글로벌 ICT 표준 컨퍼런스 2023

Global ICT Standards Conference 2023

(세션1) 미래 핵심기술 표준화를 위한 ISO/IEC 전략 · 대응

# ISO/IEC Quantum Technology new JTC 추진 현황

박성수 교수, 한림대학교

주최 과학기술정보통신부 Ministry of Science and ICT
특허청 Korean Intellectual Property Office
주관 국립전파연구원 National Radio Research Agency
TTA IITP KEA kista ETRI

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### 양자암호통신





양자암호테스트베드 및
ITU-T 양자암호 표준문서

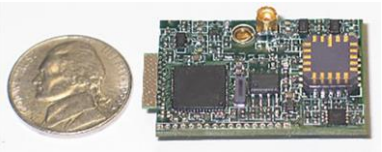
### 양자컴퓨터


Azure Quantum
Amazon Braket
Fujitsu Quantum
IBM Quantum Platform
D-Wave Leap
HUAWEI CLOUD
Quantum Inspire - By QuTech

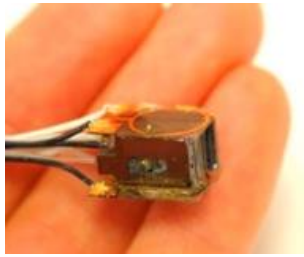
IonQ 32큐빗 이온트랩 양자컴퓨,
IBM 433큐빗 초전도 양자컴퓨터 및
양자컴퓨터 클라우드 서비스

### 양자센서

중력센서



칩 수준 원자시계



바이오용
양자자기장 센서

양자 라이다

# 01. 배경

## 양자기술 표준화를 위한 기술의 성숙도 및 표준화 추진 현황

## 양자기술 표준화 기구 현황

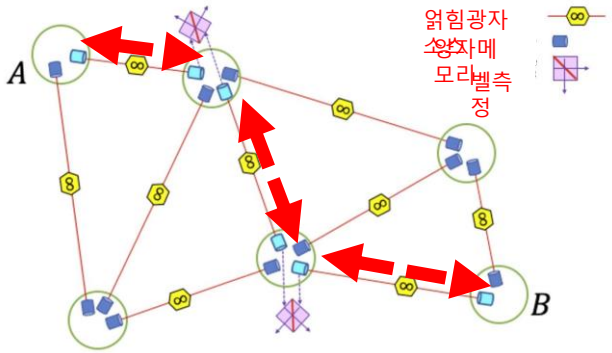
| SDO | full name | location | technologies concerned |
|---|---|---|---|
| ETSI | European Standards Organization | Paris | Quantum Communication |
| ITU | **International Telecommunication Union** | Geneve | Quantum Communication |
| IEC | The **International Electrotechnical Commission** | Geneve | TBD |
| ISO/IEC JTC1 | Joint Technical Committee 1 | Geneve | Quantum Computing |
| IEEE | Institute of Electrical and Electronics Engineers | NJ Piscataway | Quantum Communication / Computing |
| IETF | **Internet Engineering Task Force** | CA Fremont | Quantum Communication |
| TTA | Telecommunications Technology Association | Seong Nam, KOREA | Quantum Communication |
| QED-C | Quantum Economic Development Consortium | VA Arlington | Quantum Computing/ Communication/ Sensor |
| CEN-CENELEC | Comité Européen de Normalisation Europäisches Komitee für Normung | Brussel | Quantum Computing/ Communication/ Sensor |

