The CSA provides central services to the EU Quantum Flagship

Community Building and Communication

International Cooperation

R&I Flagship Strategy Development & Monitoring (KPIs)

QUCATS

Early Industry involvement

Coordination of National and EU activities and investments

Strategy on Training & Education

Key tasks

➢ Establish a vibrant and active European Quantum Flagship Community

➢ Ensure efficient operation and open and transparent decision making processes

➢ Prepare a community backed Strategic Research Agenda

➢ Propose and monitor Key Performance Indicators

➢ Manage a central communication platform

➢ Help establishing a QT supply chain in Europe for industrial deployment

QUCATS
QUANTUM FLAGSHIP COORDINATION ACTION and SUPPORT

✓ **New CSA** in Horizon Europe, starting **May 2022**

✓ **11 partners**; Coordinator: **Philippe Grangier (CNRS)**

✓ **Merges QFlag** (VDI), **QTEdu** (CNR), **InCoQFlag** (CEA)

|	Participant organisation name	Acronym	
1.	Centre National de la Recherche Scientifique	CNRS	FR
2.	VDI Technologiezentrum GmbH	VDI TZ	DE
3.	Commissariat à l'Energie Atomique et aux Energies Alternatives	CEA	FR
4.	European Quantum Industry Consortium	QuIC	DE
5.	Technische Universität Braunschweig	TUBS	DE
6.	Fundació Institut de Ciències Fotòniques	ICFO	ES
7.	Nederlandse Org. voor Toegepast-natuurwetenschappelijk on derzoek	TNO	NL
8.	Consiglio Nazionale delle Ricerche	CNR	IT
9.	Portuguese Quantum Institute	PQI	PT
10.	Aarhus University	AU	DK
11.	Technical Research Centre of Finland Ltd.	VTT	FI

QUANTUM

QUCATS
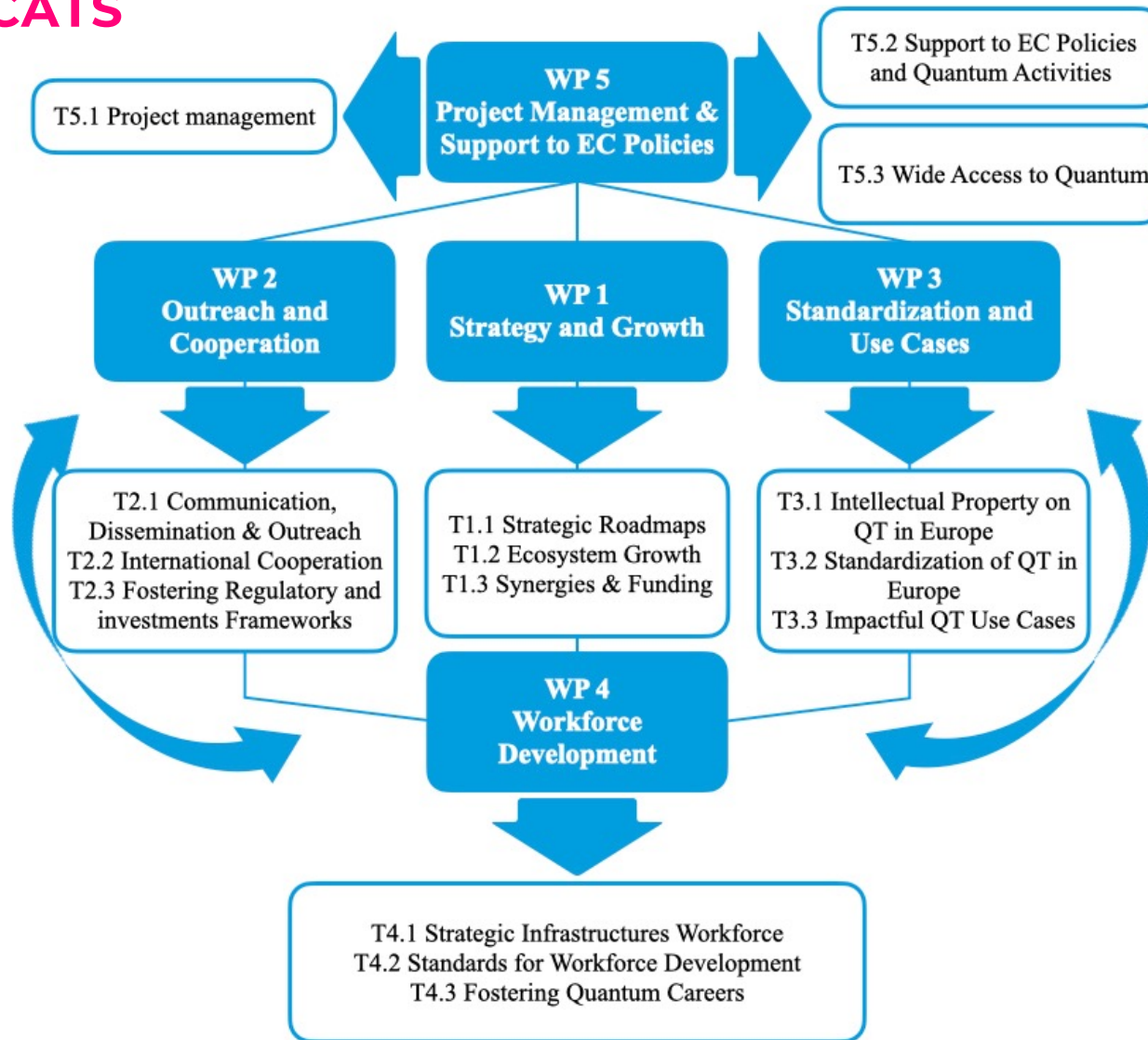
Total budget 6.5 M€
Total effort 550 pm

