



EUROPEAN QUANTUM FLAGSHIP

Strategic Research Agenda & Key Performance Indicators

Prof. Jürgen Mlynek

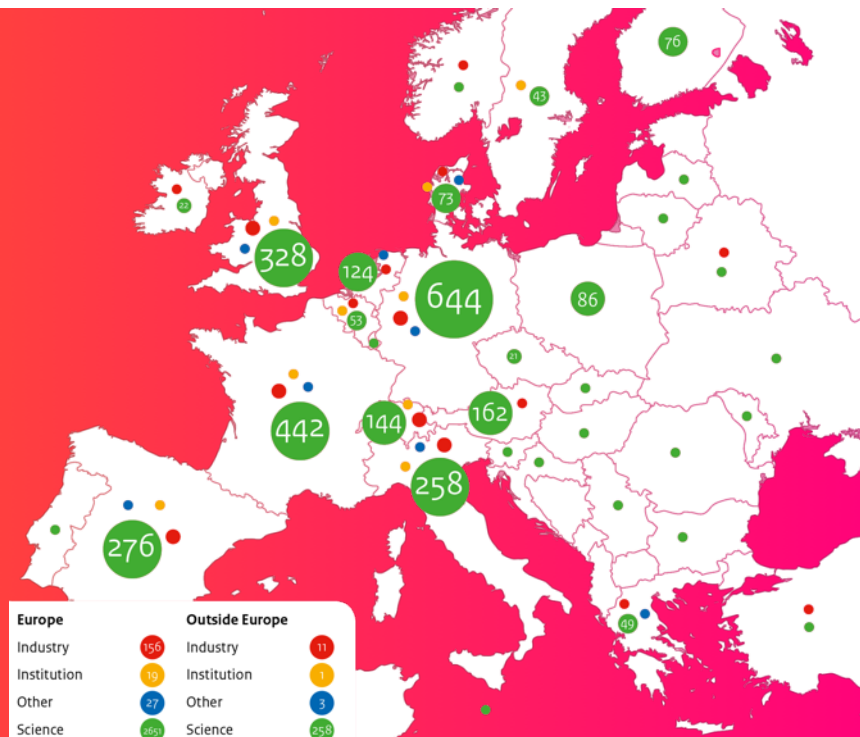
Chairman of the Strategic Advisory Board
European Quantum Flagship