# 01. 배경

## 양자기술 발전 방향

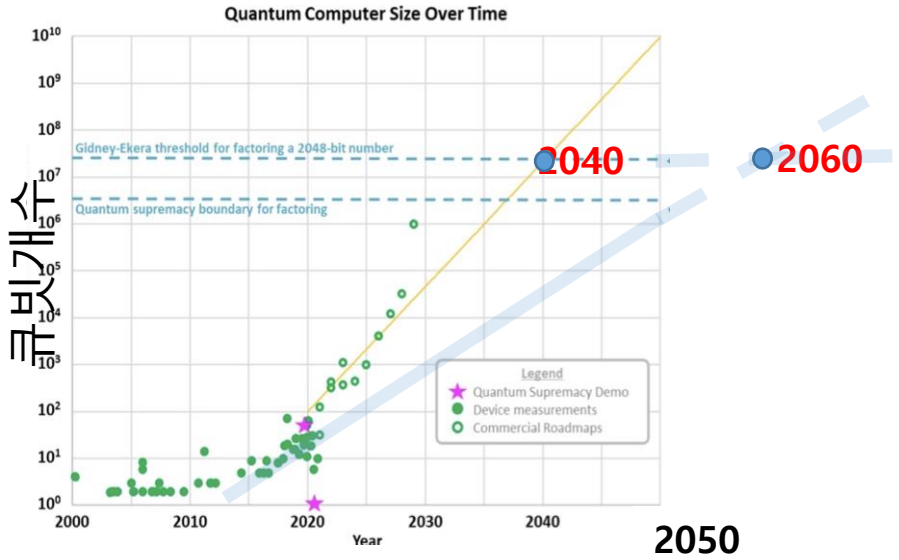
## 양자기술 궁극적 목표

### 양자인터넷



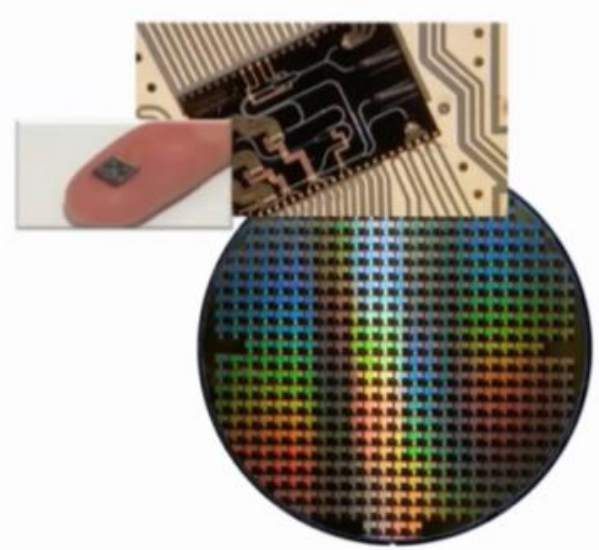

양자얽힘네트워크를 통한 분산양자컴퓨팅 및 지구크기의 양자센서

### 양자컴퓨터에 의한 암호해독 등




RSA 2048 암호해독 및 양자머신러닝

### 양자센서

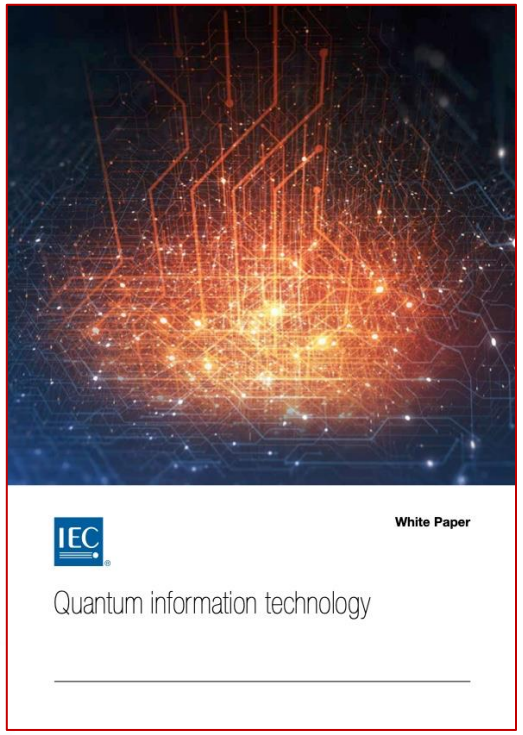


초소형화 양자센서 등

# 01. 배경

## IEC 양자기술 백서 발간 (2021.10.26.)

## IEC MSB/SWG10 White Paper on Quantum Information Technology




https://www.iec.ch/blog/iec-white-paper-quantum-information-technologies

**Acknowledgments**

This white paper has been prepared by the Quantum Information Technology project team of the IEC Market Strategy Board (MSB), with major contributions from the project partner, Korea Institute of Machinery and Materials (KIMM), Daejeon, Korea, and project leaders Dr Seong Su Park, Electronics and Telecommunications Research Institute and Dr Taik-Min Lee, Korea Institute of Machinery and Materials.

