TECHNICAL REPORT

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Intelligent transport systems — System architecture, taxonomy and terminology — Procedures for developing ITS deployment plans utilizing ITS system architecture

Systèmes intelligents de transport — Architecture, taxinomie et terminologie des systèmes — Procédures pour développer des plans de déploiement ITS en utilisant une architecture ITS

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 24098 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

Introduction

This Technical Report was developed by ISO/TC 204, WG 1, *Architecture*, in order to provide a procedure for developing Intelligent Transport System (ITS) deployment plans utilizing ITS system architectures.

It is well perceived in the ITS community that understanding the system architecture is significant for the realization of ITS, which extends over wide areas on service domains, system sizes, and relating stakeholders and users. Those who deploy ITS systems within a specific region need to consider the coverage area, as well as existing inventories.

This Technical Report facilitates the introduction of ITS at regional levels through the development of the ITS deployment plans by utilizing regional ITS architectures.

Examples of ITS deployment guidelines are given in Annex A.

Intelligent transport systems — System architecture, taxonomy and terminology — Procedures for developing ITS deployment plans utilizing ITS system architecture

1 Scope

This Technical Report describes the procedure for developing Intelligent Transport System (ITS) deployment plans utilizing ITS system architectures. The document consists of the basic policy of ITS deployment and the procedure for developing ITS deployment plans. Framework, procedures and requirements for developing regional ITS deployment plans utilizing regional ITS architecture are reported.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14813-1:2007, *Intelligent transport systems — Reference model architecture(s) for the ITS sector — Part 1: ITS service domains, service groups and services*

ISO/TR 14813-5:1999, *Transport information and control systems — Reference model architecture(s) for the TICS sector — Part 5: Requirements for architecture description in TICS standards*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
institutional architecture
architecture based on political or administrational infrastructure partitioning and its division of responsibilities (rather than functions)

[ISO 14813-5:1999]

3.2
ITS service
consists of a product or activity targeted to a specific type of ITS user

NOTE 1 Adapted from ISO 14813-1:2007.

NOTE 2 An ITS service group consists of one or more similar or complementary services provided to ITS users. An "ITS service domain" refers to a specific application area which comprises one or more service groups.

3.3
ITS stakeholders
people or organizations that are involved in some way in the deployment of ITS

NOTE Their involvement can be through use, manufacture of products, provision of services, or regulations.

3.4
ITS user
one who directly receives and can act on ITS data, information or outputs that implement a measure of control

NOTE 1 Adapted from ISO 14813-1:2007.

NOTE 2 An ITS user is one who receives, directly or indirectly, or provides, the transaction of an ITS service. These users of ITS services may be human, systems or environment monitoring.

3.5
logical architecture
functional architecture
functional viewpoint
describes how the system behaves, including what it does with the inputs that it receives and how it produces the outputs; it may be described either from an object-oriented, or process-oriented, perspective and describes the system according to its behaviour

NOTE 1 Adapted from ISO 14813-1:2007.

NOTE 2 In an object-oriented perspective, a logical architecture elaborates the conceptual behaviour and in so doing defines some detail of the objects. In a process-oriented perspective, the logical (or functional) architecture determines the nature of the system (in terms of functions and data stores), and describes its conceptual behaviour and the detail of what must be done to the inputs to produce the outputs. The logical architecture is independent of any hardware or software approach.

3.6
physical architecture

allocation of the logical architecture to physical entities but not including details of the deployment of specific numbers of systems or equipment at particular geographic locations

NOTE 1 Adapted from ISO 14813-1:2007.

NOTE 2 A physical architecture, whilst describing physical configurations in system terms, is not specific to any particular location.

3.7
physical model
subset of a physical architecture which mainly considers the realization of providing one or more service(s)

4 Abbreviation

For the purposes of this document, the following abbreviation applies.

ITS Intelligent Transport System

5 Basic policy of ITS deployment

5.1 Realization of regional ITS

The general framework of ITS deployment within a region (or any other part of a nation, such as a city, state, or county) is described in Figure 1. The target is realization of regional ITS systems and provision of ITS services to the users by the collaboration of subsystems that are implemented by relevant ITS stakeholders.

An ITS deployment plan for a region will make the efficient implementation through the intelligible accountability and the consensus among the regional stakeholders. The plan is used for obtaining a budget for deployment, for designing the regional ITS systems, and for promoting the deployment and operation of the systems within the region.

