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ROK-UK Partnership on Building Capacity in Digital and Critical Technologies Standards

United Kingdom

2024/25 KSP POLICY BRIEF

Presented by the MOEF, Republic of Korea

Ministry of Economy and Finance

KDI Korea Development Institute

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Preface

In recent years, the global community has faced an increasingly complex set of challenges, including geopolitical tensions, disruptions in global supply chains, and the accelerating impacts of climate change. These trends have placed significant pressure on the international development landscape, with a noticeable decline in overall development finance. At the same time, development cooperation is evolving toward a more reciprocal and strategic approach that emphasizes mutual learning and shared benefits. Despite these challenges, collaboration remains essential for achieving lasting progress. Sustainable development requires countries to work together toward shared goals and to build partnerships that foster shared prosperity. By drawing on the diverse knowledge, policy experiences, and innovations that each country offers, the global community can find practical solutions to today's challenges and create pathways toward inclusive and sustainable growth.

The Knowledge Sharing Program (KSP), launched by Korea's Ministry of Economy and Finance (MOEF) in 2004, has served as a vital platform for sharing Korea's development experiences globally over the past 20 years. In addition to embedding joint research outcomes into the policies of partner countries, the KSP has advanced various international projects and highlighted the value of knowledge sharing in tackling global challenges together. In recent years, the program has also broadened its horizons through collaboration with advanced economies, further expanding the scope and diversity of its partnerships.

Since its inception, the Korea Development Institute (KDI) has participated in implementing the KSP, collaborating with more than one hundred countries. As Korea's leading think tank, the KDI has addressed a broad spectrum of issues faced by partner countries, from industrial development to digital transformation. During the 2024/25 KSP cycle, the KDI has undertaken twenty-three policy consultation projects that reflect the needs of partner countries.

Among the notable projects, 'ROK-UK Partnership on Building Capacity in Digital and Critical Technologies Standards' led by the Department for Science, Innovation and Technology exemplifies the spirit of international cooperation. On behalf of KDI, I would like to extend sincere appreciation to the Government of the United Kingdom, especially the Delegation of the UK to the 2024/25 Knowledge Sharing Program, for their continued leadership and insight. I also wish to thank the KSP consultation team—

Senior Advisor Dr. Young-hwan Cha, Principal Investigator Prof. Heejin Lee, researchers Prof Hanah Zoo, Prof. Jooyoung Kwak, Prof. Seokjoon Kwon, Dr. Florian Ostmann, Mr. Christopher Thomas, Dr. John Devaney, Dr. Tim Prior, Dr. Fernando Araujo de Castro, and Dr. Charles Clifford for their dedicated and constructive contributions throughout the project. Special thanks also go to the Center for International Development (CID) at KDI, particularly Executive Director Dr. Jungwook Kim, Project Manager Dr. Kyoungdoug Kwon, and Project Officer Ms. Jieun Song for their diligent and consistent coordination throughout the project.

This Policy Brief presents key findings and practical policy options developed through the 2024/25 KSP consultation process. It is designed to meet the needs of both decision-makers and implementers by providing clear, context-aware insights drawn from collaborative research. We hope it serves not only as a reference, but as a catalyst for informed policy action in our partner countries.

This year's KSP laid a solid foundation for future-oriented cooperation between the United Kingdom and Korea—promoting practical policy exchange, strengthening mutual trust, and advancing our shared commitment to sustainable development. We are confident that this partnership will continue to deepen and contribute meaningfully to the long-term partnership between the two countries.

Cho, Dongchul
President
Korea Development Institute

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Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
AI RMF	U.S. AI Risk Management Framework
AISI	AI Safety Institute
BSI	British Standards Institution
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
DSIT	Department for Science, Innovation and Technology of the UK
ETR	Electronics and Telecommunication Research Institute of the ROK
EUC	Equipment Under Control
ICT	Information and Communication Technology
ISO DEVCO	ISO Committee on Developing Country Matters
ISO/IEC JTC1 SC42	International Organisation for Standardisation/International Electrotechnical Commission Joint Technical Committee 1, Subcommittee 42 on Artificial Intelligence
ITU-T	International Telecommunication Union – Telecommunication Standardisation Sector
GDPR	General Data Protection Regulation
GPAI	Global Partnership on Artificial Intelligence
JCL-ML	Joint Coordination Activity on Machine Learning of ITU-T
JWG	Joint Working Group
KATS	Korea Agency for Technology and Standards
KTL	Korea Testing Laboratory
MOTIE	Ministry of Trade, Industry, and Energy of the ROK
MSIT	Ministry of Science and ICT of ROK
NIST	National Institute of Standards and Technology
NLF	New Legislative Framework
NSB	National Standardisation Body
Ofcom	UK Office for Communications
SDO	Standards Development Organisation
SMEs	Small and Medium-sized Enterprises
TTA	Telecommunication Technology Association of ROK
UK AISI	UK AI Security Institute

Summary

As global competition over digital and Critical and Emerging Technologies (CETs) intensifies, standardisation has become a central pillar of this rivalry. The Republic of Korea (ROK) and the United Kingdom (UK) view standardisation not only as a means of promoting innovation and market expansion, but also as a key component of their national strategies for both security and technology. Building on bilateral frameworks such as the Downing Street Accord and the Digital Partnership, this project aims to identify shared interests, increase coordination in international Standards Development Organisations (SDOs), and build sustainable mechanisms for collaboration at the technical and policy levels. The project focuses on three technologies: Artificial Intelligence (AI), Quantum, and Semiconductors. These areas are selected based on their strategic importance and potential for joint leadership in standardisation efforts.

Through an examination of policies and strategies for each technology, as well as interviews and workshops, opportunities for future collaboration are identified.

- In AI, stakeholders from the two countries have already collaborated through initiatives such as the AI Safety Summits. This cooperation can continue through a range of joint initiatives. They include joint work on standards for traceability, safety evaluation, sustainability, and open foundation models within SDOs. Further collaboration can also be made with the wider AI standards and governance ecosystem. The ROK and the UK could jointly investigate the relationship between standards and regulation and explore how standards-based certification systems might support international regulatory interoperability. This includes knowledge-sharing between regulators and experts, as well as capacity-building programmes.
- In quantum technologies, the two countries show a strong example of effective collaboration through ISO/IEC JTC 3. Bilateral collaboration could be expanded through R&D centres, shared testbeds, workforce exchange programmes, joint funding schemes and commercialisation initiatives. These initiatives are grounded in, and will further facilitate, collaboration on standardisation in various international forums related to quantum communication, quantum computing, quantum sensing, and quantum materials.
- In semiconductors, the 2023 ROK-UK Framework for Semiconductor Cooperation facilitates collaboration in R&D, workforce development, trade and investment, and supply chain resilience. Key areas for future collaboration could include standards for low-dimensional materials, compound semiconductors, chiplets, and 3D semiconductor

integration, AI-specific semiconductors, reliability testing, and materials for packaging and thermal management. Pre-standardisation research is emphasised, as it can play a critical role in supporting innovation. The ROK and the UK have a successful case of joint pre-standardisation research, of which replication could be explored.

Based on the review of the three domains, a set of cross-cutting recommendations is proposed.