The project team was directed by Dr Dongsub Kim, Mokpo National University, Korea and an MSB member.

The project team is listed below:

Dr Seong Su Park, Electronics and Telecommunications Research Institute, Korea

Dr Taik-Min Lee, Korea Institute of Machinery and Materials

Dr Clare Allocca, National Institute of Standards and Technology, US

Dr Joonwoo Bae, Korea Advanced Institute of Science and Technology

Mr Timothy Burt, L3Harris

Dr Olaf Cames, Action-Science

Mr Takeshi Chikazawa, Mitsubishi Electric Corporation

Mr Dapeng Liu, Allibaba

Mr Daniele Dori, Tratos UK, Ltd

Mr Brian Fitzgerald, US FDA

Dr Terrill Frantz, Harrisburg University, US

Dr Barbara Goldstein, National Institute of Standards and Technology, US

Mr Yun Chao Hu, Huawei

Dr Taeho Hwang, Korea Electronics Technology Institute

Dr Munseok Jeong, Hanyang University, Korea

Dr Sohee Jeong, Sungkyunkwan University, Korea

Dr Jung Jin Ju, Electronics and Telecommunications Research Institute, Korea

Mr Nam-Joon Jung, Korea Electric Power Corporation

Mr Hyungsoo Kim, Korea Telecom

Mr Jangmyun Kim, SK

Mr Je-Hyung Kim, Ulsan National Institute of Science and Technology, Korea

Mr Seunghwan Kwak, ID Quantique

Mr Hyeokshin Kwon, Samsung

Mr Chae Lee, LX Semicon

Dr Haesong Lee, Jeonju University, Korea

Mr Gen Lei, China Electronics Standardization Institute

Mr Mengliang Li, China Electronics Standardization Institute

Mr Xiongfeng Ma, Tsinghua University, China

Mr Saejun Oh, Korea Electric Power Corporation

Mr Hee Su Park, Korea Research Institute of Standards and Science

Dr Joon-Shik Park, Korea Electronics Technology Institute

Ms Kristen Pudenz, Lockheed Martin

Mr Hai Shu, Haier Group and MSB member

Dr Jindong Song, Korea Institute of Science and Technology

Dr Edgar Sotter, CSA Group Canada

Mr Dragi Trifunovich, Mitsubishi Electric Corporation

Mr Andy Di Wang, Huawei

Dr Junchao Wang, Chinese Academy of Sciences Key Laboratory of Quantum Information

