are creating a shortcut to **quantum advantage**.

Digital-Analog algorithm (arXiv:2002.12215):



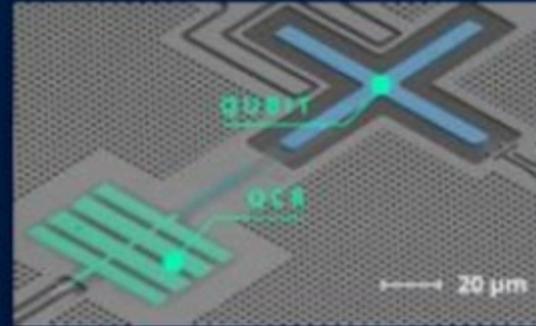
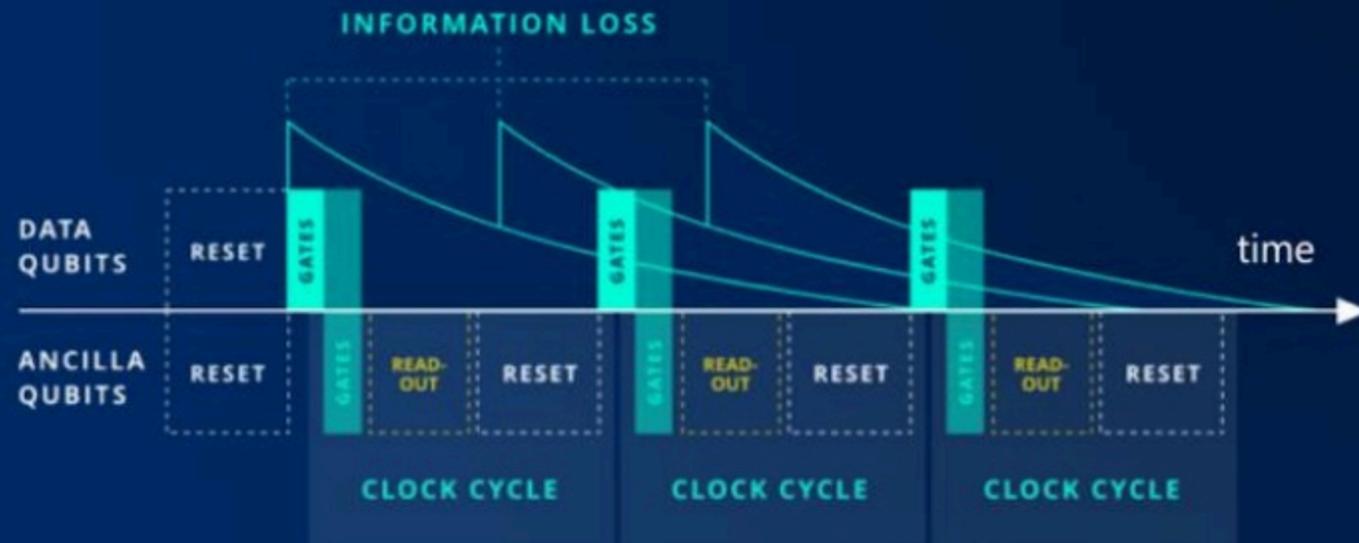
# UNIQUE CHIP TECHNOLOGY

## PROBLEM

Quantum operations too error prone for **quantum advantage** and too slow for **error correction**.

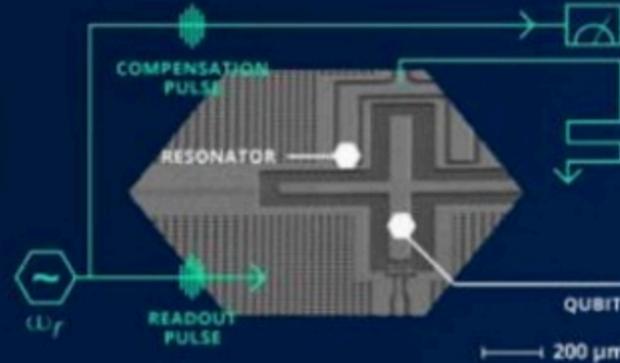
## SOLUTION

IQM builds the most precise and fastest quantum processors by improving the three basic quantum operations: reset, gates, readout.