- **Strengthen coordination on digital standards using the ROK–UK Digital Partnership.** It is agreed that two meetings be held during the annual Digital Partnership Forum: one at the policy level, and another focused on practical collaboration on R&D and standardisation.
- **Identify SDOs where the ROK and the UK can enhance collaboration**, either through informal partnerships or through shared governance structures.
- **Develop a joint approach to standardising CET**s where technological crossovers occur--such as AI- and quantum-enabled semiconductors.
- **Collaborate on how to engage industry and how to upskill a digital technical standards workforce.**
- **Explore funding opportunities** to support bilateral and global collaboration across the full life cycle of standardisation from pre-standardisation to commercialisation.
- **Enhance stakeholder engagement beyond DSIT (UK) and MSIT or MOTIE (ROK).** To strengthen people-to-people links, expert and researcher exchange programmes should be developed.

The ROK and the UK are well-positioned to take a leading role in international standardisation of CETs. Their respective strengths, when combined, provide a strong foundation for joint leadership. Through strategic alignment and deeper engagement at all levels—government, industry, research, and academia—the two countries can help shape a more inclusive and effective global standards ecosystem. They can also extend collaboration beyond the bilateral relationship to include partners from the Global South and other key actors in international standardisation.

1. Introduction

Standards for critical and emerging technologies (CETs), namely digital technical standards[1], play a crucial role in shaping how these technologies deliver solutions across sectors and geographical boundaries. They are fundamental in supporting innovation, interoperability, trade, market confidence, and security. This project was initiated to explore how stakeholders from the Republic of Korea (ROK) and the United Kingdom (UK) can cooperate to remain key players and further strengthen their presence in this increasingly important field.

1.1. Background

Global competition in CET is intensifying. Within this competitive landscape, standardisation has become a key mechanism for gaining market dominance and is playing an increasingly important role. Recognising the significance of CET standardisation, both the ROK and the UK emphasise it in their national strategies.

The ROK's 'National Security Strategy', announced in June 2023, includes a commitment to 'driving the formation of international rules and standards for critical and emerging technologies. In the UK, a report by Chatham House (Bergsen et al., 2022), the Royal Institute of International Affairs, emphasises the importance of strategic cooperation in the development of standards for digital and emerging technologies.

Bilateral agreements between the ROK and the UK include provisions on standardisation cooperation. In 'The Downing Street Accord: A ROK-UK Global Strategic Partnership' signed in November 2023, the two countries agreed to cooperate in order to "shape the future frontiers of the world's economy across global principles, standards and regulations" (emphasis by the authors). The ROK-UK Digital Partnership includes a dedicated section on 'Digital Technical Standards', which emphasises cooperation in standardisation.

This Knowledge Sharing Program (KSP) project aligns well with both countries' approaches and reflects the spirit of the two agreements. It has been designed as

1 There is no established definition of critical and emerging technologies (CETs) yet. We use the term as described in the 'US Government National Standards Strategy for Critical and Emerging Technology' (White House, 2023). They are advanced technologies that are significant for national competitiveness and security. Most of them are founded on, and applications of, digital technologies. Throughout the report, when the terms such as 'digital technologies' and 'digital technical standards' are used, they include and imply CETs.

a starting point to implement the commitments made under the 'Downing Street Accord' and the 'Digital Partnership', specifically, collaboration on the international standardisation of CETs.

1.2. Objectives of the Project

Standards now have a strategic and geopolitical value in national and international policies and play a key role in the governance and development of CETs. Recognising this, the ROK and the UK agreed to collaborate in this increasingly important area of digital and CET standardisation. The aims of this project are to:

- Identify specific technologies and policy issues in which the ROK and the UK can advance shared interests through cooperation, partnerships, and joint activities.
- Determine relevant global standards development organisations (SDOs) where the ROK and the UK have overlapping interests in specific CETs, and explore opportunities for coordinating engagement to demonstrate joint leadership in international standards.
- Develop options for sustainable collaboration on digital standards at both technical and policy levels, through domestic networks, including national institutions, academia, industry bodies, and relevant government departments.

Based on the review of the key national and international strategies for digital and CETs and their standardisation, three technologies have been selected: artificial intelligence (AI), quantum technologies, and semiconductors. The selection reflects their strategic importance and potential for joint leadership in standardisation efforts.

1.3. Structure of the Report

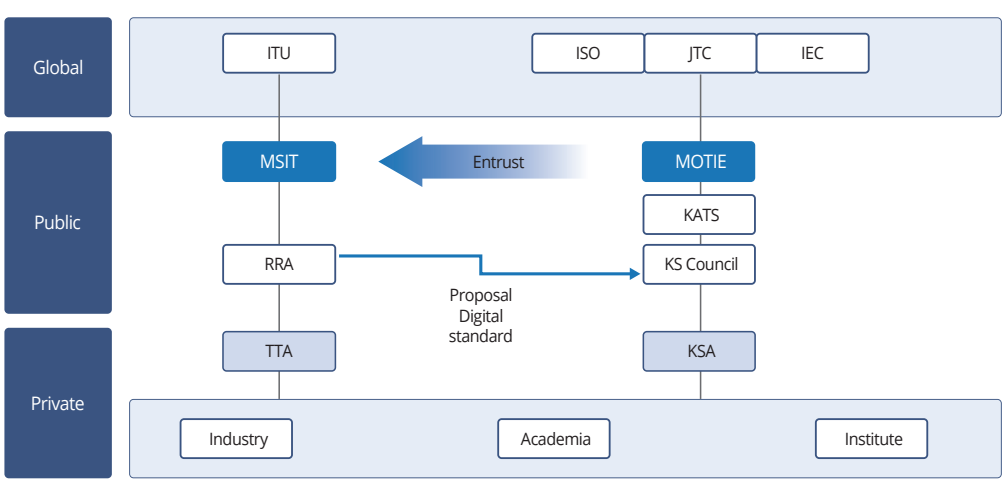
This policy brief is organised into five sections. Section 2 outlines the strategic approaches adopted by the ROK and the UK, including the distribution of responsibilities across core institutions in each country. The following three sections examine the three technology domains: AI, quantum technologies, and semiconductors. Each section highlights relevant national policies, strategies, ongoing initiatives for standards development, and opportunities for bilateral collaboration. The final section concludes with a set of cross-cutting recommendations for future cooperation.

2. Engagement with CET Standards in the ROK and the UK

2.1. The ROK

The Ministry of Industry, Trade and Energy (MOTIE), together with its specialised agency, the Korean Agency for Technology and Standards (KATS), serves as the central body in the national standardisation system. Since 2014, MOTIE has delegated part of its standardisation authority to other ministries, each responsible for specific domains. For Information and Communications Technology (ICT), which is closely related to digital and CETs, the Ministry of Science and ICT (MSIT) represents ROK in the International Telecommunication Union (ITU), while MOTIE leads on engagement with the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the ISO-IEC Joint Technical Committees (JTC).

Figure 1.
Governance Structure of Standardisation in Korea



Source: Created by author based on the MSIT presentation at the KDI workshop in November 2024.

In May 2024, KATS announced the 'Korean Government National Standardisation Strategy for High Tech Industry' to guide CET standardisation efforts. This strategy is regarded as a response to the elevation of CET standards to a strategic and geopolitical priority amid the global technology competition. It outlines twelve High-Tech Industry Priorities (see Table 1) and is guided by three key principles: expedited standardisation (timeliness), industry-driven leadership, and sustainability of standardisation initiatives.

The 'ICT Standardisation Strategy Ver. 2025', developed by the Telecommunications Technology Association (TTA) in close collaboration with MSIT, identifies twelve technologies. They are divided into two categories: 'digital innovative technologies' and 'digital foundational technologies. The former is translated into an 'ICT Standardisation Roadmap', which adopts a forward-looking approach by linking standardisation and R&D in a four-year cycle. The latter is presented as an 'ICT Standardisation Strategy Map', which outlines annual directions for domestic and international standardisation efforts.