50 pm for CNRS Coordinator (PG) + One full time project manager (36 pm)

Efficient help of CNRS / INP
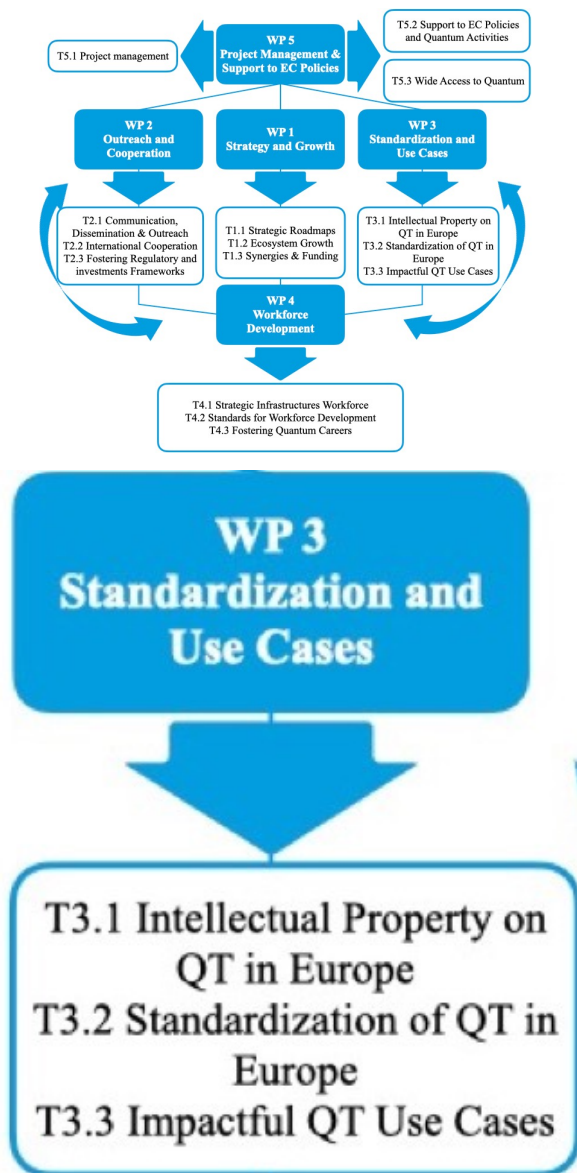
Task 3.1 - Intellectual property on quantum technologies in Europe (**VTT**, QuIC, TUBS)

ST311 Fostering IP in Academia and Industry (**VTT**, QuIC).

