



EU-Canada Workshop on Quantum Research

3 May 2021

Dr Gustav Kalbe

Head of Unit "High Performance Computing & Quantum Technologies"

DG CONNECT, European Commission

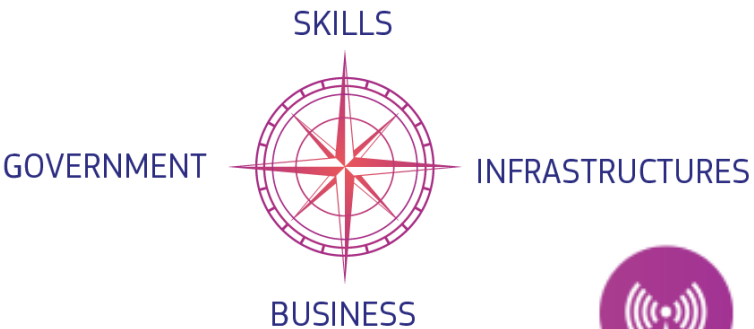
Overview

1. QT IN THE EUROPEAN UNION
2. EU – CANADA
3. HORIZON EUROPE EVALUATION



Europe's Digital Decade: Digital Compass

On 9 March 2021, the Commission presented a vision and avenues for Europe's digital transformation by 2030. This vision for the EU's digital decade evolves around four cardinal points:



Skills

ICT Specialists: 20 millions + Gender convergence

Basic Digital Skills: min 80% of population



Secure and sustainable digital infrastructures

Connectivity: Gigabit for everyone, 5G everywhere

Cutting edge Semiconductors: double EU share in global production

Data - Edge & Cloud: 10,000 climate neutral highly secure edge nodes

Quantum



Computing: first computer with quantum acceleration



Digital transformation of businesses

Tech up-take: 75% of EU companies using Cloud/AI/Big Data

Innovators: grow scale ups & finance to double EU Unicorns

Late adopters: more than 90% of SMEs reach at least a basic level of digital intensity



