GISC 2025

Global ICT Standards Conference 2025

Quantum Innovation and Standardization Pathways

European Approach to Quantum Technology and Standardisation

Direction from Industry Point of View
European Quantum Industry Consortium (QuIC)

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ICT Standards and Intellectual Property:
AI for All

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Abstract

European Quantum Standardisation: From Strategy to Implementation

Quantum Technology Standardisation

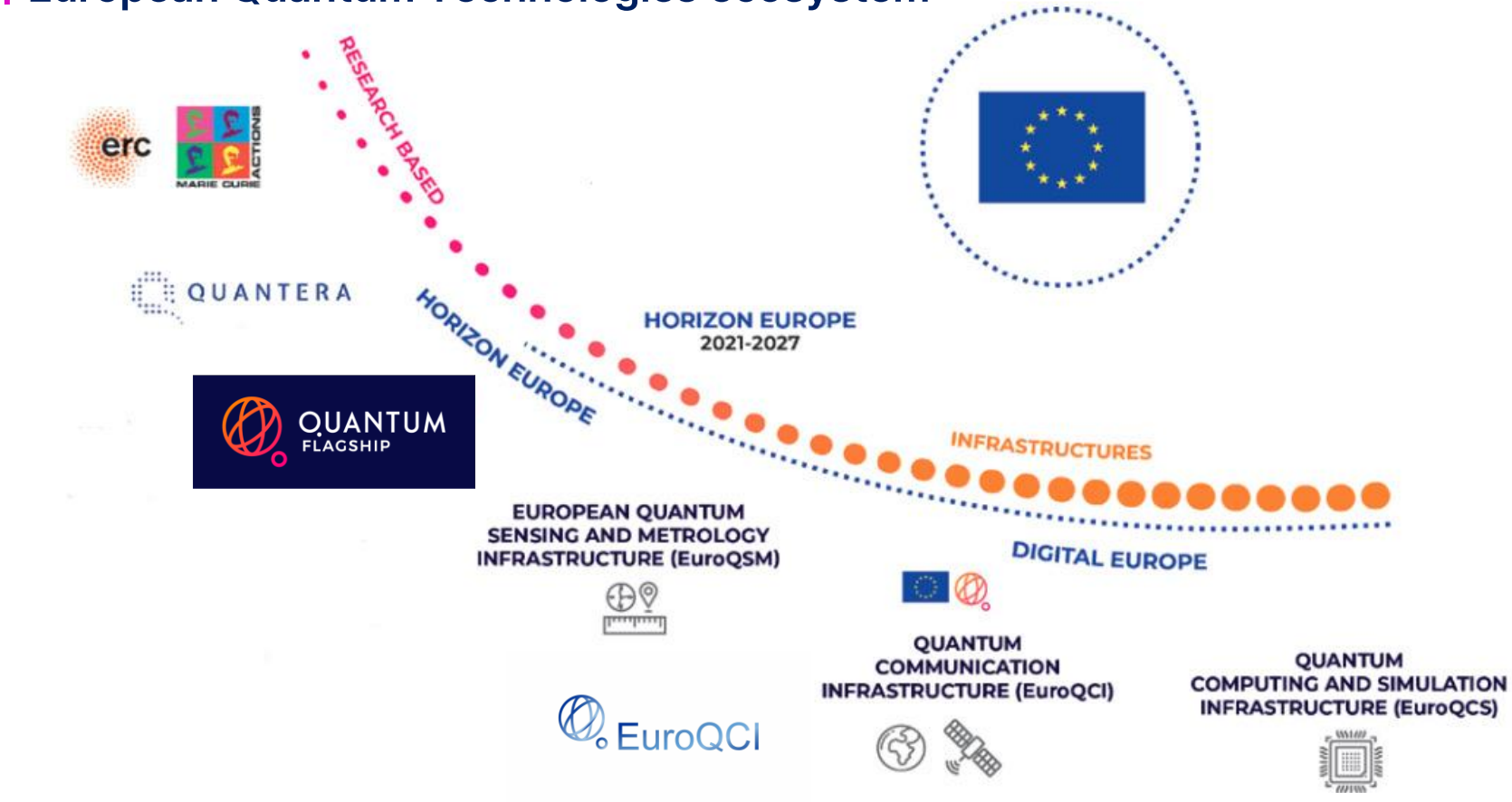
Europe is advancing a unified approach to quantum technology standardisation.

