

국제표준기구간 거버넌스의 과편화 환경에서 상호운용성 향상 방안

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Improving interoperability in a fragmented environment of international standardization governance among standards bodies

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Abstract

This paper examines the growing fragmentation in international standards governance caused by technological convergence and the proliferation of multiple standardization bodies. To address these challenges, the paper emphasizes structured, open, and inclusive collaboration among standards development organizations (SDOs). Key mechanisms are suggested for resolving fragmentation issues and developing interoperable international standards.

I. Introduction

International standards play a critical role in enabling interoperability, fostering global markets, and supporting technological innovation across industries in ICT/Telecommunication areas. Traditionally, international standards governance has been led by well-established de-jure standards bodies such as ISO, IEC, and ITU. They provided relatively stable and coordinated platforms for consensus-based standardization.

However, rapid technological convergence and the emergence of new stakeholder-driven de facto standardization organizations have significantly increased the complexity of the cooperation system for standards development, giving rise to fragmentation and coordination challenges among numerous standardization bodies [1]. These situations lead to inconsistencies among standards and weaken global interoperability.

To address these challenges, it is essential to adopt practical and effective approaches that enable multiple standardization bodies to work together toward open, interoperable, and widely accepted international standards development.

II. Fragmentation in Standardization Governance

Fragmentation manifests in several ways. First, overlapping scopes among SDOs and consortia often lead to duplicated or competing standards. Second, differences in development timelines, technical perspectives, and governance models can result in incompatible standards deliverables in relevant

standards bodies. Third, unbalanced expert participation across regions and stakeholder groups further exacerbates divergence, particularly between developed and developing economies, regions and countries.

These issues undermine the fundamental purpose of standardization. Instead of enabling interoperability and global adoption of international standards, fragmented standards increase implementation costs, limit cross-border compatibility, and create market uncertainty. Therefore, addressing fragmentation requires not merely better coordination, but a shift toward structured, open, and inclusive collaboration among all relevant SDOs.

III. Collaboration of multiple stakeholders

As technological convergence continues to expand, multiple technologies are interconnected and converged and their complexity is increasing. This makes it increasingly difficult to clearly distinguish the scope of standardization activities among related organizations pursuing standardization in similar technological areas.

Therefore, to address the fragmented nature of numerous standards development organizations and strengthen standards development activities that ensure global interoperability, collaboration among these organizations is essential. A standardization cooperation system and strategy are essential for achieving this goal.

IV. Key Mechanisms for Enhancing Interoperability

The following detailed measures are proposed to eliminate fragmentation of standards development activities and promote global interoperability through cooperation between standardization organizations.

Structured Coordination Systems among SDOs

A foundational step is the establishment of structured coordination systems among major SDOs and relevant forum and consortia. Such collaboration and coordination frameworks may include formal liaison arrangements, joint working groups, and coordinated work programs. Regular communications and information sharing can help identify overlaps at early stages and encourage alignment before standards diverge.

To address growing concerns regarding duplication and fragmentation, ISO, IEC, and ITU jointly established the SPCG (Standards Policy Coordination Group) [2]. The SPCG serves as a strategic coordination forum at the policy level, enabling the three organizations to exchange information on ongoing and planned standards activities, identify emerging cross-cutting issues, and discuss coordination strategies. The SPCG can play a more proactive role in addressing fragmented standards development by strengthening its linkage with technical-level cooperation mechanisms. Its policy-level perspective allows emerging fragmentation risks to be addressed early, before technical divergence becomes entrenched. However, detailed measures are needed to ensure that the policy-level cooperation and coordination discussed at the SPCG should be implemented by the standards development committees.

Joint Working Groups and Collaborative Teams

A highly practical and impactful method for enabling cohesive standards development is the formation of Joint Working Groups (JWGs) or Collaborative Teams that bring together experts from multiple SDOs and stakeholder communities.

In recent years, this collaborative approach has expanded significantly, especially among organizations addressing shared areas of interest. These frameworks have already resulted in successful co-published standards, demonstrating the real value and feasibility of such collaboration.

Leveraging Digital Collaboration Platforms

Historically, broader collaboration across SDOs faced practical barriers, including the need for numerous in-person meetings, high travel costs, and limited participation from smaller organizations or distant regions. However, the rapid adoption of online platforms such as Zoom and other virtual conferencing tools, has fundamentally changed the landscape.

This shift dramatically lowers the barrier for forming JWGs or cross-organizational collaborative teams. It should be fully leveraged to promote wider engagement and more inclusive cooperation for developing globally relevant and widely adoptable standards.

Joint Technical Roadmaps and collaboration

For the area, where need close collaboration, relevant SDOs should collaborate on developing forward-looking joint technical roadmaps. This joint roadmap includes priorities, expected deliverables, and potential overlaps across SDOs. If this roadmap contains the role of SDOs and the joint standards development plan, it can reduce the overlap and fragmented issues for standards development work.

Shared Reference Architectures and Frameworks

One of the very effective ways to ensure interoperability is to jointly develop Reference Architectures and Open Frameworks that can be commonly adopted by multiple SDOs. These shared Reference Architectures and Open Frameworks would provide a unified baseline for technical standards development and help reduce divergence and increase interoperability between standards developed by different bodies. By agreeing on high-level architectural principles and interfaces, SDOs can ensure that independently developed standards remain compatible.

Testbeds and Pilot Implementations

Standards interoperability cannot be assured through specifications alone. Joint interoperability testbeds and pilot implementations will provide practical environments for validating interoperable standards in real-world scenarios. The feedback generated through joint testbeds can then be reflected into multiple SDOs, accelerating harmonization and building confidence among implementers.

V. Conclusion

The fragmentation of international standards governance poses a serious challenge to global interoperability in an increasingly connected world. Through structured, transparent, and multi-stakeholder collaboration, it is possible to harness diversity while maintaining coherence. By strengthening coordination among SDOs, developing joint technical roadmaps and shared reference architectures, establishing joint working groups, leveraging digital collaboration platforms, and validating standards through interoperability testbeds, the international community can promote open, interoperable, and globally accepted standards.

ACKNOWLEDGMENT

This research was supported by the IITP with funding from the Ministry of Science and ICT (RS-2024-00355259, Metaverse Standards Research Lab).

References

- [1] Blind, K., "The Impact of Standardization on Innovation," *Research Policy*, vol. 46, no. 1, 2017
- [2] ISO, IEC, ITU, Standards Policy Coordination Group (SPCG): Terms of Reference.