Short communication

Technical standardization of ITS and Asian initiatives for intelligent mobility

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ABSTRACT

User-centric intelligent mobility businesses emerge and prosper in Asian metropolitan areas by utilizing the progress if information and communication technology (ICT). Under the rise of private lead initiatives on intelligent transport systems (ITS), the roles of public sectors are still large. Public sectors should precisely identify the extensive ITS services by considering the regional conditions and deploy them by collaboration between the public and private. Public sectors also are strongly encouraged to identify the benefits acquired by development and compliance of the international technical standards. Furthermore, in order to maximize the potential capacity of ICT, improvements of social infrastructures are required by the public sectors together with private businesses. With the realization of the collaboration works, Asian regions are well deserved to take the lead in future ITS initiatives.

1. User-centric intelligent mobility businesses emerge in Asian regions

Innovations utilizing Information and Communication Technology (ICT) are progressing in support for transport of people and goods. Leading initiatives of them are observed in Asian metropolitan areas, where economic growth and population growth are remarkable.

The progress of information utilization by mobile terminals owned by individuals contributes to the expansion of intelligent mobility support. Services combining electronic maps and location identification technologies have not been limited to in-vehicle navigation devices. Services providing real-time traffic information have not been limited by the observation of the transportation facility operators.

It is no longer surprising to explore one's route to the destination with a personal ICT device in Asian metropolitan region. In addition, ICT devices greatly assist for using demand-based intermediate public transportation modes, so-called paratransit. Requests or bookings of vehicle or motorcycle taxis, sharing services of cars or bicycles, as well as integrated guidance of available transportation means are the expanding applications of services utilizing ICT. Moreover, those nomadic devices may take roles of payments for those services.

It is quite possible to make full use of the services by centering personal ICT devises. There are so many varieties, such as matching services of service providers and consumers, location related services corresponding to origin, en-route, and destination of entire trip of people and goods, various financing services by digitized settlement or remittance, and feedback mechanism to mutually evaluate the quality of services.

Customized services according to individual conditions and activity records have become possible, and further development to new businesses will be expanded by analyzing accumulated big data. User-centric utilization of integrated data has contributed to the innovative initiatives of mobility support businesses. This is a trend observed at the same time not only in Asian regions but also in the world.

2. Public role is still large under the rise of private lead ITS

It has been proved in the Asian metropolitan areas that businesses of intelligent mobility services should grow effectively. However, even in Asian regions where private businesses of intelligent mobility service are showing prosperity, the role of the public sectors is still large.

An example may be a travel concierge service that integrates information on publicly available transportation modes, so called as "Mobility as a Service" or "Mobility on Demand". Demonstrations of the service have been proposed from public standpoints and the effectiveness of the service are being reported. In addition, there is a good chance for further new mobility support businesses to grow if their access to data collected and maintained by the public sectors should become easier.

On the other hand, a new mobility support business may often bring conflicts with existing businesses. The improvements of mobility may

lead to the increase in total number of trips and in vehicle traffic volumes, resulting adverse effects on the traffic environment. From the public viewpoint, it is often necessary to make adjustments through appropriate government intervention. From regional point of views, it is quite necessary for a region to coordinate to make constructive alignment of intelligent mobility services to the whole Intelligent Transport Systems (ITS) of the region. The first candidate to play the coordinator's role would be the regional government.

The range of ITS services is extensive. Let us check ISO 14813-1: 2015, the document describing a standardized list of ITS services and a good guidance for stakeholders planning and operating the ITS in their regions [1]. The ISO 14813-1: 2015, "Service domains, service groups, and services" defines 13 kinds of ITS service domains. It further describes the organization of 50 service groups and 177 individual services. Users of individual ITS services range from travelers, vehicles to private and public organizations, such as transport facility operators, transport vehicle operators, traffic flow managers and transport related service providers.

Entities that plan their ITS can select specific services according to the conditions of the target area. In addition, there are varieties of choices in design and deployment of the specified services, i.e. combinations of logical processes to achieve the services, designs of physical deployment of processes, assignments of process groups into subsystem packages and responsible organizations. Due to the choices of deployment designs, the interface specifications, such as elements and amounts of data to be distributed among subsystems, and the transmission protocols, clarify the keys to the interoperability of their ITS.