ST312 Training IP in Academia (**TUBS**, VTT).

Task 3.2 - Standardisation of quantum technologies in Europe (**TNO**, CEA, QuIC, TUBS, AU, VTT)

ST321 Design a strategy for development of quantum standards (**CEA**, QuIC, TNO, AU, VTT).

ST322 Cooperation of industry, academia and standardisation bodies (**TNO**, CEA, QuIC)

ST323 Develop a certification scheme for industry training and best practice guidelines (**TUBS**, QuIC, AU).

Task 3.3 - Impactful use cases of quantum technologies (**QuIC,** CNRS, CEA, VTT)

ST331 Develop a unified set of benchmarks for industry and R&I (**QuIC**, CEA, VTT)

ST332 Identify industry-relevant use cases (**QuIC**, CNRS, VTT)

Communication objective
Top priority for improvement: visibility of European QT

Top priority goal

Give visibility to European Quantum Technologies

Key Message

Europe is at the forefront of the global race towards quantum technologies. It will lead to sovereignty, economic growth and could change the daily life.

Top priority **subjects**
Scientific breakthroughs From EU / Flagship / fleet
Technology steps Start-ups / Industry
Use cases General public
European leaders (scientific, industry, policy…)
European top programs / platforms / calls

Top priority **targets**
EU leaders in economy, politics, industry
Tier 1 media and opinion maker
Wider public Citizens and tax payers

Top priority **channels**
Press Releases and press conferences
Social media and web
Visible events as Trojan horse

Deontology and ethics: honest presentations of the progresses made, without bluster or exaggeration.

Chaymae Senhaji, *Communication Officer - QUCATS*
chaymae.senhaji@cea.fr

From the Science and Engineering Board (SEB, H2020) to the Quantum Coordination Board (QCB, HE)

Role of the QCB:

- Coordinate and align the activities of the EC funding initiatives in the field of Quantum Technologies (QT), including but not restricted to the Quantum Flagship;

- Follow and report on the progress made towards the European Union objectives in the field of QT;

- Identify collaboration opportunities, joint developments, and shared infrastructures among projects.

**Duration and composition of the QCB:**

- Established for the duration of the Quantum Flagship initiative.

- Every Quantum Flagship project is automatically a member of the QCB during the duration of project.

- Quantum projects from complementary EU funding programmes are members of QCB on a voluntary basis.

- All projects shall be represented by their coordinators.

- Representatives from the EC and from various bodies (SAB, QCN, QuIC) are invited observers in the QCB.

- The main logistics is managed by the CSA QUCATS.

General Assembly (GA): Outer circle, built by the **coordinators of QT projects funded by the EC across all programmes, expect between 80 and 100 projects**. Currently some sets of projects are represented by delegates: QuantERA (2 delegates), Euramet EMN-Q (2 delegates), EuroQCI (represented by CSA *PETRUS*).

