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**Intelligent transport systems — System  
architecture, taxonomy, terminology and  
data modelling — Training requirements  
for ITS architecture**

*Systèmes intelligents de transport — Architecture, taxinomie,  
terminologie et modélisation de données, relatives aux systèmes —  
Exigences de formation pour une architecture ITS*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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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is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.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 25104 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

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## Introduction

The objective of this Technical Report is to propose generic training requirements for the skills required to understand and develop architectural models for Intelligent Transport Systems (ITS).

This Technical Report has been prepared to assist organizations in developing the knowledge and skills of their own staff and those of allied organizations such as suppliers and customers, and to assist academic institutions to develop curriculum and syllabus.

The approach taken is the proposal of a taxonomy of the knowledge elements of ITS architectural theory and practice. This approach has been widely used in other fields where it is often entitled as the “Body of Knowledge” (BOK), for example the software engineering BOK or SWEBOK.

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# Intelligent transport systems — System architecture, taxonomy, terminology and data modelling — Training requirements for ITS architecture

## 1 Scope

This Technical Report discusses the development for generic education and training requirements for the teaching of ITS architecture, and the acquisition of skills to interpret and develop ITS architectures.

This Technical Report provides suggestions to those planning education and/or training courses associated with ITS system architecture as to the subjects that should be studied.

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

<https://standards.iteh.ai/catalog/standards/sist/c18fdc40-a0af-49c0-8d9d-66752c7536ff/iso-14813-1-2008>

ISO/TR 14813-2, *Transport information and control systems — Reference model architecture(s) for the TICS sector — Part 2: Core TICS reference architecture*

ISO/IEC 19501, *Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2*

## 3 Terms and definitions

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

### 3.1

#### **architecture**

set of concepts and rules describing the interrelationship between entities in the entire system, independent of the hardware and software environment, reference [1] and described through a series of views that may be at varying levels of generality/specificity, abstraction/concretion, totality/component and so on

### 3.2

#### **system architecture (Intelligent transport)**

framework for ITS deployments

**NOTE** It is a single, high-level description of the major elements or objects and the interconnections amongst them. It provides the framework around which the interfaces, specifications and detailed system designs can be defined. An architecture is not a product design, nor a detailed specification for physical deployment, reference [1].

3.3

**business case**

structured proposal for business improvement that functions as a decision package for decision-makers

The business case should explain why a project is required for the business and what the product or service is going to be. It should include an outline of the "Return on Investment" (ROI), or a cost/benefit analysis for the project, the project's product and performance characteristics, major project risks and the opportunities.

The business case addresses, at a high level, the business needs that the project seeks to meet. It includes the reasons for the project, the expected business benefits, the options considered (with reasons for rejecting or carrying forward each option), the expected costs of the project, a GAP analysis and the expected risks.

**4 Symbols and abbreviated terms**

<b>AASHTO</b>	American Association of State Highway and Transportation Officials
<b>ANSI</b>	American National Standards Institute
<b>APTA</b>	American Public Transportation Association
<b>APEC</b>	Asia Pacific Economic Cooperation
<b>ARIB</b>	Association of Radio Industries and Businesses (Japan)
<b>ARINC</b>	Air Radio Incorporated
<b>ASTM</b>	American Society for Testing and Materials
<b>BCA</b>	Benefit cost analysis
<b>CEN</b>	Comité européen de normalisation
<b>CEPT</b>	Conférence européenne des administrations des postes et des télécommunications
<b>ETSI</b>	European Telecommunications Standards Institute
<b>EU</b>	European Union
<b>FCC</b>	Federal Communications Commission (USA)
<b>GAP</b>	good/average/poor
<b>ICT</b>	Information and Communications Technology
<b>IEC</b>	International Electrotechnical Commission
<b>IEEE</b>	Institute of Electrical and Electronics Engineers
<b>IETF</b>	Internet Engineering Task Force
<b>ITE</b>	Institute of Transportation Engineers
<b>ITS</b>	Intelligent Transport Systems
<b>ITU</b>	International Telecommunications Union
<b>ITU-T</b>	International Telecommunications Union — Telecommunications
<b>ITU-R</b>	International telecommunications Union — Radio
<b>NEMA</b>	National Electrical Manufacturers Association
<b>OASIS</b>	Organization for the Advancement of Structured Information Standards

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<b>OMG</b>	Object Management Group
<b>ROI</b>	Return on Investment
<b>SAE</b>	Society of Automotive Engineers
<b>TE&amp;A</b>	Test, Evaluation & Acceptance
<b>TIA</b>	Telecommunications Industries Association
<b>TICS</b>	Transport Information & Control Systems (old name for Intelligent Transport Systems)
<b>UN/CEFACT</b>	United Nations Centre for Trade Facilitation and Electronic Business
<b>USDOT</b>	United States Department of Transport
<b>W3C</b>	World Wide Web Consortium
<b>WG1</b>	Working group 1 (of TC 204)

## 5 Subjects for education and training

### 5.1 Background information

This Technical Report arose from work by WG1 on the elaboration of ITS Architecture standards and their application. It appeared that the successful uptake of relevant standards and practices would be dependent partly on the effectiveness of the education, training and organizational development related to ITS architecture.

The education and training requirements identified are those which have occurred within the development activities of the ISO TC204 WG1. A list of references is provided in the Bibliography. See References [6] to [17].

### 5.2 What are “Intelligent Transport Systems”?

Intelligent Transport Systems have been described in a variety of ways including this from the ITS Handbook:

“ITS embraces a broad range of information technologies (IT), satellite and communications-based information, control and digital technologies. Collectively, these offer new possibilities for solving what seem to be intractable problems of congestion, traffic accidents, inefficient logistics, and the environmental impact of surface transportation” (see Reference [1]).

### 5.3 “User Needs” and “Fundamental Services” requiring ITS

ISO 14813-1 characterizes the ITS sector as comprising 12 “ITS service domains”. These are:

- Traveller information — Provision of both static and dynamic information about the transport network to users, including modal options and transfers.
- Traffic management and operations — Management of the movement of vehicles, travellers and pedestrians throughout the road transport network.
- Vehicle Services — Enhancement of safety, security and efficiency in vehicle operations, by warnings and assistance to users or control vehicle operations.
- Freight transport — Management of commercial vehicle operations; freight and fleet management; activities that expedite the authorization process for cargo at national and jurisdictional boundaries and expedite cross-modal transfers for authorized cargo.