2 December 2020, Board of Funders Meeting



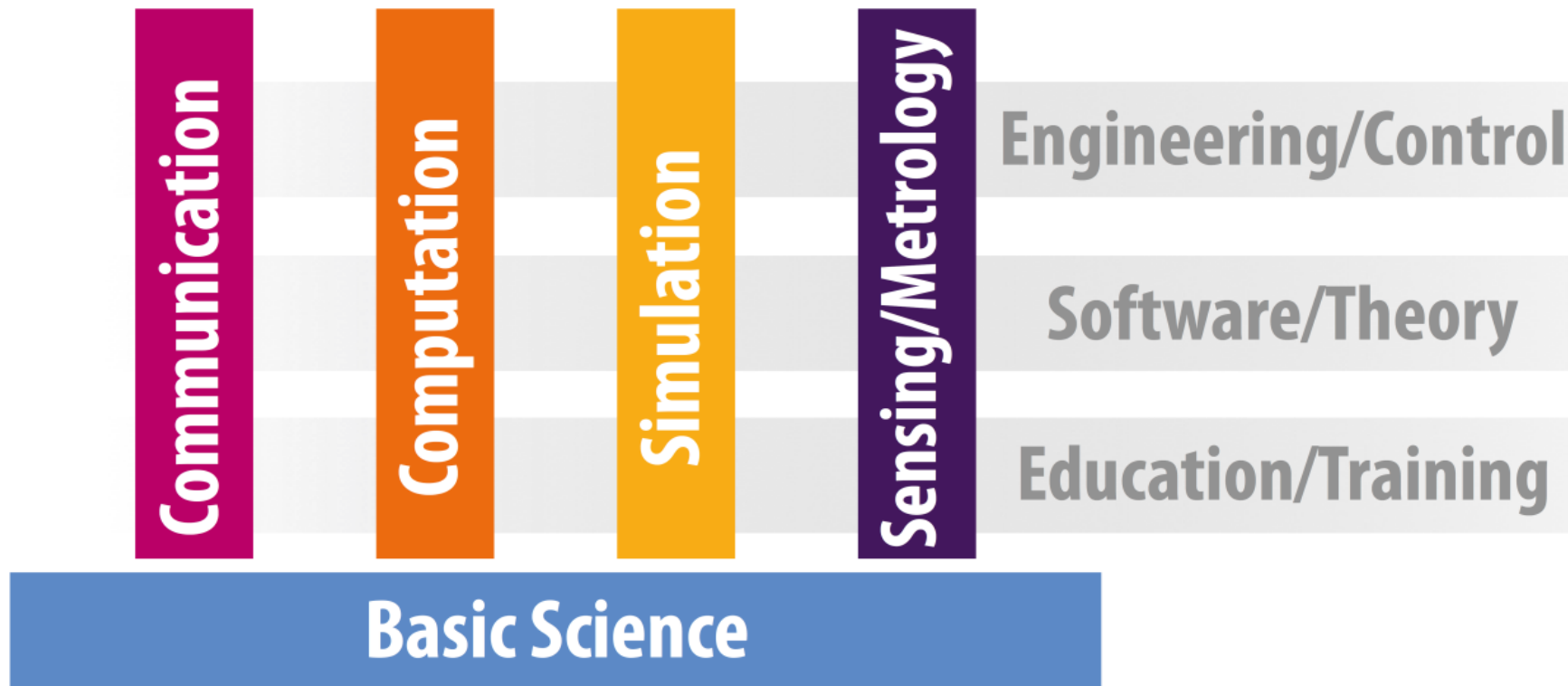
2016: EUROPEAN QUANTUM MANIFESTO

Roadmap and call to action
from the scientific
community



Over 3500 scientists, research institutions and companies endorsed the Quantum Manifesto
The milestone document of the European Quantum Community was officially published in May 2016

2017: STRATEGIC RESEARCH AGENDA FOR THE FLAGSHIP



The five key domains of the Quantum Flagship

Based on the Final Report of the High-Level Steering Committee, July 2017



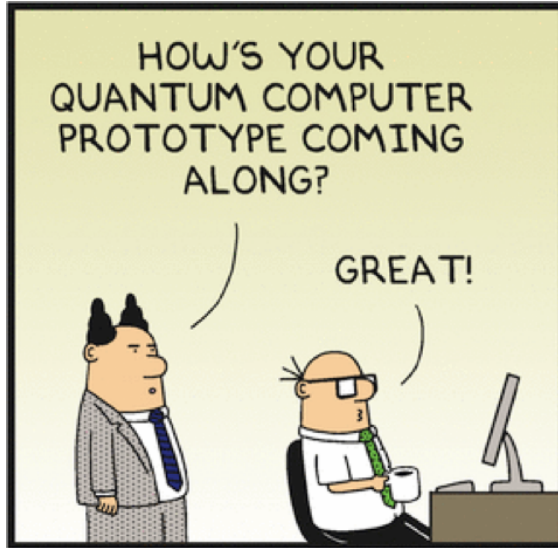
2018: LAUNCH



**QUANTUM
FLAGSHIP**



2019: GOOGLE CLAIMS TO ACHIEVE QUANTUM 'SUPREMACY'