Core Group: Inner circle, constituted by **projects coordinators on a voluntary basis, size limited to 25 members**, elected by the GA for a term limited to the duration of their project, renewable each year by explicit mutual agreement. The Core Group elected a Chair **(Thierry Debuisschert)** and Vice-Chair **(Frank Wilhelm Mauch).**

12 Thematic Committees: Intermediate circle, arranged by **thematic objectives, transversal to funding programmes**. Their goal is to build a community based on mutual interest, developing cross-project fertilization and collaborations. **They propose new directions of research, to be consolidated at the Core Group level.**

The QCB Terms of References
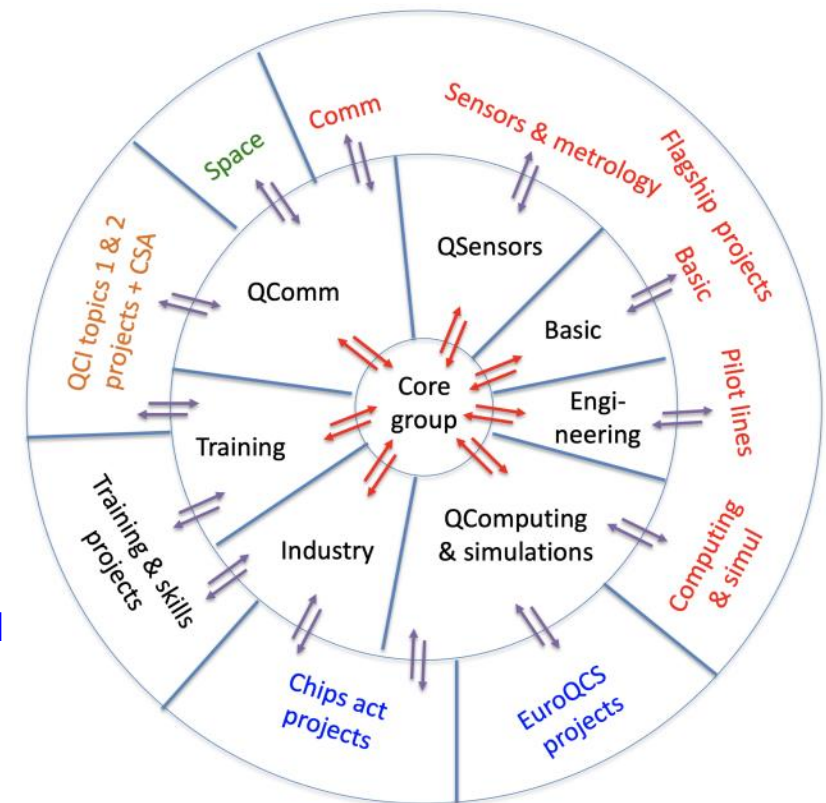
Setting up the 12 Thematic Committees

- Members can be experts from the projects, not only coordinators.

- There should be at least one member of the Core Group in each Committee.

Quantum Computing	Education and Workforce Development
Quantum Simulation	Equality, Diversity and Inclusion
Quantum Communication	International cooperation (eg USA, CA, JP)
Quantum Sensing and Metrology	Standardization and markets
Basic Science	Quantum chips (inc. photonic integration)
Prototyping, pilots, engineering	Public relations and outreach

The Quantum Technologies KPIs for Europe

Defined by the Quantum Flagship Strategic Advisory Board (SAB) in 2021, after a large community consultation.

Goal: monitor the progress of the Flagship quantitatively in the following areas:

1. **Ecosystem**

2. **Quantum Communication**

3. **Quantum Computing**

4. **Quantum Simulation**

5. **Quantum Sensing and Metrology**

6. **Education**

KPI Scorecard

KEY

- 🟢 Ahead of schedule | >>10%
- 🟢 On schedule | ~10%
- 🟡 Needs progress | <10%
- 🔴 Behind schedule | <<10%

KPI Quantum Computing	2021 value	2030 target	progress (%)

KPI Quantum Simulation	2021 value	2030 target	progress (%)

KPI Quantum Communication	2021 value	2030 target	progress (%)

KPI Quantum Sensing and Metrology	2021 value	2030 target	progress (%)

KPI Education	2021 value	2030 target	progress (%)

KPI Ecosystem	2021 value	2030 target	progress (%)	
Investment (b€)	n.a.	1		
Lab-to-market	79	250	31,6	🟢
Lab-to-fab	1	10	10,0	🟢
Job Creation	n.a.	n.a.		
Patent Creation/IP Retention (rank)	n.a.	top 2		
Supply Chain & Strategic autonomy	0	10	0,0	🟡

The SR(I)A : a European History

1998: The Pathfinder Project laid the foundation for the research field of QIPC at EU level (Helsinki conf.)

