International Standardization Activities Supporting Global Deployment of Social Infrastructure Systems

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OVERVIEW: The scope of application of international standards has been growing as people seek ways of resolving global issues. There has also been a trend in recent times toward the introduction of standards for services. These service standards are intended to apply not to individual technologies but to actual services in a particular field. There is also a strengthening move toward international standardization of social infrastructure systems, a field that in the past did not need to take account of international standards. Hitachi is actively involved in international standardization. In the field of smart cities, Japan proposed the establishment of an ISO committee for standardizing indicators used to evaluate the performance of community infrastructure, resulting in the creation of the new ISO/TC 268/SC1 subcommittee. As a member of the Japanese team, Hitachi assisted with the proposal to establish this committee and with the writing of standards.

INTRODUCTION

CHANGES are taking place in the field of international standardization, both in the approach to standardization and the type of things for which standards are being created. Likewise, driven by factors such as infrastructure exports and World Trade Organization (WTO) agreements, there is a growing move toward international standardization for social infrastructure systems, a field that has not needed to take account of such standards in the past. Because this new trend is seeking to use international standards to define specific fields of business activity (in contrast to standardization aimed at the adoption of common technologies), there is a need for those involved to fundamentally re-evaluate their understanding of these standards and strategies for complying with them.

Japan is also responding to these moves toward the use of international standards to define specific fields of business activity by making its own proposals. One example was the proposal to establish a new committee at the International Organization for Standardization (ISO) to look at smart community infrastructure. This led to the creation in 2012 of an ISO technical committee (TC) and an associated subcommittee (SC) (ISO/TC 268/SC1: smart community infrastructures), with Japan receiving the secretariat and chairperson appointments. The subcommittee's first standard, ISO technical report (TR) 37150 is currently being drafted.

This article describes the changing trends in the field of international standardization, the growing moves toward the international standardization of social infrastructure systems, the activities of the new ISO/TC 268/SC1 subcommittee established in response to a Japanese proposal, and the future direction of work on international standardization.

CHANGING TRENDS IN INTERNATIONAL STANDARDIZATION

In the past, most international standards applied to products. That is, they specified things like product shape, dimensions, materials, composition, quality, and performance. Recently, however, there has been an increase in the number of new committees and standardization work that deal with "service standards."

Rather than a specific technology alone, service standards are about defining standards for services in a particular field. The following lists some of the major new TCs recently established by ISO and the International Electrotechnical Commission (IEC) to consider service standards.

(1) ISO/TC 223: societal security
(2) ISO/TC 224: service activities relating to drinking water supply systems and wastewater systems - quality criteria of the service and performance indicators
(3) ISO/TC 228: tourism and related services
(4) ISO/TC 232: learning services outside formal education
(5) ISO/TC 260: human resource management

For example, whereas a TC that deals with water quality measurement already existed (ISO/TC 147:

water quality), the new TC 224 committee was set up to consider water supply and wastewater services, an area that falls outside the scope of TC 147.

The objectives and philosophies behind the drafting of these service standards are completely different to those of existing product standards.

Product standards have as their starting point existing products and technologies. The objective of this type of standardization is to facilitate the worldwide use of products by the adoption of common product specifications to ensure mutual compatibility. Accordingly, the important consideration for standardization is how to incorporate all of the leading technologies proposed by each of the members.

The starting point for service standards, on the other hand, is the definition of the service (business activity). This type of standardization seeks to define the scope covered by the particular service activity, and to ensure that services can be delivered in an internationally consistent way to create better societal systems. Because the scope of the service becomes formally defined by the international standard once it has been published, important considerations during the standardization process include how to demarcate the service from surrounding activities, and whether the standard correctly encompasses the service's scope. This leads directly to market expansion.

Based on an understanding these changing trends in recent international standardization and that proposing the standardization of a service will lead to the scope of that service becoming prescribed by an international standard, a fundamental change is necessary in how people think about these standards and their strategies for complying with them (see Table 1).

TABLE 1. Differences between Product and Service Standardization
Differences between product and service standards include different objectives and applicability, and different considerations when proposing standards.

	Product standards	Service standards
What is being standardized	Product shape, dimensions, materials, composition, quality, and performance, etc.	Content and scope of services
Objectives	Product compatibility and international adoption	International consistency in service content and level
Considerations	Widespread adoption made possible by common specifications, and ability to enhance market competitiveness through differentiation	Demarcation from surrounding areas, and that the international standard correctly encompasses the scope of the service

GROWING IMPORTANCE OF INTERNATIONAL STANDARDIZATION TO SOCIAL INFRASTRUCTURE SYSTEMS

The trend toward service standardization is becoming particularly evident in the field of social infrastructure systems.