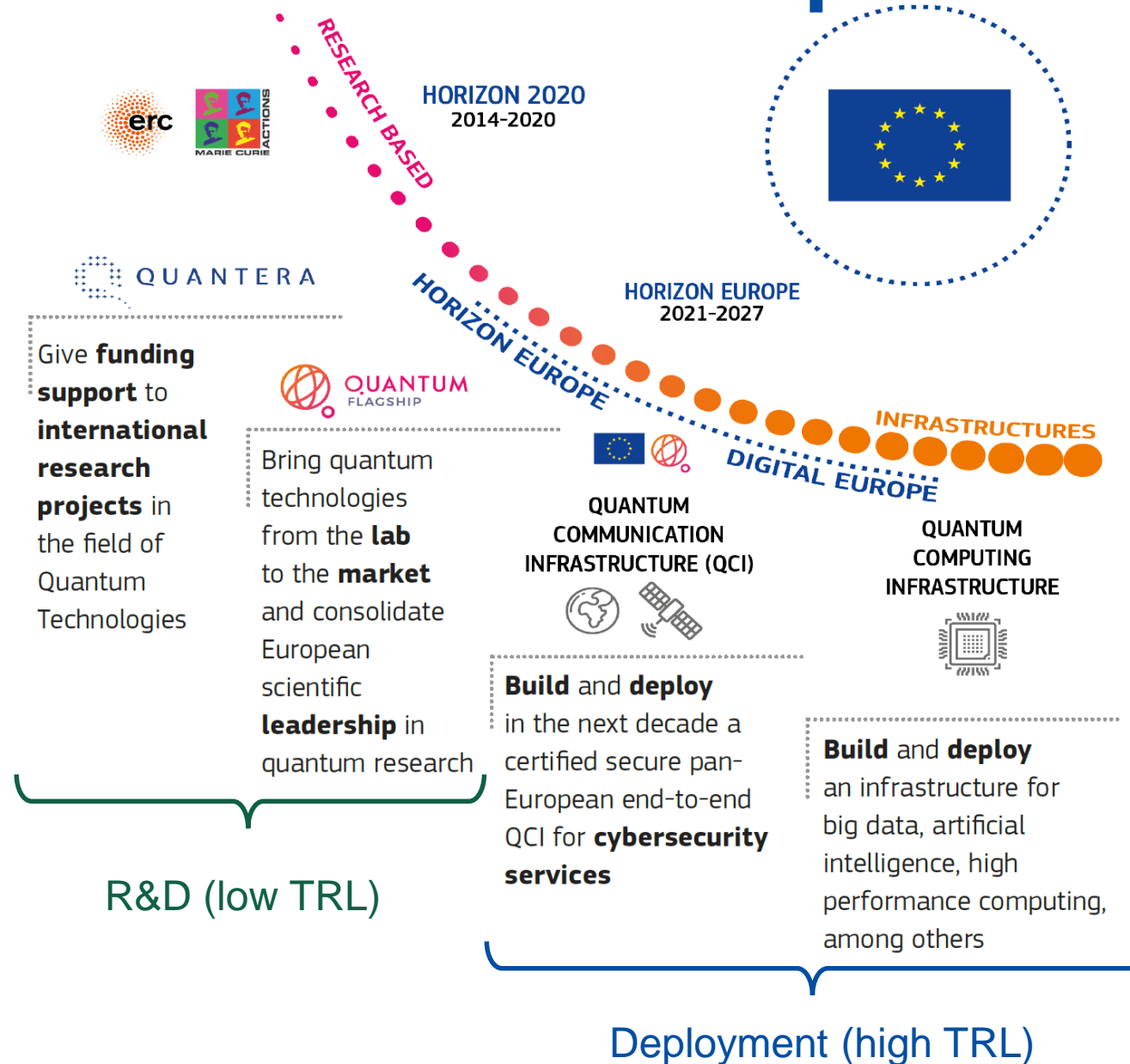
Digitalisation of public services

Key Public Services: 100% online

e-Health: 100% availability medical records

Digital Identity: 80% citizens using digital ID

Quantum in the EU in the period 2021-2027



The Quantum Flagship 2018-2021

EU Research Framework Programme
2014-2020 (Horizon 2020)

RAMP-UP PHASE
2018-2021



€152 million



20 EU-funded projects



QUANTUM
FLAGSHIP

www.qt.eu

4 projects



QUANTUM
Communication



Quantum Internet - secure
communication and
applications

2 projects

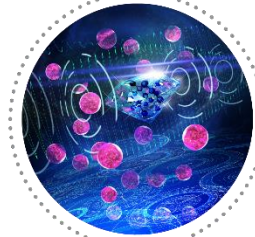


QUANTUM
Simulation



By 2021 quantum simulators 20x
more precise

4 projects

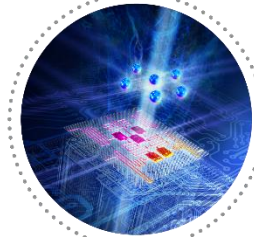


QUANTUM
Sensing
metrology



By 2021, sensors with
resolution 1000x better

2 projects



QUANTUM
Computing



By 2021, quantum computers of
50-100 qubits demonstrating first
quantum applications

7 projects



QUANTUM
Basic science



Discover & understand new
fundamental quantum principles

QUANTERA

37 projects

EU – Canada Collaboration

- Long tradition of EU-Canada Collaboration
- Both are at the forefront of S&T developments
- Both have programmes focusing on long-term objectives
- Successful EU-Canada institutional & scientific dialog

Expected Outcomes

- Make progress in the foundations of quantum S&T
- Benefit from synergies and complementary competencies
- Identify mutual benefits and achieve common targets to reach within the next decade

→ EU – Canada joint call



HORIZON-CL4-2021-DIGITAL-EMERGING-01-23: International cooperation with Canada (RIA)