2004: Special session Rome Conference on QIPC   (Quantum Information Processing & Communications)

2005: QIPC Roadmap → 2005 – 2016: 9 iterations

2005-08: Era-Pilot QIST // **06-09**: CA – QUROPE // **10-13**: CSA - QUIE^{2}T // **13-16**: CSA - QUTE-Europe

Quantum Technologies Roadmap
152 pages, 2016

QuantumManifesto
A New Era of Technology   May 2016

Quantum Technologies Flagship Final Report | High-Level Steering Committee 28 June 2017

Always a long-term vision that was independent of the funding and support instruments in place : work out what we want/need to do, then work out how to do it !

➢ Last version of the SRA published in 2020 under the CSA QFlag (2017-2022)
  • High level, going beyond research: innovation, international relations, equity and equality
  • With the Quantum Fleet already in mind
➢ Added in 2021 : SIR, Strategic Industry Roadmap, edited by QuIC

Expanding the Quantum Technologies Landscape
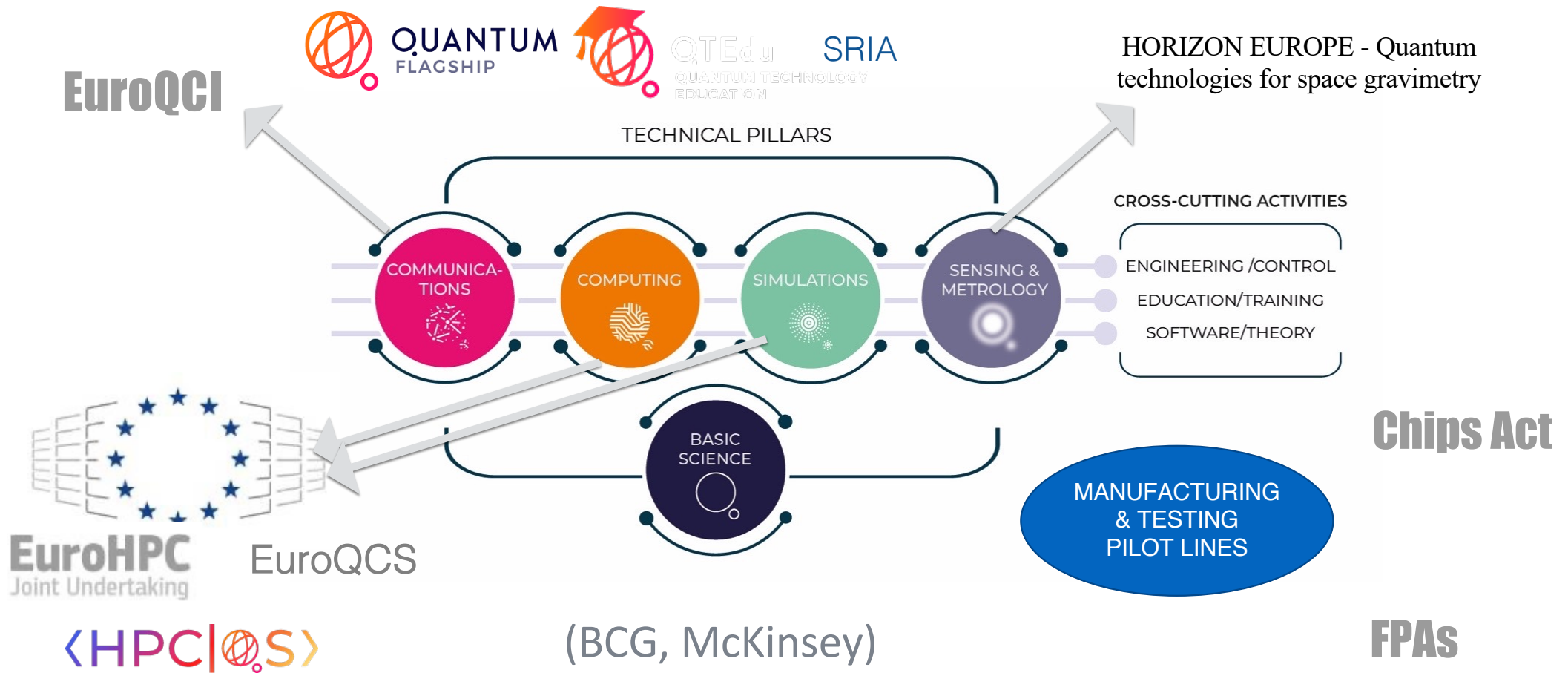
From SRA & SIR to SRIA – Proposal outline