physicsworld

QUANTUM COMPUTING | RESEARCH UPDATE

Google reports quantum supremacy in draft paper

24 Sep 2019 Hamish Johnston

**The
Economist**

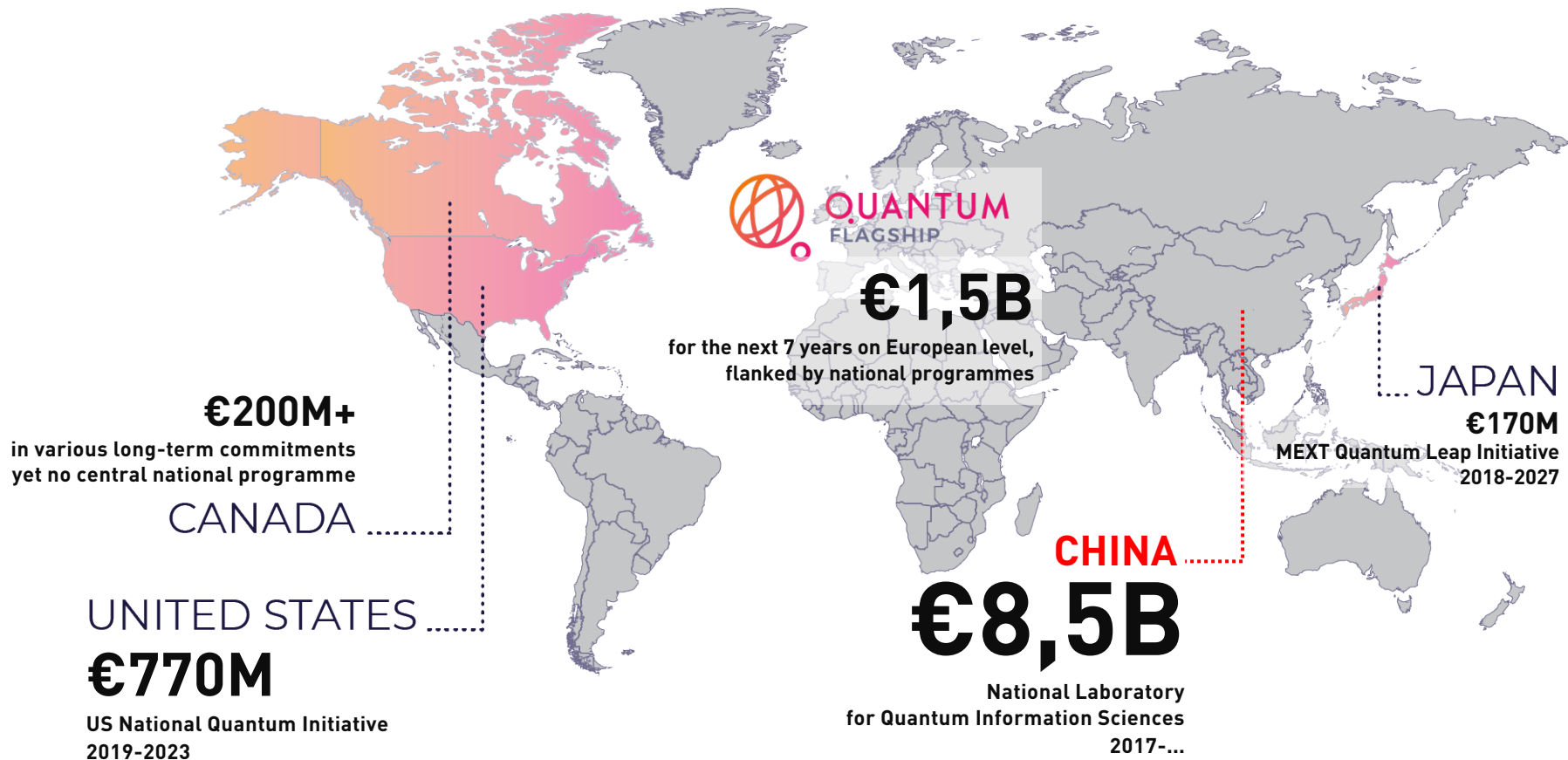
Quantum computing

Google claims to have demonstrated
“quantum supremacy”

FINANCIAL TIMES

“Rivals rubbish Google’s claim of
quantum supremacy”

2020: GLOBAL STATE OF PLAY – NATIONAL PROGRAMMES



EUROPE'S COMMITMENT: FROM VISION TO REALITY



HORIZON EUROPE

QUANTERA



Give funding support to international research projects in quantum technologies

QUANTUM FLAGSHIP



Bring quantum technologies from the lab to the market and consolidate European scientific leadership

QUANTUM COMMUNICATION INFRASTRUCTURE (QCI)



Build and deploy in the next decade a certified secure pan-European end-to-end QCI for cybersecurity services

DIGITAL EUROPE

QUANTUM COMPUTING INFRASTRUCTURE

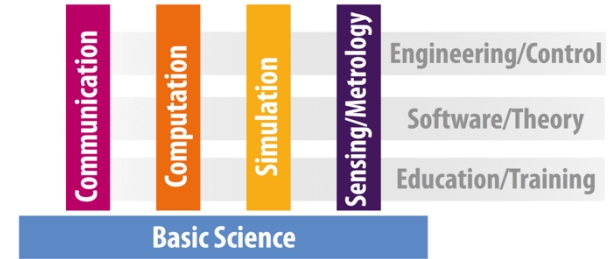


Build and deploy an infrastructure for big data, AI, high-performance computing, and more



2020: UPDATE OF THE STRATEGIC RESEARCH AGENDA

Europe has all the elements to become a world leader in quantum technologies and its industrial exploitation. Our goal is to establish a quantum industry and develop quantum enabled strategic value chains across European key sectors.



Core principles of the updated Strategic Research Agenda

1. Quantum Europe – Engage all stakeholders and create an innovative ecosystem!
2. Financing the growth – Build a sustainable Quantum industry!
3. From lab to fab to market - Provide the necessary infrastructure!
4. Strengthening Europe - Create a European IP and Standardisation strategy!
5. Education and Outreach – Train a quantum-aware workforce and society!

2030: KPIs FOR THE QUANTUM TECHNOLOGY ECOSYSTEM

For Europe's Prosperity and Jobs

Europe's quantum industry belongs to the top two QT industries in the world in terms of number of jobs and of quality/production volume/market share.