EU – Canada Research and Innovation Action joint call

CONDITION	SPECIFIC CONDITION
Indicative opening of the Call	May-June 2021
Indicative deadline of the Call	8 September 2021
Expected (EU+Canada) contribution per project	EUR 2.5 million (this does not preclude submission and selection of a proposal requesting different amounts)
Expected duration of projects	36 months (this does not preclude submission and selection of a proposal requesting different durations)
Indicative EU budget	Indicative EU budget EUR 4.00 million (CAD 6.00 million) – Support EU beneficiaries
Indicative Canada budget (NSERC)	Indicative Canada budget EUR 4.00 million (CAD 6.00 million) – Support Canada beneficiaries
Type of Action	Research and Innovation Actions, single-stage submission and evaluation
Technology Readiness Level	TRL 1-2 to TRL 2-3, basic science

HORIZON-CL4-2021-DIGITAL-EMERGING-01-23: International cooperation with Canada (RIA)



Scope of Joint EU – Canada projects

- ✓ Address a mix of quantum technology challenges in the areas of EU – Canada interest



- ✓ Identify the *added value and/or mutual benefit* for both EU and Canadian beneficiaries (including the integration of different aspects like physics, engineering, computer science, theory, algorithms, software, manufacturing, control, infrastructures, etc.)

HORIZON-CL4-2021-DIGITAL-EMERGING-01-23: International cooperation with Canada (RIA)



Technological and societal challenges to address (1 or more)



Quantum computing and simulation

- Co-design of hardware and software to accelerate applications
- Seamless interoperable software-to-hardware stack that can apply over multiple platforms
- Theoretical and computer science foundations of quantum algorithms and architectures

/!\ Clearly define the benefit of EU-Canada collaboration /!\

HORIZON-CL4-2021-DIGITAL-EMERGING-01-23: International cooperation with Canada (RIA)



Technological and societal challenges to address (1 or more)



Quantum communication

- Privacy and security concepts, proofs and applications, including QKD (quantum key distribution) and beyond
- Device independent protocols, quantum network/repeater protocols, including architectures and network stack
- Development of satellite and space-based hardware, and certification/verification of states and correlations

/!\ Clearly define the benefit of EU-Canada collaboration /!\

HORIZON-CL4-2021-DIGITAL-EMERGING-01-23: International cooperation with Canada (RIA)



Technological and societal challenges to address (1 or more)



Quantum Sensing and Metrology

Application-specific quantum sensor development covering:

- Device fabrication, characterisation, e.g. for magnetometry, prospection, imaging, navigation, biomedical
- Theoretical research optimising simple sensors, control, as well as advanced approaches (use of entanglement and error correction).

/!\ Clearly define the benefit of EU-Canada collaboration /!\

Who is eligible for EU funding?

EU COUNTRIES

- Member States (MS) including their outermost regions.
- The Overseas Countries and Territories (OCTs) linked to the MS.

NON-EU COUNTRIES

- Countries associated to Horizon Europe (AC).
- Low and middle income countries: See [HE Programme Guide](#).

SPECIFIC CASES

- Affiliated entities established in countries eligible for funding.
- EU bodies
- International organisations (IO):
 - International European research organisations are eligible for funding.
 - Other IO are not eligible (only exceptionally if participation is essential)
 - IO in a MS or AC are eligible for funding for Training and mobility actions and when announced in the call conditions.

- Minimum number of partners as set out in the call conditions (at least one independent legal entity established in a MS, and, at least two other independent legal entities established either in a MS or AC).
- Legal entities: Universities, research centers, industry, SMEs ...