A two-step process :

* First step: a preliminary version for Nov 2022, with the objective to provide recommendations to the commission for the 2025-2026 programs.
- Merge the SRA and SIR, and align it with EuroHPC and the Chips-Act
- Document delivered to the commission on the 17-11-2022, now available on qt.eu[1]
- It includes the feedback from a large number of stakeholders, including the SAB, the SEB, the SRA Working Groups, the QCN.

* Second step: renew the members of the WGs, including the relevant bodies; then work with the WGs to populate the action items, fill the gaps, and consolidate the SRIA.
- A draft version will be shared, to gather and include the feedback from a large number of stakeholders, as previously done in the final phase of the November's version.
- The final version of the SRIA is expected by Dec 2023

[1]https://qt.eu/about-quantum-flagship/newsroom/quantum-flagship-publishes-preliminary-strategic-research-and-industry-agenda/

SRIA December 2023 Outline
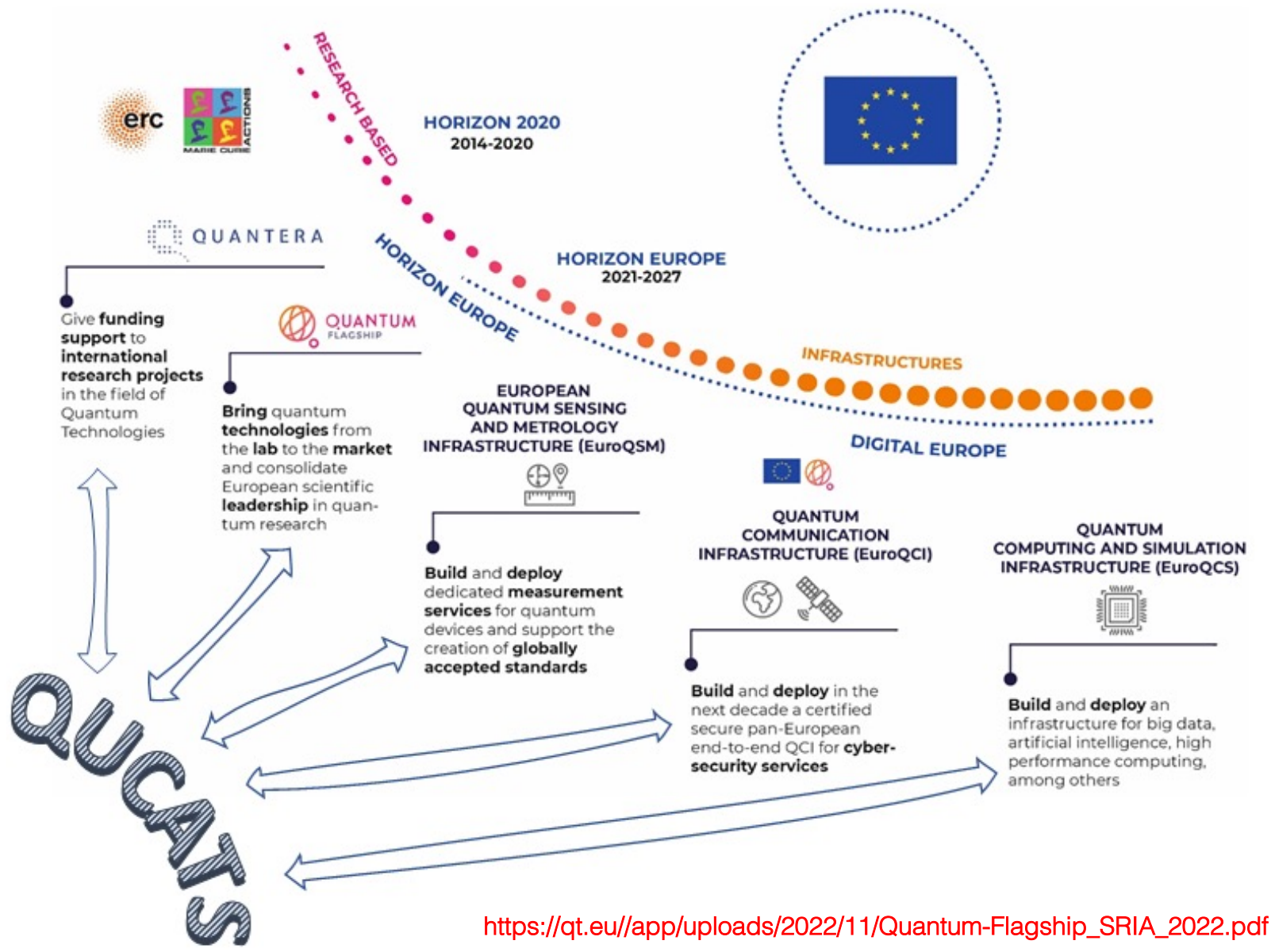
Roadmap to 2030: Quantum Ambitions over this Decade