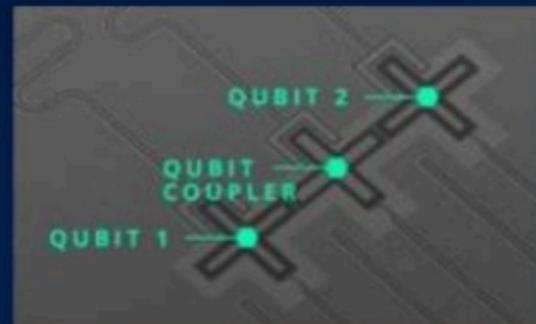
### FASTER RESET: QCR WITHOUT FEEDBACK

- Unconditional reset
- 10x speedup to current alternatives
- Resets also higher quantum states (leakage errors)
- No RF fields required (quasi-DC technology)
- Suitable for active on-chip cooling
- Protected technology suitable for licensing



### FASTER READOUT: MULTICHANNEL INSTEAD OF SINGLE DRIVE

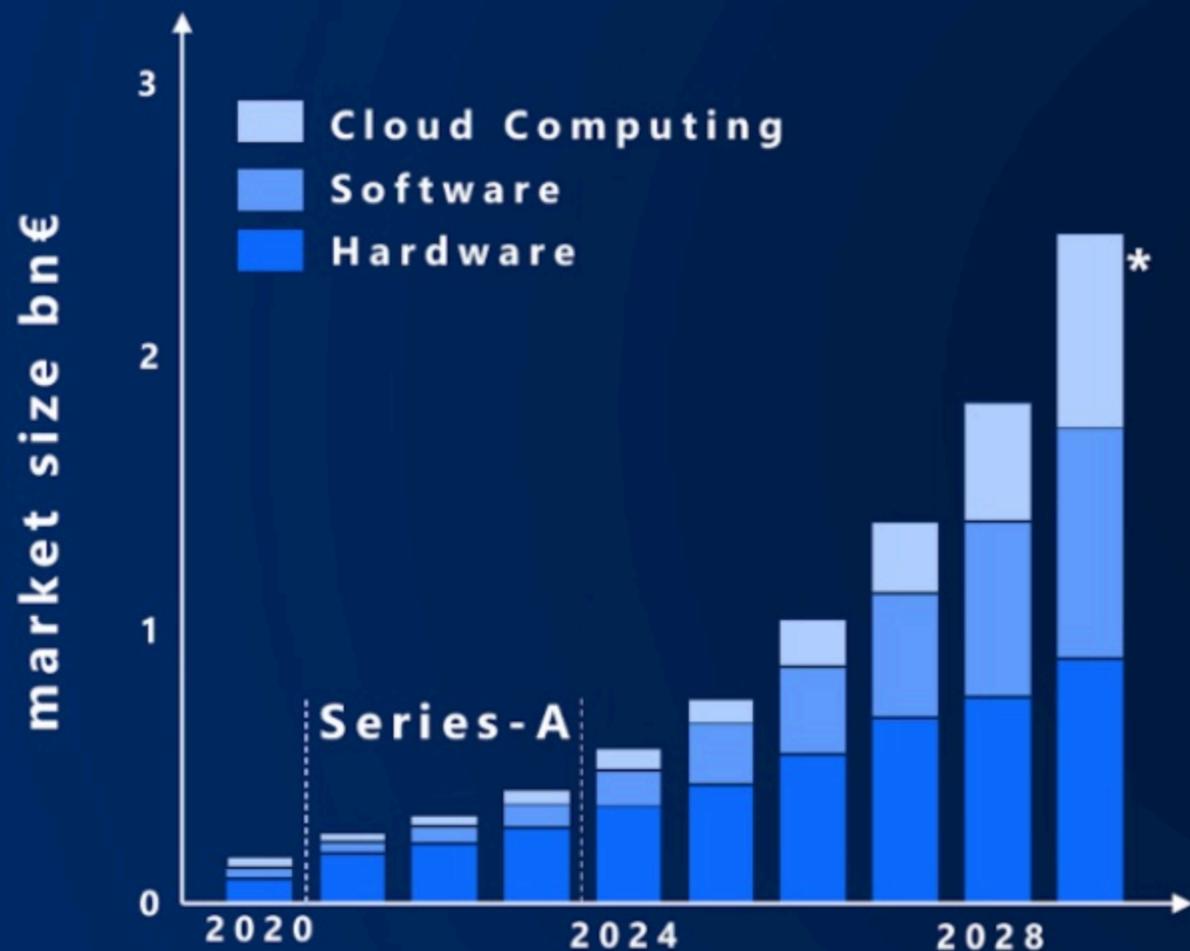
- Based on a multichannel driving scheme
- No on-chip overhead
- Protected technology suitable for licensing



### FASTER GATES: TUNABLE COUPLER & N-JUNCTION QUBITS

- Tunable coupler with ultrafast gate times
- Utilizing higher nonlinearity of novel qubit types

# IQM ENTERS INTO THE HARDWARE MARKET FIRST BEFORE GOING INTO THE CLOUD



# NEAR-TERM BUSINESS MODEL

## REVENUE MODEL

- IQM sells fully integrated hardware for quantum computing systems
- Modular design - the hardware can be upgraded to a more powerful QPU
- Benchmark price €41m (IBM system for Germany)
- IQM is the only provider that is delivering superconducting hardware to customer premises