For Europe's Digital Autonomy & Technological Leadership

Completeness of the value chain for different application areas with a leading IP position of Europe in core QT industry application areas.

For Europe's People

Bring breakthrough advancements to European citizens in application areas and enable European citizens to harness full potential of QT by promoting awareness.

Best Use of Europe's Cohesion and Diversity

Cross member state collaboration on quantum technology from different areas, including industry, academia, and public sector projects to ensure cohesion & diversity.



2030: KPIs FOR QUANTUM TECHNOLOGIES IN EUROPE

COMMUNICATIONS

Performance: Create quantum-safe networks across metropolitan areas, interconnected fibre networks with satellite links, and long-range quantum communication networks exploiting entanglement and quantum repeaters.

Accessibility: Connect all countries in Europe to a quantum communication network.

Functionality: Create Quantum-safe network functionality, combining Post Quantum Cryptography and QKD, for IoT, 5G, SDN, and critical infrastructure, as well as quantum internet applications exploiting long-range entanglement between remote quantum processors, clocks and sensors.

COMPUTING

Capability: Build a full stack, highly connected, high fidelity quantum computer of at least one thousand physical qubits, exhibiting scalable performance and capable of out-performing classical computers on relevant real-world use-cases.

Availability: Enable access to European quantum computing infrastructure for outperforming the best current supercomputers for scientific and technical users.

2030: KPIs FOR QUANTUM TECHNOLOGIES IN EUROPE

SIMULATION

Capability: Build programmable European quantum simulators capable of simulating far beyond classical possibilities for hard-to-compute quantum or classical systems.

Availability: Enable access to European quantum simulation facilities capable of outperforming the best supercomputer for relevant real-world use-cases.

SENSING AND METROLOGY

Capability: Widespread deployment, both terrestrial and space-based of real-world demonstrations using a network of quantum sensors.

Availability: Industry developing its own production and fabrication facilities for quantum-based products and industry-academia pilot lines to foster product development and rapid innovation especially for start-ups and SMEs.

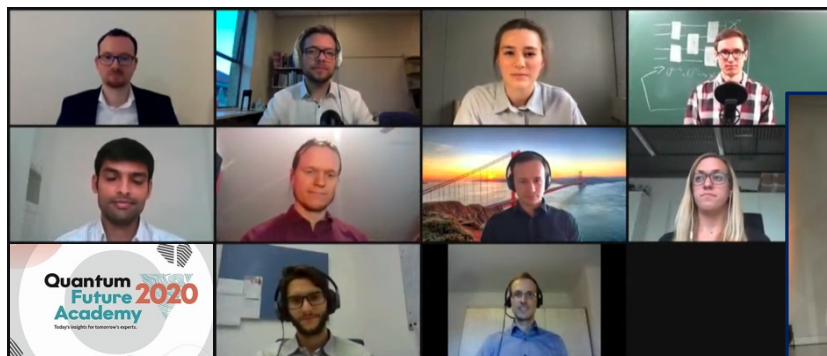
Market Readiness: Commercial products available for both high performance and mass market as well as product portfolio expansion with exploitation of quantum sensors for health, transport, navigation and telecom exploration, science, and climate challenges, building on globally accepted standards and traceable quantum measurement and calibration services.

2030: KPIs FOR QUANTUM TECHNOLOGIES IN EUROPE

EDUCATION AND DIVERSITY

Education & Training: Establish self-sustaining pan-European education programmes in quantum technologies at all educational and skill levels.

Diversity & Equity: Establish mature and effective programmes to address, promote and bring inclusiveness and equity on a pan-European scale spanning all levels of academic and industrial relevance in quantum technologies.



 Setting the stage for the next generation of quantum scientists in Europe

The Quantum Future Academy 2020 invited attendees from 30 countries to qualify for the finale in Berlin (digitally, due to Covid-19)

OUTREACH AND AWARENESS

European Commission > Strategy > Shaping Europe's digital future > Blog >

Shaping Europe's digital future

BLOG POST BY THOMAS SKORDAS, JÜRGEN MLYNEK | 16 October 2020

The Quantum Technologies Flagship: the story so far, and the quantum future ahead

ec.europa.eu

[\[link to blog post\]](#)

The future is Quantum.

The Second Quantum Revolution is unfolding now, exploiting the enormous advancements in our ability to detect and manipulate single quantum objects. The Quantum Flagship is driving this revolution in Europe.

EUROPEAN QUANTUM WEEK

November 2-6, 2020
Berlin + Online

Organized by



QUANTUM
FLAGSHIP



www.qt.eu

eqw.qt.eu



Thank you for your attention!

juergen.mlynek@falling-walls.com