Through the European Quantum Industry Consortium (QuIC) and its Working Group on Standards, the quantum industry is strengthening its engagement with standardisation to link research excellence with industrial competitiveness.

This presentation shows how standardisation serves as a bridge between quantum innovation and market readiness, enabling a competitive, sovereign, and globally leading European quantum ecosystem.

01. The European Quantum Momentum

European Quantum Technologies ecosystem




EUROPEAN COMMISSION

Brussels, 2.7.2025
COM(2025) 363 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Quantum Europe Strategy: Quantum Europe in a Changing World

EuroHPC
Joint Undertaking

European Quantum Technologies ecosystem = Quantum Flagship + Quantera + EuroQSM + EuroQCI + EuroQCS + ERC/Marie Skłodowska Curie actions + Quantum Act + Chips Act + EuroHPC + Quantum Europe Strategy

01. The European Quantum Momentum

QuIC at a glance

QUIC OVERVIEW PRESENTATION

QUIC AT A GLANCE

Building a unified quantum ecosystem that connects research, industry, and policy: Quantum Industry Alliance (QuIC)

Our **HISTORY**: Non-profit association established in 2021 by several key business actors – large enterprises, SMEs, startups, investors – from across Europe.

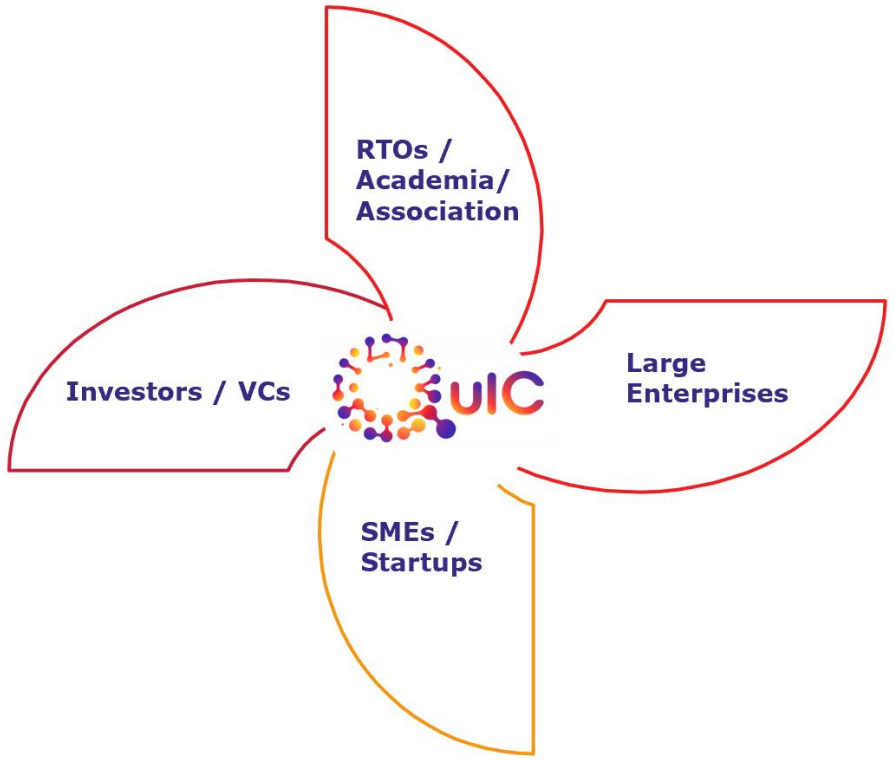
Our **MISSION**: grow and strengthen the quantum technology industry and position Europe as a global leader of the sector.

Our **METHOD**: serve as a collaboration hub between researchers, industry leaders, investors and end-users.

QuIC's definition of Quantum success in EUROPE: Foster the emergence of European Quantum Champions on the global stage.