Ms Hong Yang, China Electronics Standardization Institute

Dr Chun Ju Youn, Electronics and Telecommunications Research Institute, Korea

Mr Wangtan Yuan, Haier Group

Dr Man Hong Yung, Huawei

Mr Yajun Zhang, Tencent Technology

Dr Yu Zhang, University of Science and Technology of China

Dr Li Zhengyu, Huawei

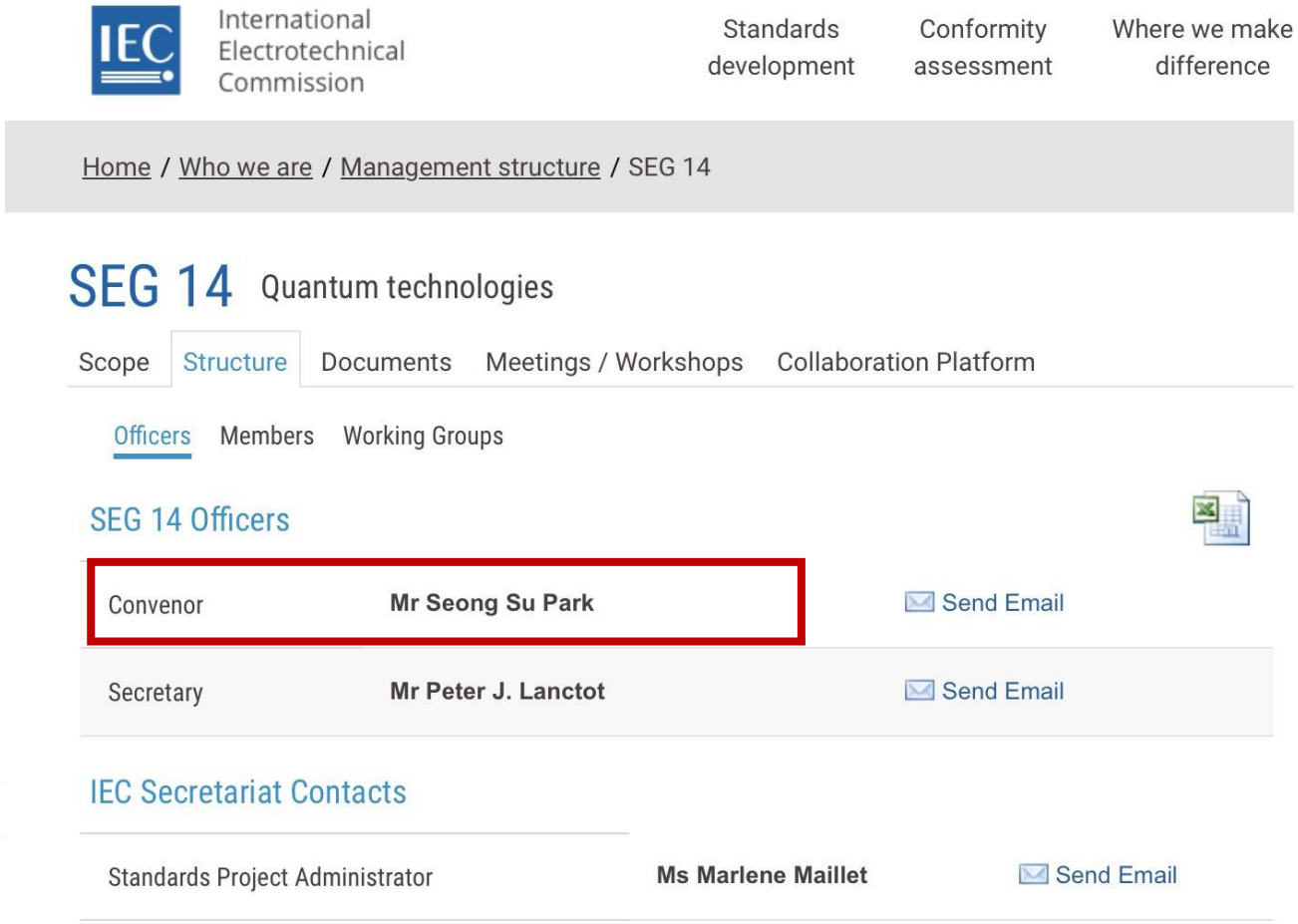
Mr Xiaobo Zhu, University of Science and Technology of China & Jinan Institute of Quantum Technology

Mr Peter J Lanctot, IEC, Project Coordinator

Recommandations
- TC 설립

# 02. 추진 현황

## IEC SEG 14 출범 (2022.10.31.)




- lead by Korea
- over 110 experts involved
- considering technology, market, other SDO, developing standardization roadmap for IEC and ISO

# 02. 추진 현황

## IEC Standardization Evaluation Group (SEG)

An open, potentially large group drawn from within and beyond the IEC community, used in the first stage of systems development. Its role is to engage the community of experts, identify the relevant stakeholders, define the general architecture and boundaries of the subject to be addressed and propose a possible programme of work and a relevant roadmap for the implementation of the standardization activities.

Standardization Evaluation Groups are established and dissolved by the Standardization Management Board. They have a limited life, normally of 18 to 24 months and shall not have on-going tasks. They are not entitled to develop standards or other IEC deliverables.