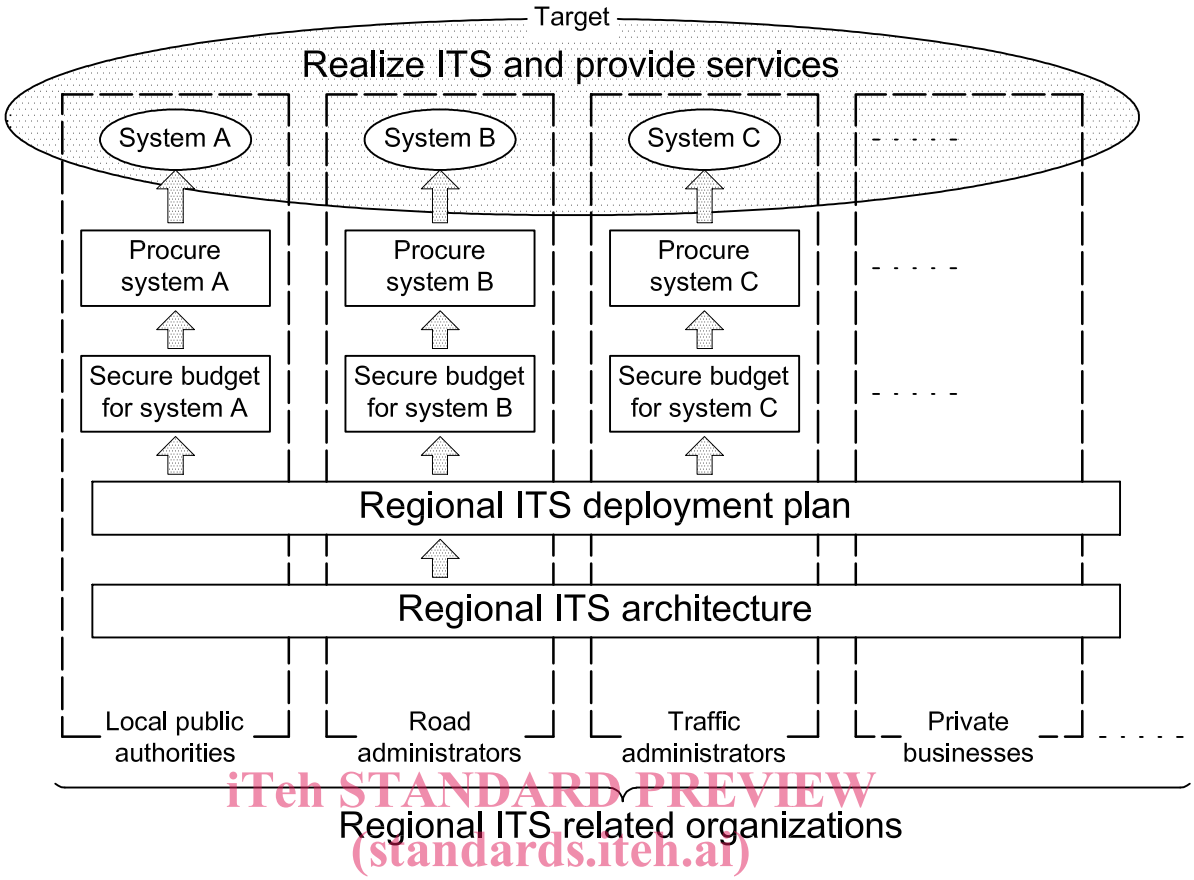

Figure 1 — Framework of regional ITS deployment

5.2 National ITS architecture

There are several ways in which a national ITS architecture can be used to create ITS deployment plans. These are illustrated in Figure 2.

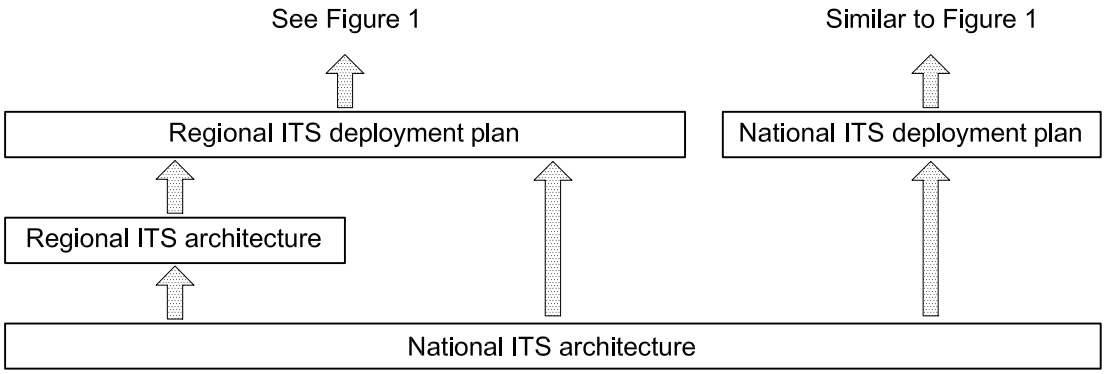

Figure 2 — Relationship between regional and national ITS deployments

The example in Figure 2 enables interoperability between the ITS systems deployed at nearby regions, as well as within the target region itself.

6 The procedure for developing ITS deployment plans

6.1 Framework

A national architecture covers overall ITS services within a nation and this may be what is needed for some ITS deployments. However, a regional architecture may be needed when only some of the ITS services within the national architecture are required.