01. The European Quantum Momentum

QuIC: Europe's Industrial Leadership in Quantum



- Bridge between academia, startups, corporates, and investors
- QuIC: representing 200+ members across 21 EU nations

01. The European Quantum Momentum

Europe's Industrial Leadership in Quantum -QuIC aims to strengthen Europe's position as a global quantum leader

QuIC's International Leadership

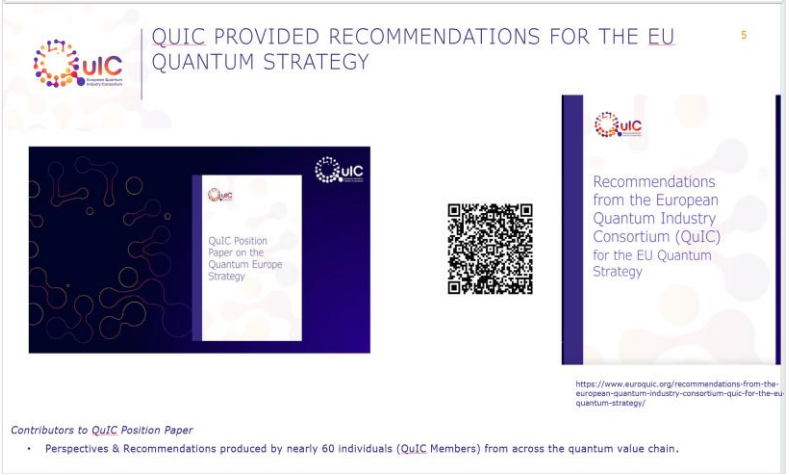
- Founding member of the International Council of Quantum Industry Associations
- Among select entities in EU High-Level Forum on Standardisation
- QuIC to join TC-22 (Europe), JTC-3 (worldwide), ETSI (Europe)

SIR for EU and National policies

- Strategic Industry Roadmap – Collective perspectives from all WGs and EGs.
- SIR is shared with European Commission and governments across Europe to inform quantum policies.

Produce Recommendations

- QuIC provided recommendations for the EU Quantum Strategy

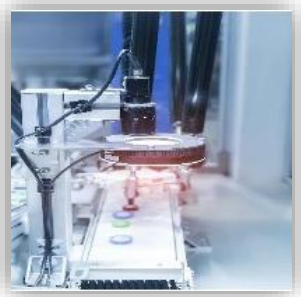


02. QuIC Standards WG: Building a European Quantum Standards Ecosystem

Five Working Groups and four Expert Groups

- Quantum Computing & Simulation

- Quantum Communications



- Quantum Sensing & Metrology

- Enabling Technologies

- Education & Skills

- Standards

- IP & Trade

Growth & Funding

Industrial Applications

02. QuIC Standards WG: Building a European Quantum Standards Ecosystem

QuIC Standards Working Group Objectives and Impact

Quantum Technologies' Standardisation Landscape

Strategic Objectives and Key Focus Areas for 2025

•Collaborate with QBC and Events to host sessions featuring speakers from JTC-3 and JTC-22, aiming to elevate the profile of JTC's work in standardization. The work of the ETSI ISG QKD on Quantum Communications will be presented as well.

- We are targeting 3-4 sessions throughout the year.
- Updates on JTC-3 and -22 and possibly of ETSI ISG QKD will be shared in the QuIC newsletter.

•QuIC will support the creation of a Super Group among international consortia (e.g., QSTAR, QEDC).

Impact of the proposed WG-ST 2025 objectives:

- Amplify the voice and influence of the quantum computing industry in global standardization efforts like the ISO/IEC JTC3.
- Serve as a platform for knowledge exchange, fostering a well-informed QuIC community that is capable of contributing effectively to the standardization process.
- Focusing on early warning for standards will allow QuIC to proactively address potential challenges.

Members

- **More than 50 members (companies)**
- Standardization_WG@euroquic.org

Monthly Telcos

- **Every 3rd Thursday of each month – 13.00 CET**

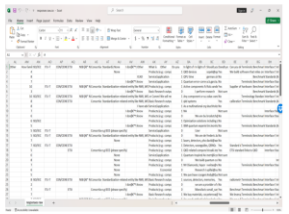
02. QuIC Standards WG: Building a European Quantum Standards Ecosystem

QuIC Standards Working Group Activities

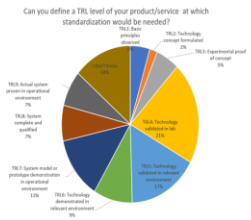
Collect Requirements

- Collect requirements via surveys to understand the standardization needs of the quantum industry

Survey to understand the Standardization needs of the Quantum Technologies domain