No NC Delegations → SEG = Community of experts

# 02. 추진 현황

## IEC SEG 14 Working Group Structure

| Working Group | Redefined Scope | Co-Convenors |
|---|---|---|
| WG 1 Market and Use Cases | To define the market landscape for Quantum Technology and to summarize knowledge of trends. To also identify relevant Use Cases for the application of Quantum Technologies.<br>• Significant exchange/collaboration with WG 2 is encouraged<br>• Describe science and technology investments | Member from QED-C (USA)<br>Joon Woo Bae (KAIST, Korea) |
| WG 2 Research | Review global R&D activities for Quantum Technology | Barbara Goldstein (NIST, USA)<br>Kazutomo Hasegawa(Fujitsu, Japan) |
| WG 3 Review of Standardization Activities | Aggregation of current standards activities for Quantum Technology. | Clare Allocca (NIST, USA)<br>Taikmin Lee (KIMM, Korea)<br>Hong Yang (CESI, China) |
| WG 4 Standardization Roadmap | Propose a roadmap for standardization in the area of quantum technologies. Incorporate standardization readiness levels.<br>• Aggregate input from WGs 1, 2 and 3 into the roadmap<br>• Propose technology possible standardization activities to CAG | Clare Allocca (NIST, USA)<br>John Devaney (NPL, UK)<br>Haeseong Lee (Jeonju Univ, Korea) |
| AG 5 Convenor's Advisory Group | • Coordination of SEG 14 activities<br>• Synthesis of recommendations to SMB<br>• 'Horizontal'/cross domains issues and technologies<br>• Edition of reports to SMB | Seong Su Park<br>Peter Lanctot<br>WG Co Convenors |

# 02. 추진 현황

## IEC SEG 14 Plenary Meeting History and major activities

- 1st SEG14 in-person meeting at SF on 2022-10-31 – 2022-11-1.
  - Established WG structure, redefined WG scope and volunteered WG coconveners (experts from Korea, US, UK, Japan)
  - Agreed about timeline for 1st draft report before 87th IEC GM 2023-10-22 – 26.
- 2nd SEG14 online meeting on 2022-12-24.
  - Review and adjust WG co-conveners – China added
  - Timeline for each WG for 1st deliveries
- 3rd SEG14 online workshop on quantum technologies on 2023-1-12.
  - Review on categorization and other considerations of taxanomies, designations, classifications
- 4th SEG14 in-person meeting at Jeju on 2023-2-13 – 14.
  - Review of the WG progresses and remind of the time line for 1st draft.
  - Discussion about the Standardization activities change such as ISO/IEC new JTC, JTC1, ITU-T JCA-QKDN, etc.
- Final report to SMB on 2023-5-5 and JTC-Q approved by SMB on 2023-6-6
- 5th SEG14 on/off-line meeting at Teddington on 2023-6-22-23.
  - Announcement of JTC-Q approval from SMB and review on the WG processes.
  - Discussion about QIT, QT and Scope for the new JTC-Q
- IEC NC, ISO NB ballots also approved new JTC-Q based on UK's proposal.
- Ballot is now proceeding for the allocation of secretariate for the new JTC (UK or China)
- TMB/SMB joint meeting is scheduled on 2023-11-20

# 02. 추진 현황

## Issue point 1 - Allocating the secretariate of new JTC between UK and China.

- Ballot by SMB/TMB is proceeded before November 20 to determine the secretariate.
  - UK and Korea collaborate the ballot with Korea's support.

  - As the initiator and proposer of the new Joint Technical Committee on Quantum Technologies, BSI – the UK's NSB and National Committee – is seeking your **support to hold the Secretariat, alongside the Republic of Korea who will take the Chair position**. This collaboration **between the UK and the Republic of Korea** at the leadership level will bring regionally diverse, innovative thinking and strong management to the committee, demonstrating the truly global nature of ISO and IEC work.

# 02. 추진 현황

## Issue point 2 – Scope of the new JTC (2023-10-10)

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### Scope (For JTC to Review)

**Scope**: Standardization in the field of quantum technologies.

The scope includes standardization in the field of quantum technologies, including quantum computing, quantum metrology, quantum sources, quantum detectors, quantum simulation, and fundamental quantum technologies. The JTC will coordinate with relevant committees and subcommittees accordingly on any specific sector-based applications.

**Excluded:** Standardization in the field of nanotechnology (IEC TC 113 and ISO TC 229), cloud computing and distributed platforms (JTC 1 SC 38), fibre optics (IEC TC 86), cryogenic vessels (ISO TC 220), semiconductors (IEC TC 47), telecommunications and information exchange between systems (IEC JTC 1 SC 6) information security, cybersecurity, and privacy protection (JTC 1 SC 27), and cards and security devices for personal identification (JTC 1 SC 17).