Table 1.
Twelve Technologies Included in the Two Strategies

Korean Government National Standardisation Strategy for High Tech Industry	ICT Standardisation Strategy Ver.2025
Semiconductors, Electronic Displays, Secondary Batteries, AI, Future Cars, Future Ships, Robots, Smart Manufacturing, Quantum Technology, Core Materials, Next Generation Nuclear and Clean Energy	Digital innovative technologies: AI, Data, Mobile communications, Next-generation security, Digital contents and Quantum communications Digital foundational technologies: Intelligent network, Satellite communication/Electromagnetic waves, Internet of things, Cloud computing, Broadcasting/media and Blockchain

Source: Author.

2.2. The UK

Responsibility for general product standards in the UK lies with the Office for Product Safety and Standards (OPSS). The primary purpose of OPSS is to protect people and places from product-related harm, ensuring consumers and businesses can buy and sell products with confidence. OPSS is within the Department for Business and Trade (DBT) portfolio. DBT, as the sponsoring department for standards, is responsible for cross-cutting standards policy and leads the Government's relationship with the British Standards Institution (BSI), the UK's National Standards Body (NSB).

Policy and strategic oversight of digital technical standards rests with the Department for Science, Innovation and Technology (DSIT). This includes coordinating cross-government initiatives and fostering partnerships with domestic and international stakeholders. The UK Government's engagement in digital technical standards is underpinned by three strategic drivers:

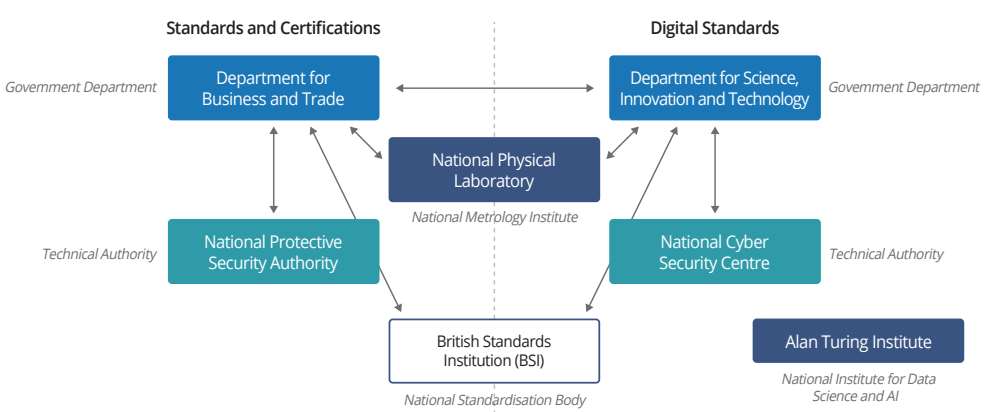
1. **Ensuring the health of the global digital standards development ecosystem.**
2. **Ensuring UK industries and academia play a leading role in standardisation for critical and emerging technologies.**
3. **Coordinating a whole-of-nation approach to standardisation.**

DSIT is currently developing a cross-government digital technical standards strategy, which will outline the UK government's approach and ambitions in this area. The strategy is expected to focus on building talent and capability, strengthening international cooperation and partnerships, and increasing active UK participation in SDOs through an industry driven, multistakeholder approach.

BSI leads the coordination of UK experts' input into the European and international standards committees of European Committee for Standardization (CEN) and European Committee for Electrotechnical Standardization (CENELEC), as well as ISO and IEC. BSI was also chosen in January 2024 to serve as the secretariat of the first international quantum technology committee within the IEC and ISO frameworks, focusing on developing new best practice standards across quantum information technology, quantum communications, quantum metrology, quantum sources, detectors, and imaging.

Collaboration between DSIT, DBT and other key stakeholders, including the National Physical Laboratory (NPL, the UK's national metrology institute), Alan Turing Institute (ATI, the UK's national institute for data science and artificial intelligence), and the UK's technical authorities for physical and cybersecurity, ensures a coordinated national approach to standardisation, as shown in Figure 2.

Figure 2.
Governance Structure of Standardisation in the UK



Source: UK Department for Science, Innovation and Technology (2025).

3. Strategic Cooperation in Artificial Intelligence

The ROK and the UK occupy a unique position as major adopters of foundation models, whose governance is the central focus of this section. Both countries have demonstrated a strong commitment to international AI safety and standardisation. This section outlines the global background, domestic policies, and standardisation frameworks of both countries, evaluates their engagement in international AI governance, and proposes areas for joint action in developing standards and governance frameworks for foundation models.

3.1. International Background for ROK-UK Collaboration

The rise of foundation models has created both opportunities and significant governance challenges that cross borders. These AI models raise issues related to misuse, environmental impact, and transparency, often beyond the scope of national regulation. Fragmented definitions and inconsistent oversight frameworks hinder effective global risk management. Standardisation can address these gaps by enabling shared technical criteria and promoting coordinated approaches to foundation model governance across jurisdictions.

ISO/IEC JTC 1/SC 42 has led global AI standardisation, offering groundwork in areas such as trustworthiness and risk management. However, its current scope was established prior to the emergence of foundation models. Meanwhile, as part of recent international efforts, AI Safety Institutes (AISIs) have focused on upstream risks posed by advanced models—such as loss of control, manipulation, and misuse—treating safety as an overarching concern. Aligning these perspectives requires bridging the conceptual gap between SDOs and the AI safety community to ensure coherence in future standardisation efforts.

Standards play a vital role in global AI governance by offering infrastructure for shared norms and implementation pathways. They can translate emerging safety practices into formal governance mechanisms. However, the rapid technological change presents challenges to the timeliness and relevance of standards. Moreover, SDOs are largely industry-led, while national governments continue to play a central role in AI governance. Broader participation, especially from developing countries, is essential to making standardisation processes inclusive and globally representative.

There are four priority areas for standardisation in the governance of foundation models. Traceability ensures accountability throughout model lifecycles. Safety evaluation can build upon functional safety standards to enable robust and consistent governance. Sustainability requires standards to address both environmental and societal impacts. Open foundation models pose distinct challenges, for which standardisation can support responsible downstream use. A joint focus on these areas can help enable the consistent and trustworthy global deployment of foundation models.

3.2. National AI Policies and Standardisation Structure

The ROK

Both the ROK and the UK have developed comprehensive AI strategies that place a growing emphasis on standardisation as a key tool for safe, trustworthy, and pro-innovation AI governance. In the ROK, AI is regarded as a national strategic industry. Recent policies have focused on integrating AI into daily life and industry, while establishing institutional and legal foundations. The 2024 AI Basic Act—one of the world's first national AI laws—establishes a risk-based governance framework, formalises the National AI Committee and the AISIs, and provides legal foundations for promoting AI standardisation as part of trustworthy innovation.

The ROK government has formulated dedicated AI standardisation strategies led by MOTIE, while MSIT and affiliated institutions such as TTA lead technical and applied standardisation work. Recent initiatives include the adoption of ethical and safety-focused standards, the development of national standards for AI explainability and data quality, and the launch of a voluntary testing and certification system for trustworthy AI. These strategies aim to strengthen national capabilities while fostering bilateral and international collaboration, including with the UK.

Regarding standardisation structures, national coordination is led by KATS under MOTIE and MSIT, with institutions such as TTA contributing to technical standard development. The ROK plays an active role in ISO/IEC JTC 1/SC 42 and ITU's Standardization Sector (ITU-T).