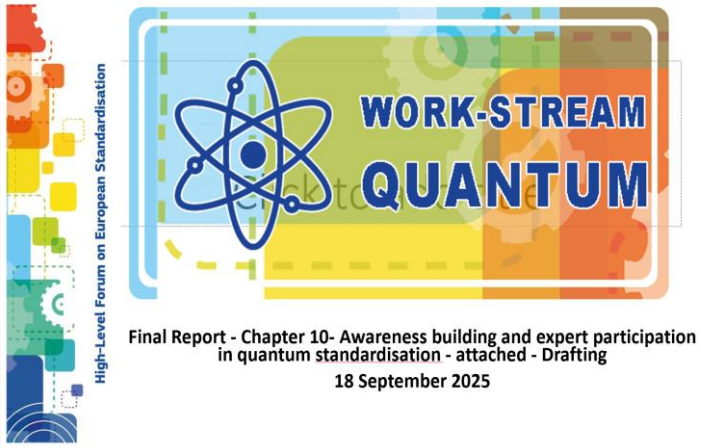
Raw data of the Survey



Analysis of the Survey

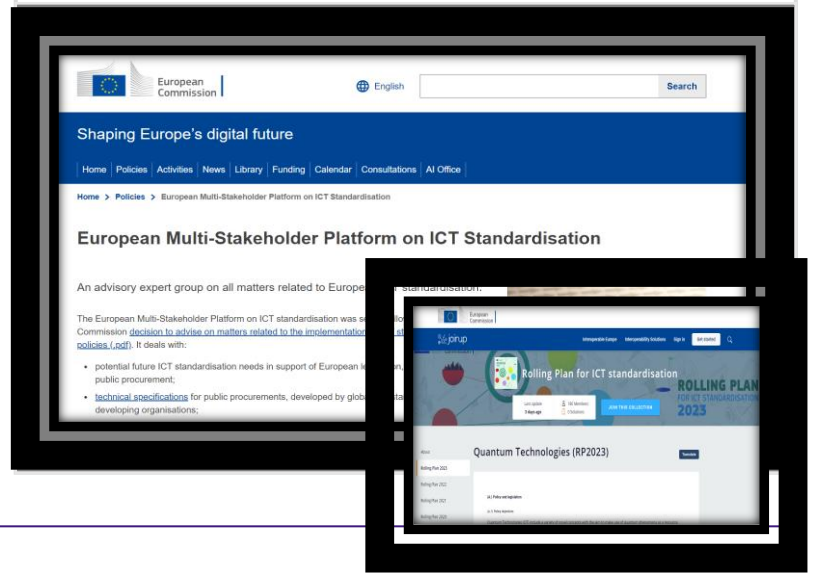
Support European Roadmaps

- Contribute to the HLF Quantum Roadmap



Support EU ICT Standard policies

- Participate in the MSP and Rolling Plan group and the MSP Taskforce on Research & Innovation,



02. QuIC Standards WG: Building a European Quantum Standards Ecosystem

QuIC Standards Working Group Activities

Increase awareness of Standards

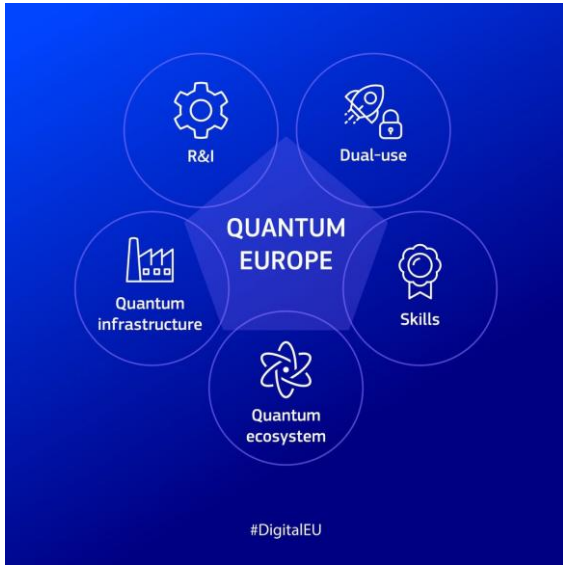
- Online training for Policy Makers

Contribute to the SIR

- The WG Standards contributes to the Standardisation Sections to the Strategic Industry Roadmap https://www.euroquic.org/quic-unveils-its-strategic-industry-roadmap-sir-2024/