Because social infrastructure is built in a particular location (in a particular country), Japan's social infrastructure, for example, does not generally extend outside Japan and therefore, while its construction may take account of national technical standards, it has rarely needed to be concerned with international standards. Recently, however, factors such as infrastructure exports (meaning exports by Japanese companies) and WTO agreements (for overseas suppliers in the Japanese market) have increasingly made it necessary to consider compliance with international standards.

In the case of exports by Japanese companies, unless associated with the construction of a city on a greenfields site, they need to consider compatibility with the existing infrastructure in the destination country. Rather than insisting that the recipient accept products designed for the exporting nation, the main way to ensure this compatibility is to adopt international standards.

The following sections discuss compliance with international standards.

WTO, TBT, and GP Agreements

The WTO requires member nations to comply with agreements on Technical Barriers to Trade (TBT) and Government Procurement (GP).

The purpose of TBT agreements is to eliminate technical barriers to trade, and they oblige the parties to use international standards as a basis for their national standards. Similarly, GP agreements oblige the parties to use international standards when specifying the requirements for government procurement.

Because Japan is a member of the WTO, it is in a situation where it has to comply with international standards even for domestic social infrastructure.

Case Study of Achieving Compliance with International Standards in Japan's Advanced Infrastructure Services

ISO/TC 224 (Service activities relating to drinking water supply systems and wastewater systems) was established in 2002 in response to a 2001 proposal by France for the formulation of measurement guidelines for water and wastewater service providers. The scope

of this committee included the definition of indicators for the quantitative evaluation of water and wastewater services. Depending on how these indicators were defined, there was a risk that the standard would prevent Japan from maintaining its high level of water and wastewater services.

For example, although Japanese water is safe to drink straight from the tap, if the international standard were to specify service levels lower than those that currently apply in Japan, it would not be permitted under WTO agreements to prevent suppliers who supplied water that complied with international standards but was not suitable for drinking from entering the Japanese market. While this is an extreme example, if such an outcome were to be realized, the impacts on Japanese society would be immeasurable. This meant it was necessary to defend Japan's high level of water and wastewater services.

Accordingly, Japan issued guidelines (national standards) for water business operations and for improving sewage system management services that complied with the international standards being formulated at the time, and lobbied to have these included in the international standards. As a result, they were included in the citations for the ISO 24510 series of standards issued in 2007. This meant that existing national service levels could be maintained in a way that was compliant with the international standards.

Japanese Proposal for International Standardization for Smart Cities

The above examples demonstrate how the trend toward international standardization is impacting the field of social infrastructure. When considered from a passive standpoint, this situation requires that steps be taken in relation to two particular aspects of international standards: (1) compliance with international standards, and (2) defending against the establishment of international standards that affect the scope of domestic services.

Meanwhile, steps have also been taken toward Japan proposing new service standards. The following section describes one of these: the proposal for ISO/TC 268/SC1 (smart community infrastructures).

ISO/TC 268/SC1 SMART COMMUNITY INFRASTRUCTURES

Background to Proposal for New Subcommittee

Smart city projects are currently in progress in various parts of the world, with various interested organizations promoting their own concepts. With regard to questions such as what defines a smart city or what sort of things and setups can be treated as "smart," however, there is only a vague consensus and no international standards. In other words, the international procurement and construction of community infrastructure is proceeding without any international standards having been established to provide benchmarks for the procurement process. This has made the task of setting international standards for smart infrastructure an urgent one. The establishment of international standards provides a basis for TBT and GP agreements and helps create an active international market for infrastructure procurement.

With this in mind, Japan proposed the establishment of a subcommittee to consider indicators for evaluating smart community infrastructure in 2011. The ISO/TC 268/SC1 (smart community infrastructures) subcommittee was subsequently set up in 2012 with Japan receiving both the secretariat and chairperson appointments.

International Standards for Smart Community Infrastructure

As of January 2013, ISO/TC 268/SC1 was in the process of considering its first standard (ISO/TR 37150). This standard, for smart community infrastructure metrics, is to be issued in the form of a TR on the future directions for the systematization of international standards. This section describes what it is that is to be standardized, and the methods to be used in the investigation.

What is to be standardized

The necessary starting point for the discussion is to decide what is meant by smart community infrastructure. To this end, the concept of a three-layer model of a city has been adopted (see Fig. 1). Table 2 defines the three layers.

ISO/TR 37150 places an emphasis on being able to be improved or enhanced by technology, and targets standardization primarily at the community infrastructure layer, the role of which is to support the community service and facility layers.

