10th Anniversary

GISC 2026

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[Session 2: Shaping the Global Quantum Ecosystem : Full-Stack Innovation and Standardization Strategy]

Trends in International Standardization of Quantum Sensors

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ICT Standards and Intellectual Property:
Shaping the Physical AI

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Abstract

Overview of the talk

IEC/ISO JTC 3 · Quantum Sensors

IEC/ISO JTC 3 (Quantum Technologies) was established in December 2023 to address international standardization of quantum technologies comprehensively.
This presentation reviews Korea (KR NC: KATS)'s contribution to the founding of JTC 3 and its current status as of October 2026, then presents standardization trends in WG 10 (Quantum Sensors), convened by Korea, and the strategy going forward.

01

JTC 3: Founding and Current Status

JTC 3 overview, Korea's contribution, membership, structure and projects

02

International Standardization of Quantum Sensors (WG 10)

Roadmap, founding of WG 10, five standardization items, expanded scope

03

Conclusion and Future Strategy

Achievements and challenges, cooperation for balanced standardization

01. IEC/ISO JTC 3 Overview

IEC and ISO established JTC 3 in December 2023 to cover quantum technologies comprehensively

IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ITU	International Telecommunication Union

Of the three formal international SDOs, IEC and ISO jointly formed the quantum committee (Secretariat: UK BSI)

IEC/ISO JTC 3

Quantum Technologies · Established December 2023

Quantum information
Quantum computing · simulation

Quantum metrology
Quantum metrology

Quantum sources · detectors
Quantum sources & detectors

Quantum communications
Quantum communications

Excluded: sector-specific applications and IT (JTC 1), nanotechnology (IEC TC 113, ISO TC 229), fibre optics (IEC TC 86), cryogenic vessels (ISO TC 220), semiconductors (IEC TC 47)

01. Korea (KR NC: KATS)'s Contribution to the Founding of JTC 3

Korea NC (KATS) led the way from the IEC white paper proposal to JTC 3, taking the first Chair

2020.06
Adopted as IEC MSB white paper topic

2020.12
Korean white paper Publication supported by KATS, KSA and MOTIE

2021.10
IEC MSB white paper published

2022.02
IEC SEG 14 Convenor

2023.11
Quantum Standardization Forum supported by KATS, MOTIE

2023.12
JTC 3 establishment

2024.05
1st JTC 3 plenary Seoul (May 28–30) supported by KATS, MOTIE

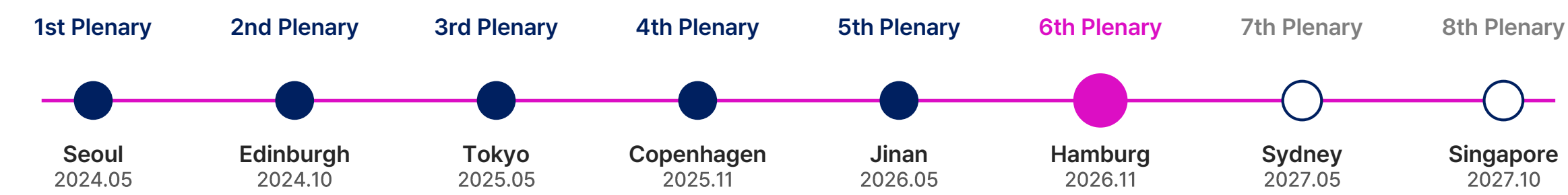
The Korea NC (KATS)-led IEC SEG 14 final report and the UK's JTC-Q proposal shaped the founding of JTC 3 → by agreement with the UK, Korea (KR NC) took the first Chair.

01. JTC 3 Current Status (as of October 2026)

34 P-members; Korea holds the Chair, the UK the Secretariat (source: JTC3/230/INF)

34	10	9	14
P-member countries	O-member countries	Subgroups (AG · WG · PT)	Projects in progress