03. From Strategy to Standards: Building Europe's Quantum Future

Quantum Europe Strategy Key points



01 Research and Innovation

- Consolidating excellence across Europe to lead in quantum science and its industrial transformation

02 Quantum Infrastructures

- Developing scalable, coordinated infrastructure hubs to support production, design, and application development

03 Strengthening the Quantum Ecosystem

- Through investments in startups and scaleups
- Securing supply chains and the
- Industrialisation of quantum technologies

04 Space and Dual-Use Quantum Technologies (Security and Defence)

- Integrating secure, sovereign quantum capabilities into Europe's space, security and defence strategies

05 Quantum Skills

- Building a diverse, world-class workforce through coordinated education, training, and talent mobility across the EU

03. From Strategy to Standards: Building Europe's Quantum Future

Key European Quantum Industry recommendations for the EU Quantum Strategy

Strengthen Europe's Quantum Industry Backbone

- Translate scientific excellence into industrial strength in all quantum fields (incl. quantum software), supported by:
  - scalable infrastructures,
  - harmonised, sustainable and secure supply chains,
  - and an agile regulatory environment.

Lead Global Quantum Standards and Interoperability

- Lead in global standards and benchmarking, leveraging Europe's influence to shape interoperability and security frameworks

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Leverage Public Tools to Attract Private Capital

- Crowd-in private capital through de-risking mechanisms, focused public procurement, and incentives for lead users

Strengthen Europe's Quantum Sovereignty

- Develop sovereign capabilities in key areas, including :
  - quantum chips,
  - hardware and software platforms,
  - and enabling technologies.

Invest in People and Quantum Skills

- Invest in people, fostering a skilled and mobile workforce through targeted education and talent-retention initiatives.

03. From Strategy to Standards: Building Europe's Quantum Future

Why Standards Matter for Quantum Technologies

Adoption of Quantum

- Standards accelerate industrial adoption and interoperability: From Lab to Market through Standards

Certification

- Certification builds trust for public and private adoption and market readiness.
- Example: Quantum Communication testbeds guiding certification models

Standards Roadmap

- A harmonised standards roadmap for Quantum technologies ensures scalability across Europe

03. From Strategy to Standards: Building Europe's Quantum Future

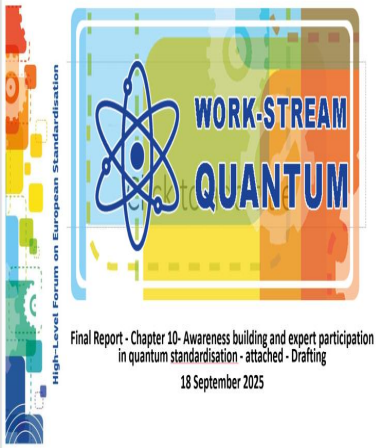
European Standardisation Landscape

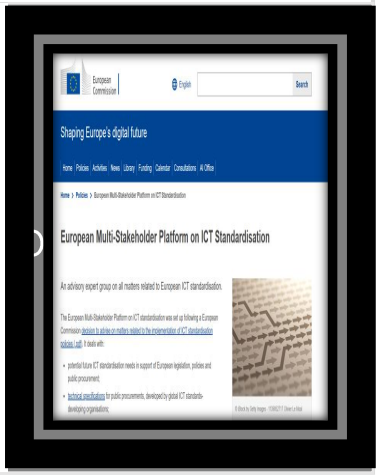
Strategic Goal

- European leadership through industrial standardization ETSI ISG QKD, Cen Cenelec JTC 22
- Aim: European-origin standards with global recognition (Europe in ISO/IEC JTC3)

Coordination efforts

- Coordination between European Commission, MSP, HLF, CEN-CENELEC, ETSI
- and QuIC: A central role of Industry in defining practical, interoperable frameworks





Standards Roadmap

- European Quantum Standards Roadmap (2026)
- Goal: A roadmap to support cross-platform interoperability and harmonised certification

https://digital-strategy.ec.europa.eu/en/library/quantum-europe-strategy

04. Challenges for the European Quantum Standards Roadmap 2026

Cross - Cutting

•**Standards Roadmap (2026)**: Industry should ensure early involvement, so the roadmap is not purely academic or policy-driven but to reflect industrial priorities (e.g., supply chain requirements, certification costs, interoperability with global markets)

•**Certification and Security Frameworks**: Harmonised schemes to affect product design, time-to-market, and cost. Need clarity on certification processes (who leads, timelines, fees).