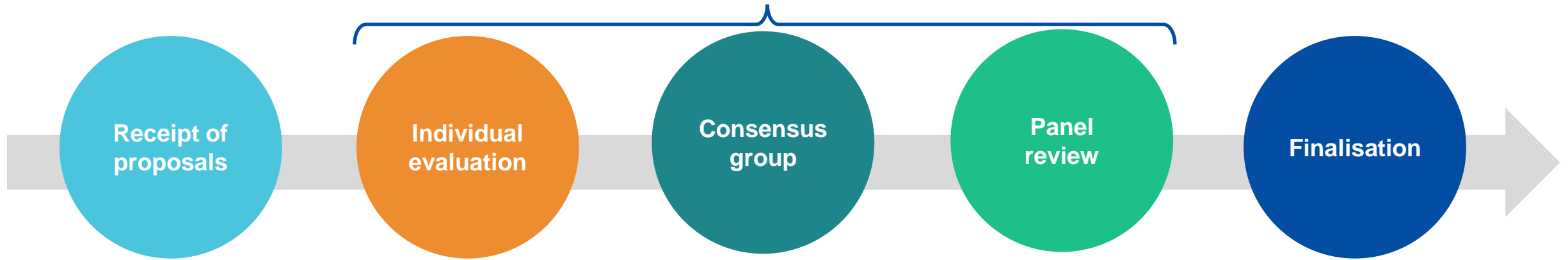
Who is eligible for Canada funding?

See NSERC presentation (Canada researchers must meet NSERC's eligibility criteria)



Standard EU evaluation process

Evaluation panel: EU and Canada experts



Receipt of proposals

Individual evaluation

Consensus group

Panel review

Finalisation

EU Funding & Tenders Portal – **single entry point**

Admissibility/eligibility check

Allocation of proposals to evaluators

Experts assess proposals **individually**.

Minimum of three experts per proposal (but often more than three).

All individual experts discuss together to agree on a **common position**, including comments and scores for each proposal.

The panel of experts reach an **agreement** on the scores and comments for all proposals within a call, checking **consistency across the evaluations**.

if necessary, resolve cases where evaluators were unable to agree.

Rank the proposals with the same score

The Commission/Agency reviews the results of the experts' evaluation and puts together the **final ranking list**.



Evaluation criteria (RIA)

Research
and
innovation
action
(RIA)

Activities to establish new knowledge or to explore the feasibility of a new or improved technology, product, process, service or solution.

This may include basic and applied research, technology development and integration, testing, demonstration and validation of a small-scale prototype in a laboratory or simulated environment.

EXCELLENCE

- ✓ Clarity and pertinence of the **project's objectives**, and the extent to which the proposed work is ambitious, and goes beyond the state-of-the-art.
- ✓ Soundness of the proposed **methodology**, including the underlying concepts, models, assumptions, inter-disciplinary approaches, appropriate consideration of the **gender dimension** in research and innovation content, and the quality of **open science practices** including sharing and management of research outputs and engagement of citizens, civil society and end users where appropriate.

IMPACT

- ✓ Credibility of the **pathways** to achieve the expected **outcomes and impacts** specified in the work programme, and the likely scale and significance of the contributions due to the project.
- ✓ Suitability and quality of the **measures to maximize expected outcomes and impacts**, as set out in the dissemination and exploitation plan, including communication activities.

QUALITY AND EFFICIENCY OF THE IMPLEMENTATION

- ✓ Quality and effectiveness of the **work plan**, assessment of risks, and appropriateness of the effort assigned to work packages, and the resources overall.
- ✓ Capacity and role of each **participant**, and extent to which the **consortium** as a whole brings together the necessary expertise.

Proposals aspects are assessed to the extent that the proposed work is within the scope of the work programme topic

For more information



<https://ec.europa.eu/digital-single-market/en/quantum-technologies>



EU Topic Coordinator

Christian Trefzger, Policy Officer, DG CNECT

High Performance Computing & Quantum Technologies

cnect-c2-evaluations@ec.europa.eu

Canada, NSERC contact

Katie Wallace, NSERC

Director Strategic Partnerships

rp-quantum@nserc-crsng.gc.ca