The UK

The UK follows a sector-based, pro-innovation approach to AI regulation, emphasising the role of standards in supporting assurance and accountability. Key strategies—ranging from the 'National AI Strategy' to the 'AI Regulation White Paper' and the '2025 AI Opportunities Action Plan'—position standards as flexible, industry-led governance tools. They are also seen as instruments for international regulatory alignment. The UK acknowledges the potential for granting standards formal legal status but currently maintains a largely voluntary approach to their adoption in AI.

The UK's AI Security Institute (AISI)[2], established in 2023, has become a global leader in the testing and evaluation of advanced AI systems. It serves as a model for a growing international network of AISIs and informs the UK's focus on safety, governance, and public benefit in AI. Building on this, the current government, elected in July 2024, has announced plans to legislate requirements for developers of the most powerful AI systems, while maintaining a non-regulatory framework for lower-risk applications.

To enhance stakeholder engagement and international cooperation, the UK launched the AI Standards Hub in 2022, led by ATI, BSI, and NPL. The Hub supports capacity-building, multi-stakeholder inclusion, and global knowledge exchange. Its first Global AI Standards Hub Summit in 2025 marked a milestone in its mission to elevate standards as central tools in the international governance of AI.

The UK's standardisation ecosystem is centred on BSI, with its ART/1 committee mirroring ISO/IEC and CEN-CENELEC efforts, particularly in horizontal standards like AI management systems and bias mitigation. The UK also engages through European Telecommunications Standards Institute (ETSI) and sector-specific committees, although its participation in ITU-T is more limited.

3.3. Current Collaboration between the ROK and the UK

In recent years, the ROK and the UK have significantly expanded their collaboration on AI standardisation and governance, engaging through multiple high-level platforms. These include joint participation in AI Safety Summits, institutional linkages through the international network of AISIs, multi-stakeholder exchange at the AI Standards Hub Global Summit, and structured policy dialogue via the ROK–UK Digital Partnership. These platforms facilitate bilateral and multilateral cooperation across technical and policy domains in the AI ecosystem.

2 The AI Safety Institute was renamed as the AI Security Institute in February 2025.

The AI Seoul Summit in 2024 built upon the momentum of the UK's inaugural AI Safety Summit at Bletchley Park. The Seoul Summit resulted in 16 major AI companies committing to the Frontier AI Safety Commitments, reflecting both countries' leadership in global AI governance. In March 2025, the AI Standards Hub Global Summit held in the UK provided another key opportunity for collaboration. A strong ROK delegation contributed to sessions on AI regulation, foundation model evaluation, and the role of standardisation in development cooperation.

The ROK–UK Digital Partnership, signed in November 2023, offers a dedicated policy platform for collaboration across ICT domains, including AI. Co-led by the ROK's MSIT and the UK's DSIT, the partnership hosts an annual Digital Partnership Forum to facilitate dialogue on AI, semiconductors, cybersecurity, next-generation communication (6G and Open RAN), and digital technical standards. Key initiatives include policy exchange, joint R&D discussions, talent development, and professional networking, laying a foundation for deeper bilateral collaboration in emerging technologies.

3.4. Opportunities for Future Collaboration

The ROK and the UK are well-positioned to lead international cooperation on foundation model governance, owing to their shared status as major adopters rather than primary developers. Both countries recognise the strategic role of standardisation in shaping trustworthy AI and have emphasised its use within their respective national AI governance frameworks. The UK leverages BSI and the AI Standards Hub to drive international engagement, while the ROK promotes standardisation through its AI Basic Act and privately-led certification systems.

Building on this shared emphasis, the ROK and the UK have several complementary strengths that can be harnessed for bilateral and multilateral cooperation. These include their leadership in global AI Safety Summits and active participation in standard-setting bodies such as ISO/IEC JTC1 SC42. Within SC42, experts from both countries play key roles in developing standards in areas such as traceability, trustworthiness, system testing, and explainability.

Future collaboration can be structured in two areas. First, within SDOs and quality infrastructure fora, the two countries can jointly support new and ongoing projects, particularly in foundational terminology, evaluation methods, and pre-standardisation efforts across four priority areas: traceability, safety evaluation, sustainability, and open foundation models. The ROK and the UK can also strengthen links between their respective AISIs and national standardisation bodies to ensure alignment between safety research and formal standards work.

Second, collaboration can be extended to the wider AI standards and governance ecosystem through strategic research, knowledge-sharing, and capacity-building efforts. This presents broader opportunities to drive effective and inclusive development and implementation of standards for foundation model governance. Beyond formal channels, cooperation should also prioritise strategic research and capacity-building initiatives. The ROK and the UK can jointly investigate the relationship between standards and regulation and explore how standards-based certification systems might support international regulatory interoperability. This includes knowledge-sharing between regulators and experts, as well as capacity-building programmes targeting both countries and developing countries. Inclusive participation is a shared goal, and ROK-UK leadership can contribute to enhancing the representation of under-resourced stakeholders in global AI standardisation processes.

Table 2.
Collaboration through SDO and the Governance Ecosystem

At the SDO level		
Working areas: **(i) Joint proposals for new work items** **(ii) Joint input into existing work items**		
Topic	**Activities and Mechanisms**	
	Standards Development	**Standards Implementation**
(1) Enhancing the safety and governance of foundation models by standardising definitions and terminology, governance processes, and evaluation methods	Support ROK and UK experts in developing and contributing to work on foundation models within ISO/IEC JTC1 SC42 and other international AI standards. Enhance bilateral coordination between AISIs and other subject-matter experts to align priority areas for foundation model standardisation.	Support ROK and UK national standards delegations and quality infrastructure actors in connecting with AISIs to inform evaluation and protocol work, and to integrate best practice into standards.
(2) Categorizing needs and dependencies for standards-based certification for foundation models	Coordinate bilaterally and multilaterally with SDOs to categorise the requirements and dependencies necessary for establishing a common standards-based certification framework for foundation models.	

Table 2. (Continued)

Governance Ecosystem Level		
Knowledge-sharing, capacity building, and strategic research to shape: **(i) Standards development and adoption** **(ii) The relationship between standards and other aspects of AI governance**		
Topic	**Activities and Mechanisms**	
	Standards Development	**Standards Implementation**
(3) Informing the relationship between standards and regulation	Joint strategic research: • To inform the relationship between standards and regulation in the ROK and the UK; • On the role of standards in international regulatory interoperability for foundation models; and • To support the development and adoption of standards-based certification. Capacity building for regulatory authorities: • In the ROK and the UK • In developing countries	
(4) Driving inclusive participation in the development and use of AI standards	Assisting developing countries in building the capacity to engage in AI standardisation	Collaborative leadership on standards outreach and dissemination

Source: Author.

3.5. Delivery Mechanisms for Collaboration

To effectively realise these opportunities, structured delivery mechanisms should be established across formal and informal cooperation platforms. Within SDOs and quality infrastructure fora, the ROK and the UK can jointly propose new work items or contribute to existing ones, focusing on foundational definitions, evaluation protocols, and governance processes for foundation models. Early-stage collaboration should emphasise pre-standardisation work through the development of Technical Specifications, Technical Reports, and International Workshop Agreements.

Bilateral collaboration between AISIs and national delegations should be institutionalised to bridge gaps between AI safety research and standardisation activities. This coordination can facilitate the integration of risk assessment best practices into formal standards. A near-term goal for bilateral engagement should be to document the requirements for a certification framework aligned with international standards. This work will serve as the basis for future certification systems, once standards and governance mechanisms are sufficiently mature.

Beyond SDOs, collaboration within the broader AI governance ecosystem should focus on advancing strategic research and capacity-building initiatives. These efforts

can help align regulatory approaches in both countries with international standards and enhance global coherence in foundation model governance. By drawing on platforms such as the AI Standards Hub, Global AI Standards Summit, and International AI Safety Summits, both countries can expand inclusive participation and support the practical implementation of AI governance frameworks in developing regions.