Chair KR **Secretariat** UK



● Held ○ Upcoming ※ 5th plenary: 15 of 18 decisions actioned, 3 pending

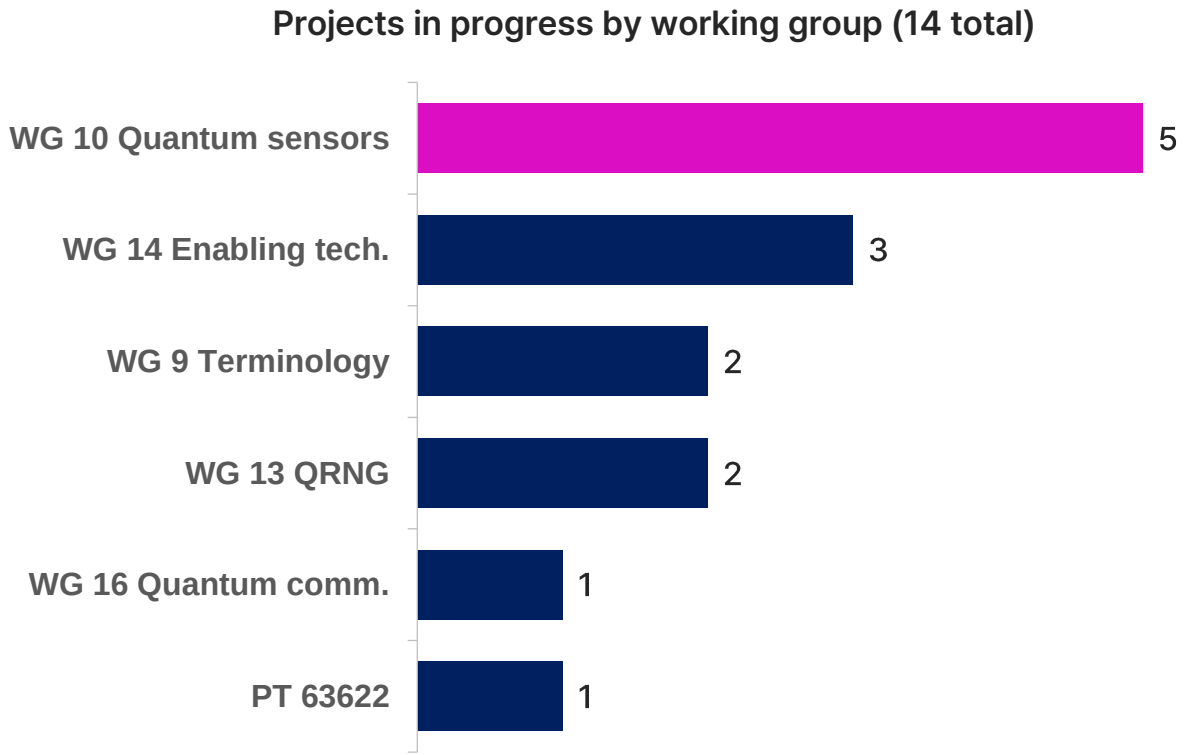
01. JTC 3 Structure

Group	Title
AG 1	Strategic planning
AG 8	Chair's Advisory Group
AG 17	Investigation & New Technology Studies (new)
WG 9	Terminology and quantities
WG 10	Quantum sensors
WG 13	Quantum random number generators
WG 14	Quantum enabling technology
WG 16	Quantum communication
PT 63622	Quantum photonics vocabulary

- Quantum computing WG 11, 12, 15 and PT 18157 moved to JSC 3A (now JSC 3A WG 1–3)

01. JTC 3 Projects

Of 14 main-committee projects, WG 10 (Quantum Sensors) has the most, with five



WG 10 progress

- Quantum sensor TR (formerly PWI TR JTC 3-2) registered as project IEC/ISO TR 63770-1 (2026-04)
- PWI JTC3-1, 3, 4 and IEC/ISO 63692 in progress

New projects since the 5th plenary (2026-06)

- WG 13: TR 63742 (entropy sources), TR 63744 (QRNG overview)
- WG 14: TR 63743 (single-photon detectors), PWI TR JTC 3-5
- WG 16: TR 63760 (transmission media)

※ Excludes quantum computing projects moved to JSC 3A (TR 18157, 63712, PWI TR JTC3-7) · No new publications since the 5th plenary

02. Quantum Technology Standardization Roadmap v2.0

11 target items across 4 priority areas (Nov 2022) — the basis for Korea's work in JTC 3

Quantum computing
3 items

- Estimation of quantum gate errors
- Estimation of quantum measurement errors
- Quantum measurement error mitigation

Quantum communications
3 items

- QKD transceiver for fiber communications
- QKD transceiver for free-space communications
- Trusted node interface for fiber communications

Quantum sensing
3 items

- Quality of diamond NV center materials for quantum magnetometers
- Quality of single-photon sources for quantum sensors
- Quality and reliability of quantum gravimeters

Quantum materials
2 items

- Single-photon source identification using quantum dots
- Low-Tc Josephson junction control

Source: Quantum Technology Standardization Roadmap v2.0 (MOTIE project and Quantum Technology Expert Committee, Nov 2022)

02. From Ad-hoc Group 3 to WG 10 (Quantum Sensors)

Korea convened AG 3 and then WG 10, leading international standardization of quantum sensors

2024.05	**1st plenary (Seoul)** DECISION 5/2024 — Korea appointed Convenor of AG 3 (Quantum Sensors: Sensing, Devices, and Imaging)
2025.05	**3rd plenary (Japan)** DECISION 3/2025 — WG 10 (Quantum Sensors) established; task: develop a TR on quantum sensors
2025.07	**IEC 63692 NP approved** WG 10's first IS project — cold-atom absolute quantum gravimeters
2025.10	**Korea becomes WG 10 Convenor** Appointed after candidacy and confirmation ballot
2026.05	**5th plenary (China)** DECISION 1/2026 — expanded WG 10 scope approved

Co-Project Leader model



Several countries' PLs share one project, minimizing opposition and moving standards forward efficiently.

