EU Quantum Agenda: An Overview of the JRC Outlook Report on Quantum

Dr Stefano Calzati

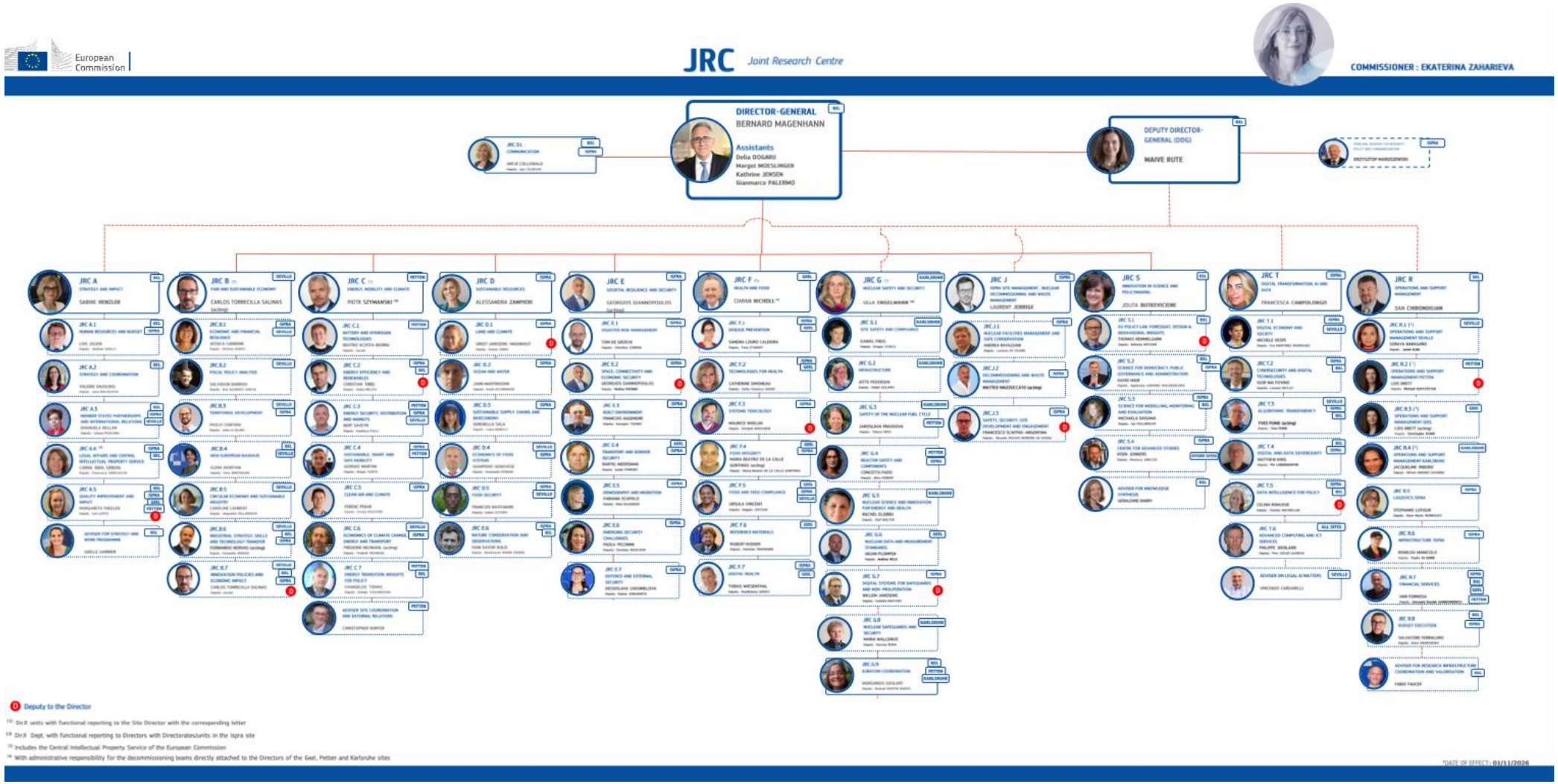
Independent researcher

(former JRC's project officer)

Rudolfovo – Science and Technology Centre Novo mesto
18th November 2026

Institutional Overview

The Joint Research Centre



6 sites (≈ 3000 people)

[JRC Publications (OA repository)]