Finally, dissemination and outreach activities should target underrepresented stakeholders. The ROK and the UK may lead knowledge exchange initiatives and technical assistance projects to support developing countries' engagement in AI standardisation. By combining technical expertise, institutional networks, and shared governance values, the ROK and the UK can deliver a model for effective and inclusive cooperation on foundation model governance.

4. Strategic Cooperation in Quantum Technologies

Collaboration in quantum technologies between the ROK and the UK is rooted in a mutual commitment to advancing quantum science, developing international standards, and promoting global leadership in this rapidly evolving field. Both countries have established national policies and strategies for quantum and its standardisation. They also engage in bilateral collaborations across various international platforms, covering quantum communication, quantum computing, quantum sensing, quantum materials, and enabling technologies.

4.1. International Background for ROK-UK Collaboration

The ROK-UK collaboration in quantum technology is part of a broader international effort to develop and standardise quantum technologies. Both countries are active participants in global standardisation bodies, including ISO, IEC, Internet Engineering Task Force (IETF) and ITU. A pivotal moment in their cooperation came in 2024, when the ROK and the UK formalised their partnership through ISO/IEC JTC 3 (Quantum Technologies), with the ROK serving as the Chair and the UK as Secretariat. This joint leadership position in ISO/IEC JTC 3 has provided both countries with a strategic platform to influence global quantum technology standards.

The decision to establish ISO/IEC JTC 3 was made following the successful collaboration in the IEC Standardisation Evaluation Group for Quantum Technologies (SEG 14), which first met in 2022. The active role of both the ROK and the UK in SEG 14 laid the groundwork for their leadership in JTC 3, allowing them to co-lead the international discourse on quantum technology standardisation. This leadership has enabled both countries to promote their respective technological strengths while ensuring that global standards reflect their strategic interests.

4.2. National Quantum Policies and Standardisation Structure

The ROK

The ROK has actively promoted quantum technology through its 'Quantum Act', formally titled the 'Quantum Science and Technology Development and Industry Promotion Act'. It was enacted in May 2023 and became effective in November 2024. This Act establishes a comprehensive legal framework to accelerate the development of quantum technologies. The Act emphasises the creation of specialised quantum zones, significant increases in government funding, workforce development, support for commercialisation and enhanced international collaboration. It is a cornerstone of the ROK's ambition to become a global leader in quantum science and technology by 2035.

The Korean government's National Quantum Initiative (NQI), launched in 2024, further reinforces this commitment by providing a strategic framework that integrates various governmental bodies, including MSIT, MOTIE, and the Ministry of Education. The NQI focuses on the accelerated development of quantum communication, quantum computing, quantum sensing, and other critical technologies. These initiatives are supported by substantial public and private investment, fostering a robust ecosystem of academic institutions, research organisations, and industry partners.

Standardisation is a critical pillar of quantum technology strategies. The ROK employs a dual-tier approach to standardisation, with domestic standards managed by MSIT (focusing on R&D) and MOTIE (focusing on industrial applications). Internationally, MSIT coordinates with ITU, while MOTIE represents Korea in ISO. Key organisations such as TTA, Korean Standards Association (KSA), and the Korea Research Institute of Standards and Science (KRISS) are central to these efforts, ensuring that Korea's standards are aligned with global best practices.

The UK

The UK published its National Quantum Strategy in 2023, a ten-year plan centred around four goals: to ensure the UK is home to world-leading quantum science and engineering, to make the UK the to-go place for quantum businesses, to drive the use of quantum technologies in the UK to benefit the economy, society and security and to create a national and international regulatory framework that supports innovation and ethical use of quantum. The UK has defined Quantum Technology Missions, which focus on advancing quantum computing, quantum networks, quantum sensing, and critical infrastructure resilience. These missions are backed by significant government investments, including £100 million to fund five quantum research hubs across the UK.

For standardisation, the British Standards Institution (BSI) leads quantum technology

standardisation via its ICT/4 Quantum Technologies Committee, which mirrors ISO/IEC JTC 3. The UK has also established the Quantum Standards Network, a pilot initiative that coordinates UK experts, identifies priority standards, and supports industry engagement. This network is led by NPL, in collaboration with BSI, UKQuantum, and other stakeholders. The UK's proactive engagement in international standardisation bodies ensures that British expertise contributes to the development of global quantum standards.

4.3. Current Collaboration between the ROK and the UK

The partnership between the ROK and the UK is not a recent development but has evolved through sustained efforts in research and standardisation. Notably, both countries have established formal mechanisms to enhance quantum collaboration. The 2024 Memorandum of Understanding (MoU) between KATS and BSI serves as a foundation for joint standardisation initiatives in ISO/IEC JTC 3. The partnership has been further strengthened by KRISS and NPL, which collaborate on metrology and quantum measurement techniques.

Collaborative initiatives have also taken place in the form of joint research workshops, shared testbeds for quantum communication and computing technologies, and coordinated participation in international standardisation bodies. Korean and British experts actively contribute to global quantum standardisation efforts, including quantum key distribution (QKD), quantum sensing, and quantum materials. These initiatives are supported domestically by academic institutions such as Korea Advanced Institute of Science and Technology (KAIST), POSTECH (Pohang University of Science and Technology), and Seoul National University (SNU) in the ROK, and the Universities of Cambridge and Oxford in the UK, creating a strong foundation for bilateral research exchange.

4.4. Opportunities for Future Collaboration

The partnership between the ROK and the UK in quantum technology has significant potential for expansion, particularly through focused and strategic collaboration. Future cooperation should leverage the complementary strengths of both countries, aligning their expertise in research, standardisation, commercialisation, and policy development related to quantum technologies.

R&D

Collaborative quantum research hubs represent a key opportunity for cooperation and can serve as a foundation for standardisation efforts. The ROK and the UK could establish shared quantum research centres, focusing on next-generation quantum computing, quantum communication networks, and quantum-enhanced sensing. These hubs could facilitate joint research on quantum algorithms, materials, and hybrid quantum-classical systems. By leveraging the UK's expertise in software and the ROK's strengths in semiconductor technology, these research hubs could become centres of excellence for cutting-edge quantum technology development. Additionally, a joint testbed for quantum sensors could be established, enabling cross-validation of measurement standards and calibration techniques.

Workforce development and exchange programmes could further strengthen bilateral ties. Both countries can develop joint PhD and postdoctoral programmes between leading universities—such as KAIST, POSTECH, and SNU in the ROK, and Cambridge, Oxford, and Imperial College in the UK. Regular training workshops and courses on quantum technologies could ensure skill development for researchers and industry professionals. Furthermore, student and faculty exchange programmes could foster a shared understanding of quantum science and technology, creating a pipeline of skilled professionals familiar with both countries' quantum technology landscapes.

Joint funding mechanisms for quantum research could provide the financial backbone for these collaborative efforts. The ROK's National Research Foundation (NRF) and the UK's UK Research and Innovation (UKRI) could explore establishing bilateral research grants and funding schemes to support collaborative projects. Priority areas for funding can include quantum metrology, quantum-enhanced cybersecurity, scalable quantum computing, and pilot projects demonstrating the commercial potential of quantum technologies in sectors such as healthcare, energy, and telecommunications.