**Liaisons:** JTC 1 SC 27, JTC 1 SC 6, JTC 1 SC 42, IEC TC 46, IEC TC 47, IEC TC 86, IEC TC 90, IEC TC 113, ISO TC 172, ISO TC 201, ISO TC 206, ISO TC 220, ISO TC 229, ITU-T, ETSI, CEN & CENELEC JTC 22

bsi.

# 03. 향후방향

## IEC SEG 14 와 new JTC ← SMB Decision 177/9 (2023-6-12)

**A.** SMB thanked Peter Lanctot for presenting the work done by SEG 14 and congratulated SEG 14 for providing its final recommendations before the deadline set up in SMB Decision 176/7.

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SMB also approved that SEG 14 deliver its final standardization roadmap by SMB meeting 178 in October 2023

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**B.** Referring to SMB Decision 176/7, SMB further noted that the UK NC had revised its initial proposal for a JTC o n Quantum technologies to align it with the final recommendations of SEG 14.

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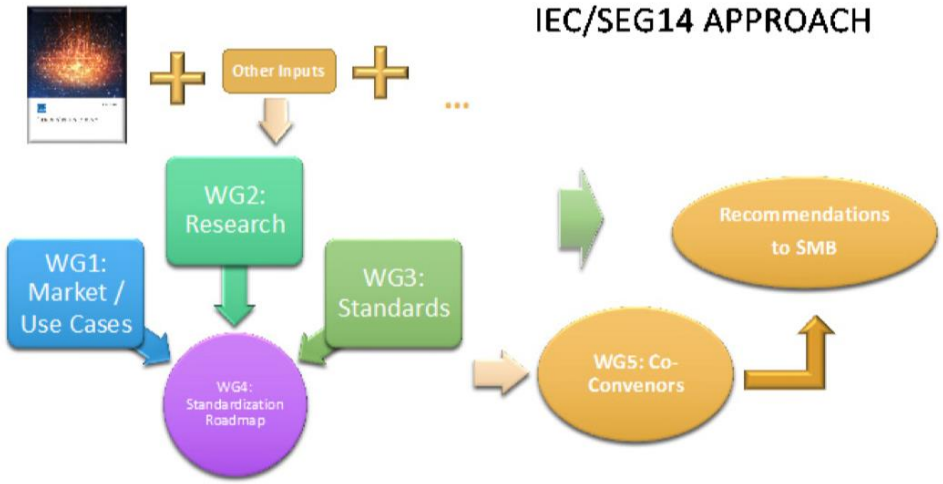
SMB thanked SEG 14 for its work and agreed for it to be disbanded once the JTC holds its first meeting.

# 03. 향후방향

## IEC SEG 14 preliminary standardization roadmap




Standardization Roadmap Methodology

| IEC/SEG14 Working Group | Contributions to Roadmap |
|---|---|
| IEC/SEG14/WG1 *Market and use cases* | • Windows of opportunity / timing<br>• Needs (both business and technical)<br>• Product differentiation: indicators<br>• Use cases |
| IEC/SEG14/WG2 *Research* | • TRL<br>• Metrology |
| | • Dependencies<br>• Competing technologies<br>• Systematic and infrastructural<br>• Measures of success / "performance" |
| IEC/SEG14/WG3 *Standardization landscape* | • Inventory (mapped to categorization)<br>  • Materials, application, sub-categories<br>• Scopes of SDO committees, WGs, etc<br>• Potential liaisons / joint efforts / awareness |
| IEC/SEG14/WG4 Standardization roadmap | • Aggregate WG1, WG2, WG3 inputs<br>• Derive methodology<br>• Evaluate methodology with test cases<br>• Implement methodology for quantum technology<br>• Identify interdependencies among data |
| IEC/SEG14/WG5 Convenors Advisory Group | • Derive overall message and recommendations based on input of WGs |

**Table 1. WG Contributions to Standardization Roadmap**


# 감사합니다.

박성수 교수, 한림대학교
parkss@hallym.ac.kr