## SALES AND DISTRIBUTION

- IQM sells its products with own salesforce, as the product requires special technical expertise and understanding
- Sales cycle is estimated to be 6 – 12 months
- Demand and lead generation is done via industry events and content creation to develop customers' quantum readiness

## TARGET CUSTOMERS

- State research centers and universities
- Private organizations
- Large HPC-centers
- Smaller supercomputing centers and big corporations which need on-premise computing capacity

## TRACTION

- Advanced discussions with global customers

# **IQM: The European Quantum Computing Company**

## **FAST LANE TO QUANTUM ADVANTAGE**

### **1. APPLICATION-SPECIFIC PROCESSORS:**

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### **2. QUANTUM ELECTRONICS:**

We combine experience in cryogenic electronics with scalable room-temperature control.

### **2. UNIQUE CHIP TECHNOLOGY:**

We build 2<sup>nd</sup> generation quantum processors using proprietary on-chip components to increase the QPU clock speed.

### **STRONGLY BACKED:**

We have secured €11.45m seed funding and gained strong support from a network of global leaders.

### **WORLD-CLASS TEAM:**

We have collectively published over 640 scientific articles with more than 27,000 citations (IQM h-index: 81).

### **FAST AT SCALING:**

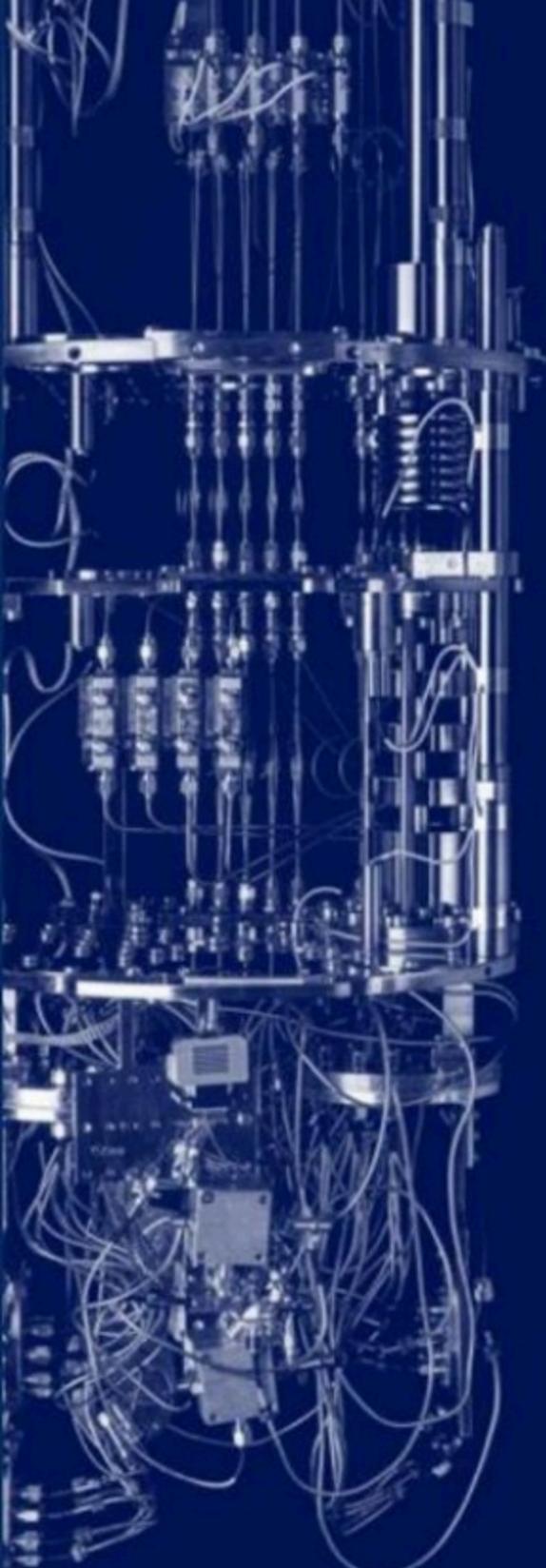
We scaled the team to 70+ exceptional experts in two countries in less than 18 months.

### **GET THINGS DONE:**

We took quantum processors into operation in record time. Reached the Seed funding goals in 1/3 of the time.

### **THE SERIES-A GOAL:**

We deliver 2<sup>nd</sup> generation quantum supremacy machines with 54 qubits by 2023 using novel processor concepts.



IQM

**Thank you.**

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[www.meetiqm.com](http://www.meetiqm.com)



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