Standardisation

One of the most promising areas for future collaboration is in joint standardisation initiatives. Stakeholders from the ROK and the UK could work together to develop joint proposals in ISO/IEC JTC 3 for quantum communication, quantum computing, quantum sensing, and quantum materials. This effort can be further strengthened by establishing bilateral working groups dedicated to creating unified performance benchmarks, interoperability protocols, and security standards for various quantum technologies. In addition, both countries can enhance their coordination in ETSI and ITU.

Commercialisation

The growth of the quantum industry in both countries can be supported through joint industry support and commercialisation initiatives. The ROK and the UK could facilitate the growth of quantum start-ups through joint incubator programmes, industry mentorship, and access to investment opportunities. A bilateral quantum industry forum can be established to enable the sharing of best practices, the promotion of joint ventures, and the exploration of market expansion strategies. Moreover, technology transfer and licensing agreements can be facilitated for quantum communication, computing, and sensing technologies developed through collaborative research, accelerating their commercialisation.

The ROK-UK Digital Partnership

The ROK-UK Digital Partnership (as referenced in chapter 1) provides a strategic framework for deepening digital co-operation between the DSIT in the UK and the MSIT in the ROK. The agreement should offer sufficient flexibility for collaboration to extend beyond DSIT and MSIT to other relevant government departments and agencies (e.g., MOTIE and KATS, DBT, BSI and OPSS).

Having an official, regular communication channel might ensure governmental cooperation on quantum policy, regulation, and standardisation leadership as part of broader discussions on digital standards policy considered in the ROK-UK Digital Partnership.

4.5. Delivery Mechanisms for Collaboration

To effectively implement these collaboration opportunities, a series of structured delivery mechanisms is essential. A bilateral quantum standardisation committee can be established under ISO/IEC JTC 3, co-chaired by the ROK and the UK, ensuring that both countries share leadership in global quantum standardisation. Regular high-level policy dialogues can be institutionalised, enabling senior officials to address regulatory alignment, international standardisation, and quantum technology commercialisation.

Joint quantum research consortia can be formed, integrating universities, research institutions, and industry partners from both countries. These consortia can support collaborative research projects through joint funding, shared testbeds, and joint publications. The bilateral quantum industry network can be expanded, creating a platform for start-ups, small to medium-sized enterprises (SMEs), and large enterprises in both countries to collaborate, share best practices, and explore joint venture opportunities.

Finally, continuous stakeholder engagement will be critical to ensure that collaboration remains aligned with technological trends and market needs. Regular consultations with industry, academia, and research institutions can provide valuable insights, allowing both countries to refine their collaboration strategies and maximise mutual benefits. By focusing on these targeted opportunities and implementing them through well-defined delivery mechanisms, the ROK and the UK can significantly enhance their partnership in quantum technology, positioning themselves as global leaders in this critical field.

5. Strategic Cooperation in Semiconductors

Semiconductor standards are essential for interoperability, supply-chain security, and technological leadership. They enable designers, manufacturers, and integrators to deploy components across diverse ecosystems, reduce barriers to market entry, and promote innovation. In a sector of strategic importance—underpinning telecommunications, defence, artificial intelligence, and climate technologies—robust standards guard against substandard or compromised components and enhance supply-chain resilience amid geopolitical tensions. Emerging materials, novel device architectures, and advanced metrology demand new standardisation efforts. Collaboration between the ROK and the UK can help accelerate such standardisation in a way that benefits both countries.

Pre-standardisation research is playing an increasingly important role in supporting the rapid pace of innovation in the semiconductor industry. New materials and device concepts are expected to shape the next decade of development[3]. This is leading to a significant shift in focus from miniaturisation of silicon technology to the adoption of materials and device architectures that can achieve more efficient chips and components. As a result, there are substantial new requirements for the standardisation of emerging semiconductor technologies, as well as for the measurement and testing capabilities needed to support innovation, regulations, and global trade. This section addresses two themes separately: pre-standardisation and next-generation semiconductor materials and devices.

5.1. International Background for ROK-UK Collaboration

Global standards in the semiconductor industry play a crucial role in ensuring interoperability, compatibility, and scalability across the value chain. From design and fabrication to packaging and integration, standardised protocols and specifications enable seamless collaboration among diverse players in the industry. By adhering to these standards, semiconductor companies can integrate components from multiple suppliers, reducing barriers to innovation and entry for smaller firms. Furthermore, such standards facilitate the optimisation of manufacturing processes and the development

3 International Roadmap for Devices and Systems, IRDSTM 2023 Updated: Beyond CMOS, IEEE IRDSTM.

of common platforms, which are essential for maintaining efficiency and scalability in the highly competitive semiconductor market.

As such, bilateral cooperation on the standardisation of semiconductors is identified as strategic for both the ROK, as a major semiconductor manufacturer, and the UK, with strengths in niche areas such as chip design. It offers a strategic advantage in navigating the complex and rapidly evolving global semiconductor landscape and can help accelerate the development and adoption of innovative technologies, while ensuring compatibility across both countries' respective ecosystems. This not only reduces redundancy in R&D efforts but also helps create a stable framework that supports seamless integration within the global semiconductor value chain.

5.2. National Semiconductor Policies and Standardisation Structure

The ROK

The ROK has announced plans to establish a major semiconductor cluster in the southern region of Gyeonggi Province by the mid-2040s. This cluster will encompass the full value chain of the semiconductor industry, including chip design, manufacturing, materials development, and advanced R&D facilities. In support of this initiative, MOSIT enacted legislation in 2023 to promote and protect R&D in semiconductor technologies, while MOTIE introduced a complementary policy to foster the semiconductor sector as a strategic industry of the future. Both policies emphasise support for the standardisation of current technologies as well as the pre-standardisation of emerging innovations.

The government's current focus is on securing leadership in advanced memory chips (DDR5, HBM3E, and HBM4+). Standardisation efforts are concentrated on the specification of materials, parameter settings for chip-making equipment, process optimisation, and metrology technologies. In parallel, the ROK government and its standardisation bodies, including KATS and the Korea Laboratory Accreditation Scheme (KOLAS), are deeply engaged with international standardisation bodies such as the IEC, Institute of Electrical and Electronics Engineers (IEEE), Joint Electron Device Engineering Council (JEDEC), and Semiconductor Equipment and Materials International (SEMI). These partnerships support national laboratories, private firms, and academic researchers to take active roles in international working groups, often assuming leadership positions such as committee members, conveners, secretaries, or chairpersons.

Currently, the ROK's standardisation efforts are targeted at three core areas: next-generation technologies (such as advanced packaging and compound semiconductors), the commercialisation of novel technologies (including neuromorphic and bio-

specific chips), and the foundational infrastructure for standardisation, which involves international collaboration and training of researchers.

The ROK government and its agencies for standardisation of the semiconductor industry include TTA, Korea Semiconductor Industry Association (KSIA), KSA, KOLAS, and KATS, implementing the Next-Generation Semiconductor Standardisation Strategy (May 2024). They coordinate multi-year projects with national laboratories (KRISS, KIST, KETI, ETRI), industry leaders (Samsung, SK Hynix), and academia, targeting 3D/chiplet packaging, compound semiconductors, AI-neuromorphic chips, and bio-semiconductor fusion. To secure the ROK's leadership in DRAM, NAND Flash, and other memory-related standards, companies in the ROK aggressively participate in JEDEC and IEC, aiming to take leading roles in working groups, technology groups, and project groups of several SDOs.

The UK

The UK's National Semiconductor Strategy, launched in May 2023 under the Rishi Sunak administration, concentrates on strengthening the nation's core capabilities in R&D, design/IP, and compound semiconductors. By leveraging these niche strengths, the UK aims to stimulate technological innovation, foster economic growth and job creation, enhance supply chain resilience, and safeguard national security.