The emerging Asian private businesses are regional mobility services based on their innovative applications utilizing ICT infrastructure in their region. However, if those services should become incorporated and integrated into their whole regional ITS, common usage of data and clarification of API specification would be required for data fusion with other subsystems including public ITS services in order to ensure interoperability and to eliminate the barriers to entrants.

Public sectors have traditionally been responsible for construction, operation, surveillance and management of the physical transport infrastructure. Even for the public sectors today, information from vehicles, probe data, is becoming a powerful means of information collection in order to monitor and manage facilities and traffic flows. However, the global standards on probe data are still in the process of development, such as interface definitions for their widely usage and mechanism of their applications. Asian ITS stakeholders still have time and rooms for contribution to standard developments from their regional businesses to regional and global standards.

Let us review the International Organization for Standardization (ISO) as a representative example of the global technical standard development organizations. Basically, the ISO is participated by national countries and the development activities are carried out by experts mainly from private sectors nominated by national bodies.

As of January 2018, 162 national standardization bodies participate in ISO. Based on the proposal and approval of member countries, a Technical Committee (TC) for specific field is established. From the oldest installed ISO/TC 1 (Screw threads) to the latest ISO/TC 314 (Ageing societies), the number of active TCs exceeds 250. In the basic field of information technology, ISO/IEC JTC 1 (Information technology) has been established by jointly with the International Electrotechnical Commission (IEC). For the ISO member countries, participations in individual TCs are their discretions. There are two levels of TC members; a participating member (P-member) and an observing member (O-member). Regarding the TCs related to transport of people and goods, the titles and numbers of member countries are summarized in Table 1 [2].

Referring the nine TCs listed in Table 1, P-members who are actively participating in the standard development activities are around 30 countries, respectively. Countries in East Asia and South Asia (23 countries) comprise about 20% of the whole members of each TC. Within TC 204, intelligent transport systems, P-members are five countries (China, India, Japan, Republic of Korea, and Malaysia) and O-members are six countries (Indonesia, Mongolia, Pakistan, Philippines, Singapore, and Thailand). Hong Kong also is registered as the O-member of TC 204.

In order to effectively extend the intelligent mobility technology developed in the Asian region into the world, attentions to the mobility TCs and development activities as P-members should be expected for the standardization divisions of Asian countries.

Another areas where ISO standards are effective is the international trade. The Technical Barriers to Trade (TBT) Agreement by the World Trade Organization (WTO), encourages the member countries to base their measures on international standards as a means to facilitate trade. The Agreement also requires member countries to define a technical specification based on the applicable international standard (if one exists) when they carry out government procurement that exceeds a certain size.

Standards, existing or under development, relating traveler information, public transport information and payment systems can be critical to the integrated ITS in Asian regions where intelligent mobility businesses are currently emerging. Examples of them are pointed out as the following items; ISO 17185 series "Public transport user information," ISO 22047 "Bike-share data exchange," ISO 21193 "Requirements for EFC application interfaces on common media," and ISO 24014 series "Interoperable fare management system."

3. Good social infrastructures maximize the potential capacity of ICT

Rapid progresses of ICT promotes the spread of personal information devices and encourages private businesses to innovate and disseminate their intelligent mobility services. Under the circumstances of growing ITS businesses in Asian countries, importance of the public role is pointed out in terms of promoting technical standards in the previous section.

It is furthermore observed that the public and private sectors of Asian regions have extra fields to consider in order for their regional

Table 1
Mobility-related ISO Technical Committees (TCs).
Source [2] International Organization for Standardization. http://www.iso.org/technical-committees.html, (accessed 31 January 2018).

Number of TC	Title of TC	Creation year	P-members Global	O-members Global	P-members East & South Asia	O-members East & South Asia
ISO/IEC JTC 1	Information technology	1987	34	63	6	8
ISO/TC 8	Ships and marine technology	1947	24	26	5	6
ISO/TC 22	Road vehicles	1947	28	45	5	8
ISO/TC 104	Freight containers	1961	26	25	8	4
ISO/TC 204	Intelligent transport systems	1992	28	29	5	6
ISO/TC 211	Geographic information/Geomatics	1994	37	31	6	6
ISO/TC 241	Road traffic safety management systems	2008	27	21	6	5
ISO/TC 268	Sustainable cities and communities	2012	35	22	6	5
ISO/TC 269	Railway applications	2012	22	11	3	2