In order to realize sustainable ITS within a region or nation, it is necessary to identify the ITS services that are required, to establish subsystems by dividing roles among ITS-related stakeholders, and to keep a close liaison between those stakeholders.

To achieve this, it is necessary to prepare ITS deployment plans based on the regional or national ITS architecture. These plans will illustrate the division of roles and coordination between ITS stakeholders. Based on these plans, it will be possible to negotiate and secure budgets and establish operational systems at the stakeholder level.

6.2 Procedure

The procedure for developing an ITS deployment plan for a region or nation should be the following.

— Identify the appropriate ITS stakeholders and gain their cooperation and participation.

— With the stakeholders, define the ITS services that they want to see deployed.

— Describe the ITS physical system structure that is needed to provide the services.

— Define and agree upon the stakeholders' roles for the ITS deployment.

6.2.1 Identifying the participation of appropriate ITS stakeholders

It is essential that the scope of the regional (or national) ITS architecture, and the identification and participation of the ITS stakeholders involved in the development process, are determined and agreed.

The mobility of residents in daily activities should be taken into account (e.g. commuting, shopping and business). The geographic coverage of the ITS architecture will depend on the area of jurisdiction belonging to its owners. Thus, regional ITS architecture may cover one or more metropolitan regions and transport infrastructures between them, and a city ITS architecture may cover one city. The area where the stakeholders involved in the ITS development operate or administer should also be taken into consideration. However, the need for a regional ITS architecture should also depend on how much of the national ITS architecture it will include.

Stakeholders involved in the development of the ITS architecture should include organizations that fit into one or more of the following types. These types should include those stakeholders that:

— want ITS: these will be local authorities that manage the highways, and road operators that will want ITS to improve the operation of their transport networks;

— make ITS: these will be organizations that are component and system suppliers and/or infrastructure providers that will see ITS as providing them with extra business opportunities;

— use ITS: these will be travellers, pedestrians, PT passengers, plus those that move freight; all of whom hope that ITS will improve the ways that they can travel;

— rule ITS: these will be organizations such as national and regional governments and standards bodies that regulate and control the way that ITS is deployed and implemented.

A broad range of stakeholders of several of the above types may exist within the area in which ITS is to be deployed. It is also important for any stakeholders whose existence is recognized during the ITS architecture development process be asked to participate, as appropriate.

It is important to ensure that outreach to the ITS stakeholders gains commitment to the usefulness and significance of the ITS architecture in the process of establishing the ITS systems that need to be deployed to provide the services.

It is useful to nominate a leading stakeholder, sometimes called the “architecture champion” to urge all the stakeholders to participate positively in the establishment of the ITS systems. The leading stakeholder will normally review the area covered by the ITS architecture to be developed and identify the stakeholders participating in the development process.

6.2.2 Defining ITS services

Services to be provided within the area of the ITS deployment should be based on local issues and needs for transportation. The services that are required are normally selected from the list of ITS services described in the national ITS architecture or the framework ITS architectures that are to be adopted. Consideration must be allowed for the services currently existing in the region to be incorporated into the ITS architecture and the resulting ITS deployment.

Issues arising in the area of the ITS deployment and the needs of users and stakeholders are compiled and categorized by causal factors from the perspective of each stakeholder, in order to gain an understanding of the issues and needs of the transport area.

The issues and needs thus identified are used in a subsequent process for selecting the ITS services that resolve the issues and the needs. This process identifies all the ITS services to be realized within the area.

6.2.3 Describing the ITS physical system structure

According to the ITS services selected for the region, the ITS physical system structure within the deployment area is envisioned and then elaborated. National ITS architectures may be used or referenced to develop the ITS physical models. These physical models are designed to meet the ITS deployment needs as building blocks for the ITS architecture.

The physical system structure may be developed either directly, or by the modification of the individual physical models described in the national ITS architecture. Specifically, new individual physical models are produced by adding or deleting individual physical model subsystem(s), and/or revising definitions to correspond with the content of services within the area of ITS deployment. A new subsystem definition may be created if a particular functionality is not already in the national ITS architecture

This enables the establishment of a comprehensive ITS system model structure and the documentation needed to complete the ITS architecture.

6.2.4 Deciding the stakeholders' roles for the ITS system deployment

Based on the ITS physical architecture that has been developed, and combined with the physical models of the area of ITS deployment, stakeholders should be assigned as cooperating partners.

The ITS architecture is completed by checking the future plans for the area and the envisioned ITS requirements based on the services to be introduced. The allocation of responsibility for the deployment and operation to each subsystem should be agreed by the stakeholders. All stakeholders involved should confirm agreement to the completed ITS structure.

The structure of the ITS systems illustrates the relationships between each stakeholder. The structure may be developed into an ITS institutional architecture within the area. It provides an overview of the ITS systems to be deployed and operated within the area.