•**Technical Interoperability**: Standards must avoid fragmentation and ensure cross-compatibility across vendors — **industry must push for pragmatic, implementable standards**.

•**Global Positioning**: EU industry **needs to** ensure global market relevance.

04. Challenges for the European Quantum Standards Roadmap 2026

Quantum Communication

•**Testbeds and Access Models**: Open-access facilities should work with private industry (IP protection, cost models, exclusivity issues).

•**QKD Certification**: Industry needs predictable and harmonised standards for QKD modules and systems (linked with ETSI and CEN-CENELEC work). A fragmented standards landscape will delay adoption — and therefore we should **ensure coordination and convergence** to accelerate market uptake.

•**EuroQCI Integration**: Opportunities for SMEs/start-ups to plug into EuroQCI deployments, not just large incumbents.

•**Timeline Pressure (2030 target):** Standards, supply chains, testing, and certification systems should be ready in time to support Quantum Communication by 2030

04. Challenges for the European Quantum Standards Roadmap 2026

Quantum Sensing

•**Roadmap (2026)**: Ensure industrial use cases drive the roadmap (aviation, navigation, energy, construction, defence). Avoid overly academic focus.

•**Gravimeter Deployment**: Industry involvement in pilot deployments — procurement opportunities, testing environments, and downstream markets.

•**Standardisation Support**: Define testing infrastructures for calibration, compliance, and integration with classical systems.

Quantum Computing and Simulation

•**Benchmarks and Metrics**: Industry needs standards for performance benchmarking that customers can trust — avoiding vendor "hype".

•**Certification of cloud-access quantum services**: EU certification schemes for quantum computing providers (reliability, data security, interoperability) will help.

04. Challenges for the European Quantum Standards Roadmap 2026

Industrialisation and Chips

•**Chips Roadmap (2026)**: Ensure alignment with semiconductor foundries and design libraries — industry must be consulted on feasibility, IP protection, and compatibility with existing fabs.

•**Interoperability Standards**: Avoid vendor lock-in; industry should push for modular standards (interfaces, packaging, error correction codes).