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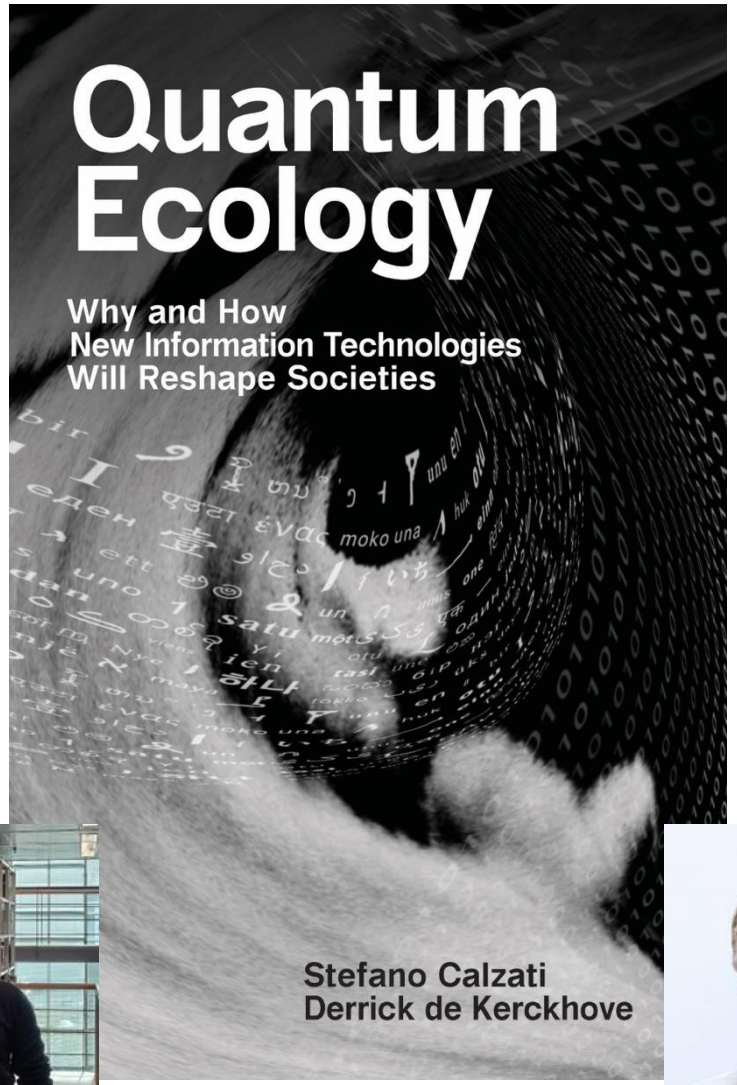




Role of the JRC:

- **Supply scientific evidence** to support policy of other DGs
- The JRC cannot make policy, but **provides recommendations**

My (Ongoing) Quantum Work







Quantum Ecology

Calzati & de Kerckhove 2024, MIT Press

Onto-epistemological framework, whose pillars are *uncertainty, complementarity, nonlocality, superposition, entanglement*

Technological paradigm, pivoting around Quantum Information Technologies (QITs)

Philosophy of technoscience → social sciences

Telecommunications Policy 50 (2026) 103222

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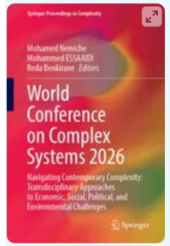
Enabling the EU's digital Sovereignty: A Europe-level quantum internet as the key infrastructure for a European digital polity

Stefano Calzati [a,*], Anastasija Nikiforova [b], Martino Travagnin, Consultant [c,d]

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[d] Joint Research Centre, European Commission, Ispra, Italy

A Quantum-Informed Conjecture on Complexity

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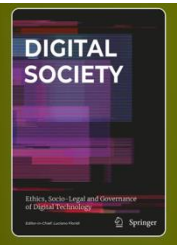
The Quantum Ecology as an Onto-Epistemological Framework: Toward an Ecological Theory of Sensing

Original Paper | Published: 25 September 2025

Volume 4, article number 71 (2025) Cite this article

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Digital Society

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Under Review: **Rethinking Ethics of Technology in the Quantum Age: An Ultra-Phenomenological Approach to Quantum Sensing**

Digital Society Topical Collection

Charting the Impact of Quantum Theory and Quantum Technologies on Technoscience and the Digital Transformation

@ JRC – Centre for Advanced Studies (S.4)

- As project officer I was involved in:

- Innovative approaches to **communication science** and **policymaking** through **AI tools** (Rapid Science for Policy report)

- **Keynote on quantum-oriented & informed policymaking**, intersecting political ecology and technology governance (here)

- **Outlook Report on Quantum** (sections 2.10, 3, & 4)