※ Most early JTC 3 WGs were set up to produce a single TR — reflecting the early stage, an immature industry, and the UK Secretariat's apparent wish to delay SC creation.

02. Scope Overlap Between WG 10 and WG 14

Europe (WG 14) and Korea (WG 10) differ on quantum sensor scope — alignment needed

WG 14 (European) position
Quantum Enabling Technology · Convenor: Denmark

- WG 10 should cover only applications and systems, not quantum materials or individual components
- Korea's HBT interferometry item (single-photon source characterization) moved to WG 14 (now TS 63687)
- Single-photon detector standards also handled in WG 14

Korea (WG 10) position
Quantum Sensors · Convenor: Korea

- WG 14's view deliberately narrows the normal scope of sensor technology
- Korea has raised the WG 10 / WG 14 scope overlap as an issue
- Scope alignment in AG 1, AG 8 and a clearer definition of enabling technology' are needed

Background The UK and European countries are cooperating under the CEN/CENELEC European quantum technology roadmap

02. Key Positions in JTC 3

The UK and Europe hold the Secretariat and many WGs — a counter-balancing strategy is needed

UK · Europe

JTC 3 Secretariat
UK(BSI)

JSC 3A Quantum Computing Secretariat
France · first SC in JTC 3

WG 14 Enabling Tech. Convenor
Denmark

WG 16 Quantum Comm. Convenor
Spain

Korea

JTC 3 Chair
Korea

WG 10 Quantum Sensors Convenor
Korea

With Europe holding the Secretariat, JSC 3A, WG 14 and WG 16, balanced standardization calls for cooperation with China, Japan, the US and others

02. Quantum Sensor Standardization Items in WG 10

WG 10 has the most items in JTC 3 (five), with Korean experts as PL or Co-PLs on every item

Type	Reference	Standardization item	PL / Co-PLs
NP · IS	IEC/ISO 63692 ED1	**Performance evaluation and test methods for absolute quantum gravimeters based on free-falling cold atoms**	France, China, Korea, Germany
PWI · TR	PWI TR JTC 3-1	**Measurement methods for the characterization of NV-diamonds for magnetometers**	Japan, Canada, Korea
TR	IEC/ISO TR 63770-1 (formerly PWI TR JTC 3-2)	**Part 1: Overview, examples, and applications**	Korea, Canada, UK, France
PWI · IS	PWI JTC 3-3	**Technical requirements and performance evaluation for Quantum Spectroscopy with Undetected Photons (QSUP)**	Korea
PWI · IS	PWI JTC 3-4	**Method for verifying a quantum measurement – Quantum detector tomography**	Korea

02. Definition and Three Types of Quantum Sensors

"A sensor that uses a quantum phenomenon to effect measurement of a physical quantity"



Type I
Quantum object

A quantum object with quantized energy levels is used to measure a physical quantity

Electronic, magnetic or vibrational states of superconducting or spin qubits, neutral atoms, trapped ions



Type II
Quantum coherence

Quantum coherence (wave-like spatial or temporal superposition) is used to measure a physical quantity

Uses wave-like superposition states



Type III
Quantum entanglement

Entanglement improves sensitivity or precision beyond what is classically possible

Precision beyond the classical limit

Definition in IEC/ISO TR 63770-1 (in draft), citing C. L. Degen, F. Reinhard, P. Cappellaro, Quantum sensing, Rev. Mod. Phys. 89, 035002 (2017)

02. Expanded WG 10 Scope Approved (DECISION 1/2026)

WG 10's remit expanded from one TR to standards across the whole field of quantum sensors

Previous scope

"To develop a technical report on quantum sensors"

Develop one TR on quantum sensors

Expanded scope

Prepare and develop standards for quantum sensors on

- Terms and definitions
- Letter symbols
- Essential characteristics
- Preparation and detection
- Measuring methods

Opens the way to standards across the full range of quantum sensors. An Internal Report on the WG 10 standardization roadmap and strategy will be published with experts in Korea and abroad.

03. Conclusion and Future Strategy

Leverage Korea's lead in quantum sensors for balanced standardization and a new SC

Achievements

Korea contributed greatly from the white paper proposal (2020) to the founding of JTC 3 (2023). Convening WG 10 led to 5 items and an expanded scope.

Challenges

The UK and Europe hold much of JTC 3 — Secretariat, JSC 3A secretariat, WG 14 and WG 16 convenors — calling for a strategy to balance European and CEN/CENELEC influence.

Strategy

Work with China, Japan, the US and others toward balanced international standardization, and pursue an SC for quantum sensors.

03. References and Acknowledgements

Supported by MOTIE's standards technology and international standardization cooperation programs

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- Thank you -

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