Investigation methods

Because the concepts that provide the basis for standards, such as what is meant by smart community infrastructure and what is to be treated as "smart," need to be derived in an objective manner that is satisfactory to all the countries involved, the following methods were adopted for presenting the direction to be taken for the system of standards.

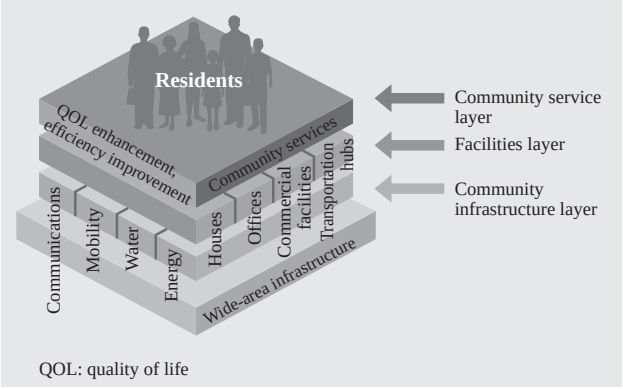

Fig. 1—Three-layer Model of City.
The model treats the functions of social infrastructure in a city as comprising a community service layer, facilities layer, and community infrastructure layer.

TABLE 2. Definition of Each Layer of Three-layer City Model
Community functions can be considered in terms of a three-layer model comprising a community service layer, facilities layer, and community infrastructure layer.

Layer	Definition
Community service layer	Supplies community functions to residents (including public services and commercial services)
Facilities layer	Public and other facilities used to supply services to residents (transportation hubs, commercial facilities, offices, etc.)
Community infrastructure layer	Infrastructure used to support the functions of the community service and facilities layers [energy, water, mobility (transportation), and telecommunications, etc.]

(1) Step 1: the countries involved were surveyed about the concepts, theoretical framework, indicators, and standards for smart cities, and about examples of smart city projects (projects currently in progress or under consideration). The survey invited responses that could be used to make comparisons (such as who is making the proposal, its purpose and scope, which items relate to being "smart," the construction schedule, and actual results).
(2) Step 2: the responses from each country are analyzed to identify things like where countries agree and differ, and what issues they raise.
(3) Step 3: the commonalities and issues identified in step 2 are then presented in the form of directions for future standardization work or issues to be addressed.

By using examples from the participating counties as a basis for consolidating their views, it is possible to establish a satisfactory consensus that is not biased toward any particular countries.

As of January 2013, a working draft of ISO/TR 37150 was being circulated. It is anticipated that a standard will be finalized and published during the 2013 fiscal year. For subsequent standards, the intention is to investigate measurement methods for specific "smart" features of community infrastructure, and to consider standardization from a multi-faceted perspective that takes account of factors such as city life cycles and the different forms that cities take. Along with the systematization of the standards, the intention is also to consider extending the organizational structure of ISO/TC 268/SC1 itself (setting up working groups to look at specific standards).

CONCLUSIONS

This article has described the changing trends in the field of international standardization, the growing moves toward the international standardization of social infrastructure systems, the activities of the new ISO/TC 268/SC1 subcommittee established in response to a Japanese proposal, and the future direction of work on international standardization.

Work on international standardization still conveys a strong image of being about promoting the best technologies we have. What has been particularly influential in practice, however, has been the tendency for a proposal for service standardization to lead to the scope of that service being locked in. The reason this has had such an influence is not only because compliance requires changes to business processes and therefore involves considerable work to achieve, but also because individual cases of technical superiority become completely meaningless or obsolete in the face of changes to business processes that act as all-encompassing rules.

A notable recent trend has been to encourage proposals for establishing new committees in order to facilitate the creation of standards at the ISO and IEC. As it is the country that takes the initiative and proposes a new committee that will be appointed as its secretariat, the country and secretariat are effectively already determined by the time the proposal is circulated (before the result of voting is confirmed). This means that the will (industrial policy) to proceed with the international standardization of the corresponding service lies with the proposing country from the beginning, and Japan also needs to take advantage of this process.

While this article has used ISO/TC 268/SC1 as an example of an activity being driven by Japan, it is not the only one. Recently (in October 2012), IEC TC 120 (electrical energy storage) was set up in response to a Japanese proposal, with Japan receiving the secretariat appointment (although the chairperson is German).

IEC TC 120 has only just begun its activities. The questions of its scope of activities and its demarcation from other TCs are still under consideration.

Hitachi is participating in standardization work such as that of ISO/TC 268/SC1 and IEC TC 120. In the future, Hitachi intends to continue working with government and industry to contribute to activities that are conductive to the global deployment of social infrastructure.

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