The Outlook Report

EU quantum agenda documents

- R&I 👍 Marketability👎
- Infrastructuring
- Quantum skills

QUANTUM FLAGSHIP 2018



2025



2026



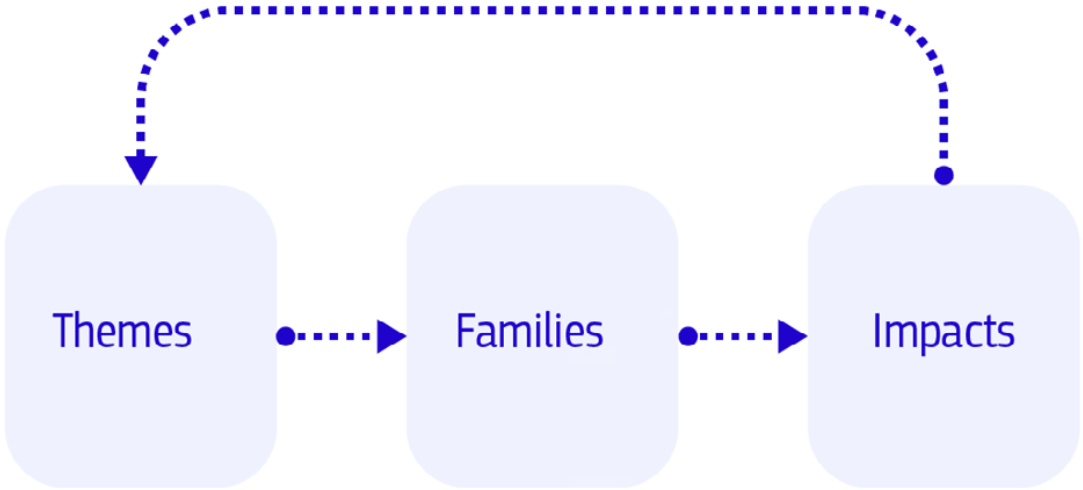
Upcoming

Rationale of the outlook report

- Across **12 thematic areas** (e.g., AI, climate, cybersecurity, energy, transportation, economy, health, etc.)

- Three families of QITs: **quantum sensing** (TRLs 6-9), **quantum communication** (TRLs 5-7), **quantum computing** (TRLs 2-5)

- **Science 4 Policy**



Key takeaways

QITs as **systemic dual-use technologies**

Different TRLs across QITs families

Two-way interaction between quantum & AI

Few will **develop** QITs, most will **adopt** QITs

QITs as a **sovereignty issue**

Anticipate **institutional & infrastructural** capabilities

Zooming In

Cybersecurity against CRQC (policy brief)

- The US leads the technical transition to quantum-safe cryptography

→ In 2024, NIST released **standards for quantum-resistant cryptography.** These standards represent the compass for both public institutions and industry in the migration of their digital systems toward quantum-safe cryptography. The US opted for a **direct drop-in replacement of classical schemes with post-quantum ones** for national security systems

- The EU opted for a gradual transition

→ In 2024, the EC recommended to define a roadmap and **initiate the migration of PS digital systems to post-quantum cryptography by the end of 2026**. The roadmap shall synchronise transition efforts across MSs to ensure cross-border interoperability. **ETSI provides guidance** (here). QA might include quantum-safe purchases



Social sciences & QITs (section 2.10)

- Quantum sensing (e.g., wearable neurodevices) to study **social behaviours** and group decision (privacy issues remain)
- Quantum communication (QKD & PQC) for **secure policy work and data sharing** (MSs and EU institutions connected through EuroQCI)
- Quantum computing (e.g., quantum annealers; TRL5) for **complex decision analysis**, non-linear modelling, and policy impact assessment
- Quantum concepts as resources to **rethink policymaking** (Policy Lab)
- Science-art nexus to create **new understandings** and knowledge of/through QITs

Strategic positioning (section 3 & policy brief)

- Quantum markets & geopolitics – Highlights

→Over 440 quantum companies worldwide and the **EU is home to 32%**

→2012-24: global private VC investments amounted to **€6bn** (led by US); investments from **PS reached €36bn**

→**China dominates quantum patenting** (46%), followed by US (23%), Japan & EU (6% each)

- EU quantum sovereignty

→**identify and mitigate dependencies** along the supply chain (raw materials, export control of components and of expertise, etc.)

→**avoid foreign/corporate lock-ins** (building internal capacity & leading standardization efforts)

→**path to industrialization** attracting and certifying public & private investments and suppliers

Conclusion & recommendations (section 4)

- Human talent (current shortage worldwide)

→promote **quantum capabilities & literacies** for developers & users

- Collaboration

→establish international ecosystems of **trusted parties, investors, suppliers** (TBC in QA)

- Infrastructure

→ensure **access to critical QITs** (e.g., shared quantum labs for EU researchers)

- Dual use (especially for strategic sectors, e.g., nuclear & Earth observations)

→need for **anticipatory governance & quantum readiness**

Thank you!

Dr Stefano Calzati

Independent researcher