As part of this strategic effort, 'Innovate UK' announced £11.5 million in funding for 16 new projects in September 2023. These initiatives aim to advance domestic semiconductor manufacturing and reinforce the resilience of the UK's supply chains.

Given the high concentration of SMEs in the UK semiconductor landscape and the limited resources available to them, the government has adopted a targeted approach to standardisation efforts. Through stakeholder engagement, such as the NPL workshops held in 2024, the UK ensures that its standardisation activities align with areas of both expertise and strategic need. BSI runs mirror committees for the relevant international technical committees with ISO and IEC.

5.3. Current Collaboration between the ROK and the UK

The UK–ROK Framework for Semiconductor Cooperation was signed in November 2023. The agreement reflects a shared commitment to harness complementary national strengths to advance technological development, with particular emphasis on workforce skills, research and development, supply chain resilience, and trade and industrial cooperation.

The ROK and the UK agreed to collaborate in the following areas:

- Developing critical workforce skills;
- Collaborating on R&D projects;
- Identifying trade and investment opportunities; and
- Enhancing supply-chain resilience.

This partnership leverages the ROK's leadership in memory-chip production and the UK's niche strengths (notably South Wales' compound-semiconductor cluster and world-class SMEs), aiming to align complementary capabilities for mutual benefit.

5.4. Pre-standardisation Research

Standards R&D, also known as pre-standardisation or pre-normative research, develops the science required to establish technical standards. It addresses challenges in formal standards committees, where participants often propose standards prematurely—before best practice is established and agreed upon—leading to opposition from other members or the adoption of poor-quality standards. International collaboration in pre-standardisation research helps build consensus before any voting begins. This is critical for the development of high-quality standards and to ensure they are fit for purpose.

The Versailles Project on Advanced Materials and Standards (VAMAS, www.vamas.org) is a global organisation dedicated to pre-standardisation research in advanced materials technologies, including semiconductors. The UK is a founding member and is represented on the VAMAS Steering Committee by NPL. The KRISS represents the ROK. VAMAS is split into technical working areas (TWAs), and semiconductor-related international projects have been identified and delivered in the past. In response to growing global interest, the UK proposed a new TWA on semiconductors, which was approved by the Steering Committee in October 2024. This is expected to focus on emerging semiconductor technologies and semiconductors metrology.

The ROK and the UK have already demonstrated successful collaboration in pre-standardisation research. The case study below highlights the value of pre-standardisation research, which can be replicated not only in semiconductors but also in AI and quantum technologies.

Case Study: ROK-UK Pre-standards Research Collaboration

Emerging sectors, such as microLEDs, often advance faster than international standards. Early investment in pre-standard research is critical to ensure innovations move rapidly from the lab to market. Porotech, a spin-out from the University of Cambridge, partnered with ROK organisations to conduct pre-standard R&D.

In 2021, through the EUREKA ROK-UK Collaborative R&D Programme, Porotech worked with Hanyang University and EtaMax to validate new porous GaN materials for microLEDs, supported by Innovate UK and Korea Institute for Advancement of Technology (KIAT).

As Porotech scaled its operations, it recognised the UK's distinctive strengths in metrology and pre-standards R&D. Since 2020, they partnered with the UK's NPL to co-develop the required pre-standards R&D to support technology validation. This resulted in advanced metrology platforms essential for the mass production of PoroGaN® products, ranging from full-wafer imaging to atomic-resolution microscopy.

In partnership with NPL, Porotech actively contributed to standards discussions in the ROK and the UK, helping to define frameworks for inspection, quality control, and in-process monitoring based on pre-standards R&D. This open collaboration ensures that emerging digital standards are rooted in real-world expertise, industrial scalability, and cross-border interoperability.

These collaborations accelerated technology readiness and built trust with commercial partners, leading to strategic investment from a ROK consumer electronics company into the UK SME.

This demonstrates the value of pre-standard research. By combining early technical validation, international collaboration, and metrology innovation, companies can de-risk emerging technologies and define future standards. This partnership strengthens strategic ties between the ROK and the UK at the intersection of semiconductors, AI, and quantum materials.

5.5. Next-generation Semiconductor Materials and Devices

The semiconductor industry is advancing through innovations such as compound semiconductors, low-dimensional materials, chiplets, photonics, and 3D integration. To support the adoption and scalability of these next-generation technologies, international standards are essential. Key areas requiring new standards include compound and wide/ultra-wide bandgap semiconductors; low-dimensional semiconductors including 2D materials; materials for chiplets and 3D integration; and AI-specific semiconductors.

Compound semiconductors and wide/UWBG semiconductors

Compound semiconductors such as gallium nitride (GaN), indium phosphide (InP), and silicon carbide (SiC) are essential for high-power, high-frequency, and high-efficiency applications. They are increasingly used in power electronics, telecommunications, and automotive sectors, especially with electric vehicles (EVs) and 5 G. Ultra-wide bandgap semiconductors, such as diamond and boron nitride, are promising for high power electronics, quantum computing, and high temperature sensors.

Standardisation is needed in areas such as material characterization and measurement—including methods for assessing electrical, thermal, and structural properties; fabrication and manufacturing processes, such as MOCVD and crystal growth techniques; integration with silicon and other materials, requiring standards for managing hybrid systems; and reliability and long-term performance, necessitating protocols for testing devices under real-world stress conditions.

Low-dimensional semiconductors (including 2D materials)

Low-dimensional semiconductors, including 2D materials, quantum wells, and nanostructures, offer unique properties like quantum effects, high mobility, and enhanced performance in optoelectronic and power electronics applications.

To enable their commercial success, standardisation is essential, as their potential cannot be fully realised without standardised processes and evaluation methods. Further work is required in several key areas: harmonisation of terminology, performance metrics (bandgap, mobility), fabrication processes, and device integration protocols to enable scalable production and supply-chain trust.

Materials for chiplets and 3D semiconductor integration

Chiplets are small, modular chips that can be combined to form larger, more powerful systems, while 3D integration involves stacking multiple chips vertically to enhance performance and reduce space requirements. These approaches offer solutions for performance scalability, miniaturisation, and cost reduction.

The success of chiplets and 3D integration depends heavily on the standardisation of materials, processes, and testing protocols. Areas that require further work include standardisation of substrates, interconnects (TSVs, microbumps), thermal interface materials, manufacturing processes (thinning, bonding), and electrical-thermal testing to ensure modularity, yield, and long-term reliability.

AI-specific Semiconductors

AI-specific semiconductors are emerging as critical enablers for efficient, scalable AI processing. To unlock their full potential and enable their integration into AI applications, there is a strong need for standardised metrics, fabrication methods, and

testing protocols. Areas that require further work include definition of terminology (neuromorphic, PIM), benchmarking metrics (energy efficiency, endurance), fabrication flows, and reliability tests for edge and mobile applications.

5.6. Opportunities for Future Collaboration

The ROK and the UK each have strengths in key areas, presenting numerous opportunities for collaboration in the rapidly evolving fields of compound semiconductors, chiplets, 3D integration, AI-specific semiconductors, metrology, and more. Specific areas for future collaboration include:

Pre-standard research on metrology for semiconductors

The ROK and the UK metrology organisations should jointly develop a detailed plan to prioritise specific measurement methods and conduct the necessary pre-standard research to accelerate standards development.

The newly established VAMAS TWA46 (Semiconductors) offers a suitable platform for this pre-standard research. Organisations such as NPL and KRISS could convene a broad range of expert stakeholders from both countries to enhance national engagement prioritise activities, and maximise economic impact.