1. Scientific and technical challenges and ambitions

1.1 Quantum Computing (including section on alignment with chips act and Euro HPC)
1.2 Quantum Simulation (including section on alignment with chips act and Euro HPC)
1.3 Quantum Communications (including section on alignment with chips act and Euro QCI)
1.4 Quantum Sensing & Metrology (including section on alignment with chips act and Euro metrology initiative)
1.5 Recommendations transverse to the four pillars.

2. Quantum Resources, Innovation, Industrialisation, and Societal Impact

2.1 Basic quantum science
2.2 Engineering & Enabling technolo
2.3 Education & Workforce Development
2.4 Standardisation
2.5 Funding: private & public
2.6 Intellectual Property
2.7 International Collaboration / Export Control Regulation
2.8 QT Governance Principles

> **Consolidate by June 2023. Check with SAB, QCB, QCN, QuIC, Euro HPC, EuroQCI, + other relevant stakeholders, to get their feedback during the summer break. Finalize in December 2023**

RESEARCH BASED

HORIZON 2020
2014-2020

HORIZON EUROPE

HORIZON EUROPE
2021-2027

INFRASTRUCTURES

DIGITAL EUROPE

QUANTERA

Give **funding support** to **international research projects** in the field of Quantum Technologies

QUANTUM FLAGSHIP

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

EUROPEAN QUANTUM SENSING AND METROLOGY INFRASTRUCTURE (EuroQSM)

Build and **deploy** dedicated **measurement services** for quantum devices and support the creation of **globally accepted standards**

QUANTUM COMMUNICATION INFRASTRUCTURE (EuroQCI)

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

QUANTUM COMPUTING AND SIMULATION INFRASTRUCTURE (EuroQCS)

Build and **deploy** an infrastructure for big data, artificial intelligence, high performance computing, among others

QuCATS

https://qt.eu//app/uploads/2022/11/Quantum-Flagship_SRIA_2022.pdf

H2020 Work Programme

Strategic Research Agenda

HE Work Programme

Strategic Research and Industry Agenda