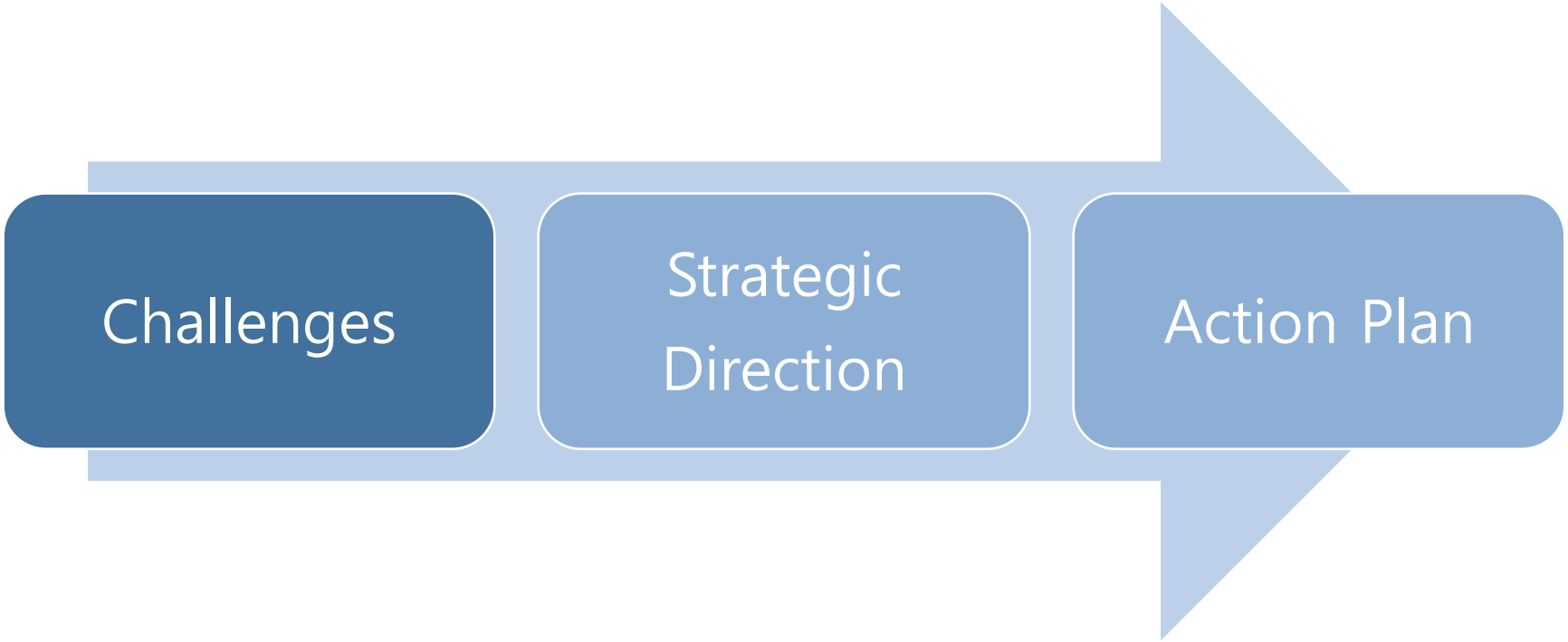
Space and Defence

•**Dual-use Tech**: Industry needs clarity on export control, security classification, and procurement processes for defence-related quantum technologies.

•**Standardisation in Space**: Interoperability for satellite-based quantum links — crucial for industry contracts and scaling.

05. From Challenges to Action: The European Quantum Standardisation Journey

A pathway from identifying barriers to defining strategic priorities and implementing coordinated European actions.



05. From Challenges to Action: The European Quantum Standardisation Journey

Key Challenges Facing the European Quantum Industry (2025–2026) - What is holding us back?

01

Fragmentation

- Lack of coordination among EU standardisation bodies slows alignment.
- Need for coordination across EU standardisation bodies

02

Certification Costs

- Complex and diverse certification schemes can hinder SME participation.
- Need to simplify and harmonise processes.

03

IP Protection

- Need for a European Quantum IP strategy to secure innovation.

04

Timeline Pressure

- Industry must be involved early to align roadmaps with technology cycles.

05. From Challenges to Action: The European Quantum Standardisation Journey

Industry's Direction for European Quantum Standardisation - Where do we want to go?

Industrial participation in standards

- Engage companies early to shape realistic frameworks.

Sustainable and secure supply chains

- Build resilience and sovereignty through harmonised standards.

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Interoperability first

- Reduce fragmentation by ensuring systems and platforms can work together

Global leadership through cooperation

- Strengthen collaboration with global partners for alignment.

Invest in people and skills

- Develop a skilled, mobile workforce through education and training.

05. From Challenges to Action: The European Quantum Standardisation Journey

From Vision to Implementation: Next Steps for European Quantum Standards - How do we get there?

step 01

Empower SMEs by Enabling Industrial Participation

- Secure strong role for SMEs and startups in shaping technical standards
- Incentivise SMEs to join standardisation efforts (European and international standardisation groups)

- Annual public investment needed to support standardization activities

- Include standardisation in public procurements and funding calls

step 02

Build the Workforce able to support Quantum Standards

- Strengthen skills and certification initiatives
- European Quantum Skills Academy: hands-on, industry-first training

- EU Fast-Track visa channels and relocation grants

- Multidisciplinary Master/PhD programs across Europe

step 03

Shape the 2026 Standards Roadmap

- Interoperability while maintaining sovereignty/ Certification / Global Alignment

- Standardisation as a tool for competitiveness and sovereignty

05. From Challenges to Action: The European Quantum Standardisation Journey

Standards for a Competitive and Sovereign Quantum Europe

European collaboration for a globally trusted quantum future.

🌍 Global Influence
Europe leads in defining international quantum standards and fostering interoperability.

🧠 Skilled Workforce
A highly trained and mobile talent base will drive innovation and industrial adoption.

🏛️ Sovereign Ecosystem
Resilient supply chains, secure IP frameworks, and harmonised infrastructures will ensure European autonomy.

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- Thank you -

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