Standardisation for low-dimensional semiconductors

The ROK and the UK should jointly promote the establishment of a blank detail specification or standard matrix table through IEC or ISO to support international cooperation in the standardisation of low-dimensional semiconductors, including 2D materials. Based on this foundation, they should progressively develop standards for material evaluation or application, thereby contributing to overcoming the current limitations in the semiconductor field.

Compound semiconductors and wide and ultrawide bandgap semiconductors

The UK can benefit from the ROK's extensive manufacturing capabilities, while the ROK can gain access to cutting-edge research and development from the UK. Both countries would benefit from the development of standards to ensure the quality and reliability of these materials and their components. Such collaboration can accelerate the commercialisation of compound semiconductor technologies, particularly for high-power, high-frequency, and high-efficiency applications, such as electric vehicles, telecommunications, and power systems.

Chiplets and 3D semiconductor integration

This collaboration could lead to the development of scalable, modular semiconductor systems that lower costs and improve performance, helping both countries remain competitive in the rapidly evolving semiconductor industry. The ROK brings extensive manufacturing experience, while the UK contributes expertise in advanced materials, research, and design.

AI-specific Semiconductors

There is a significant need to develop standards for neuromorphic and other AI-specific semiconductor devices, in particular in terms of performance assessment and reliability. Both the ROK and the UK have strong expertise in this area, and further joint R&D on standards will benefit both economies.

Collaboration between the ROK and the UK could result in the development of cutting-edge AI semiconductor solutions that power future AI applications, including autonomous vehicles, smart cities, and healthcare innovations. The ROK and the UK should collaborate on the pre-standardisation of the next generation memory chips and jointly submit new work item proposals.

Reliability and long-term performance testing

Reliability is a key challenge in advanced semiconductor technologies. Collaborating on testing protocols will help ensure that new materials, packaging techniques, and integration methods meet the highest standards of durability and performance.

Further collaboration through existing structures, such as VAMAS TWA46 and IEC TC47, could result in globally recognised standards for reliability, which would benefit industries across the world, including automotive, aerospace, telecommunications, and healthcare.

Semiconductor materials for packaging and thermal management

Packaging and thermal management are critical to ensuring the performance and longevity of advanced semiconductor systems. Collaboration in these areas can lead to the development of better materials that address heat dissipation challenges, helping both countries improve the performance and reliability of their semiconductor products.

5.7. Delivery Mechanisms for Collaboration

The ROK and the UK can enhance existing mechanisms by leveraging the 'ROK-UK Framework' and 'VAMAS TWA 46' to formalise joint R&D efforts in metrology and emerging semiconductor materials. Joint projects could be launched through programmes such as 'Innovate UK–KIAT' or 'EUREKA' to co-fund pre-standardisation initiatives in priority areas, including AI-semiconductor benchmarking and chiplet integration. A co- co-chaired working group can be established to publish a white paper aimed at harmonising technical terminology for AI-specific devices and low-dimensional materials.

At the national level, the UK could designate a single point of contact to facilitate international engagement. Meanwhile, the ROK could establish an international collaboration centre within its Gyeonggi semiconductor mega-cluster to coordinate standardisation activities. In addition, both countries may explore bilateral policy recommendations focused on standardisation incentives, export-control safeguards, and mechanisms for industry-level engagement to ensure alignment in an evolving regulatory environment.

6. Policy Implications

Each chapter has examined the current status of standardisation for each technology both nationally and internationally, and provided recommendations for bilateral collaboration. A set of cross-cutting themes has emerged from these examinations and recommendations. These themes inform cross-cutting recommendations to advance the cooperation in the increasingly important field of CET standardisation.

6.1. Cross-cutting Themes

Both countries possess strong, cutting-edge research and industrial capabilities in AI, quantum, and semiconductor technologies. Their areas of expertise, capabilities, and focus differ, but this diversity should be seen as a strength rather than a limitation. It highlights the need for coordination and underscores the potential for mutual learning and greater collective impact in the international standardisation ecosystem.

Collaboration must deepen and occur across multiple levels: government-to-government, industry-to-industry, NQI-to-NQI, researcher-to-researcher, and across combinations of these stakeholders. Moreover, this collaboration should cover all phases of standardisation along its whole life cycle: from pre-standardisation to technical discussions, knowledge sharing, and joint approaches in SDOs.

The boundaries between different technology areas are increasingly blurred in the context of standardisation. There are natural overlaps between the semiconductor and quantum space, as well as with AI. Experts widely agree that this convergence will continue to grow in the years ahead. A potential response is to adopt a joint approach to the standardisation of these technologies, ensuring that proposals are submitted to appropriate SDOs at the right time.

The ROK and the UK should identify opportunities to collaborate on governance initiatives within SDOs where both countries are active participants. This is already evident in JTC-3. A more strategic and coordinated approach to shared governance in other SDOs would help ensure joint efforts by industry and academic stakeholders from both countries are positioned for success. There is still a strong likelihood that such coordination and collaboration can more naturally occur through SDOs.

Finally, international collaboration must extend beyond the ROK-UK bilateral relationship, especially in light of growing global competition in CETs and their standardisation. To improve efficiency in CET standardisation and strengthen

effectiveness in global SDOs, collaboration should be extended to countries and stakeholders with shared values and interests. In the long term, countries from the Global South will be playing an increasingly important role in international standardisation. Jointly engaging these countries could deliver a greater impact.

6.2. Cross-cutting Recommendations

1. **The ROK and the UK can use the Digital Partnership as a high-level collaboration mechanism to build a stronger partnership.** It is proposed that we strengthen the governance around the 'ROK-UK Digital Partnership' for digital standards by meeting either side of the annual forum. The first meeting would allow government policy leads to collaborate at a working level on the strategic alignment needed to improve partnerships. The second meeting would bring key partners together such as research bodies and other stakeholders, to look at practical collaboration, particularly in the research and development space.

2. **The ROK and the UK should identify SDOs where the two countries can collaborate better, either through informal partnerships or more formally.** They should explore establishing and co-leading an informal group that would champion better coordination across SDOs on standardisation initiatives for CETs. This would show global leadership on addressing practical issues within the standards ecosystem, where duplication and a lack of coordination can reduce the effectiveness of the global standards system in bringing technologies to market.

3. **Agreement is needed on how to approach the standardisation of critical and emerging technologies where technological crossovers occur.** Different SDOs have different remits, areas of expertise, and objectives. With an increased crossover between various types of technologies, it is more important than ever that standardisation takes place in the most appropriate forum to ensure optimal outcomes.

4. **The ROK and the UK should collaborate on how they engage industry and how they upskill in digital technical standards specifically.** This would help ensure the availability of quality human resourcing and capability to contribute to the domestic and international standards development ecosystem.

5. **The ROK and the UK should identify existing funding opportunities for bilateral and global collaboration along the life cycle of standardisation.** For sustainable collaboration between the two countries, funding for standardisation of CET along its whole life cycle, including pre-standardisation, should be funnelled through national research funding bodies as well as related standards agencies.

6. **The ROK and the UK should build on existing mechanisms to actively identify standardisation issues that would benefit from collaboration.** Enhanced governance under the 'ROK–UK Digital Partnership' can serve as a starting point. Regular policy-level dialogues between DSIT and MSIT or MOTIE can facilitate exchange of ideas generate tangible projects. This KSP already provides a foundation for this. It can foster interactions between experts and researchers from both countries' standards communities. To build people-to-people links, exchange programmes (e.g., short- and mid-term visits) should be developed where appropriate. One option is to expand the existing Strategic Dialogue to include MOTIE and DBT or to utilise existing bilateral structures between those departments.

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