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Geografske informacije - Infrastrukture za prostorske podatke - 4. del: Storitveno usmerjen vidik

Geographic information - Spatial Data Infrastructure - Service centric view

Geoinformation - Geodateninfrastrukturen - Teil 4: Service-zentrierte Sicht

Information Géographique - Infrastructure de données spatiales - Vue centrée services

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Geographic information - Spatial Data Infrastructure - Service centric view

Information Géographique - Infrastructure de données spatiales - Vue centrée services

Geoinformation - Geodateninfrastrukturen - Teil 4: Service-zentrierte Sicht

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Foreword

This document (CEN/TR 15449-4:2013) has been prepared by Technical Committee CEN/TC 287 “Geographic information”, the secretariat of which is held by BSI.

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

CEN/TR 15449, *Geographic information - Spatial data infrastructures*, consists of the following parts:

— *Part 1: Reference model*

— *Part 2: Best practices*

— *Part 3: Data centric view*

— *Part 4: Service centric view*.

Introduction

Spatial Data Infrastructure (SDI) is a general term for the computerised environment for handling data that relates to a position on or near the surface of the earth. It may be defined in a range of ways, in different circumstances, from the local up to the global level.

This Technical Report focuses on the technical aspects of SDIs, thereby limiting the term SDI to mean an implementation neutral technological infrastructure for geospatial data and services, based upon standards and specifications. It does not consider an SDI as a carefully designed and dedicated information system; rather, it is viewed as a collaborative framework of disparate information systems that contain resources that stakeholders desire to share. The common denominator of SDI resources, which can be data or services, is their spatial nature. It is understood that the framework is in constant evolution, and that therefore the requirements for standards and specifications supporting SDI implementations evolve continuously.

SDIs are becoming more linked and integrated with systems developed in the context of e-Government. Important drivers for this evolution are the Digital Agenda for Europe, and related policies[1)]. By sharing emerging requirements at an early stage with the standardization bodies, users of SDIs can help influence the revision of existing or the conception of new standards. A number of recommendations are made within the Eye on Earth White Paper [1] which provides additional context and background to the service centric view.

The users of an SDI are considered to be those individuals or organisations that, in the context of their business processes, need to share and access geo-resources in a meaningful and sustainable way. Based on platform- and vendor-neutral standards and specifications, an SDI aims at assisting organisations and individuals in publishing, finding, delivering, and eventually, using geographic information and services over the internet across borders of information communities in a more cost-effective manner.

Existing material about SDIs abounds. The following reports have been taken into account in the preparation of this Technical Report:

- legal texts and guidelines produced in the context of INSPIRE;
- documents produced by ISO/TC 211 (and co-published by CEN);
- documents produced by the Open Geospatial Consortium (OGC), including the OpenGIS Reference Model (ORM) [2];
- the European Interoperability Framework and related documents;
- deliverables from European Union-funded projects (e.g. ORCHESTRA, GIGAS, SANY, ENVISION, ENVIROFI, EO2HEAVEN)[2)].

Considering the complexity of the subject and the need to capture and formalise different conceptual and modelling views, CEN/TR 15449 is comprised of multiple parts:

- *Part 1: Reference model*: This part provides a general context model for the other Parts, applying general IT architecture standards;
- *Part 2: Best Practice*: This part provides best practices guidance for implementing SDI, through the evaluation of the projects in the frame of the European Union funding programmes;

1) As described in Part 1 of this Technical Report.

2) A list of EU Funded projects is given in Part 2 of this Technical Report.

- *Part 3: Data centric view*: This part addresses concerns related to the data, which includes application schemas and metadata;

- *Part 4: Service centric view*: This current document.

Further parts may be created in the future.

1 Scope

This Technical Report describes a service-centric view of a Spatial Data Infrastructure (SDI).

The Service Centric view addresses the concepts of service specifications, the methodology for developing service specifications through the application of the relevant International Standards, and the content of such service specifications described from the perspective of the five Reference Model of Open Distributed Processing (RM-ODP) viewpoints:

- the enterprise viewpoint addresses service aspects from an organisational, business and user perspective;
- the computational viewpoint addresses service aspects from a system architect perspective;
- the information viewpoint addresses service aspects from a geospatial information expert perspective;
- the engineering viewpoint addresses service aspects from a system designer perspective;
- the technology viewpoint addresses service aspects from a system builder and implementer perspective.

The intended readership of this Technical Report is those people who are responsible for creating frameworks for SDI, experts contributing to INSPIRE experts in information and communication technologies and e-government that need to familiarise themselves with geographic information and SDI concepts, and standards developers and writers.

2 Normative references

Not applicable.

3 Terms and definitions

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

3.1
architecture
fundamental organisation of a system embodied in its components, their relationship to each other and the environment, and the principles guiding its design and evolution

[SOURCE: IEEE 1471-2000].

3.2
architectural style
co-ordinated set of architectural constraints that restricts the roles/characteristics of architectural elements and the allowed relationships among those elements within an architecture that conforms to that style

[SOURCE: [3], modified]

3.3
conceptual formalism
set of modelling concepts used to describe a conceptual model

[SOURCE: EN ISO 19101:2005]

EXAMPLE UML meta model, EXPRESS meta model.

Note 1 to entry One conceptual formalism can be expressed in several conceptual schema languages.

3.4
conceptual model
model that defines concepts of a universe of discourse

[SOURCE: EN ISO 19101:2005]

3.5
conceptual schema
formal description of a conceptual model

[SOURCE: EN ISO 19101:2005]

3.6
conceptual schema language
formal language based on a conceptual formalism for the purpose of representing conceptual schemas

[SOURCE: EN ISO 19101:2005]

EXAMPLE UML, EXPRESS, IDEF1X.

Note 1 to entry: A conceptual schema language may be lexical or graphical. Several conceptual schema languages can be based on the same conceptual formalism.

3.7
conformance
fulfilment of specified requirements

[SOURCE: EN ISO 19113:2005]

3.8
component
physical, replaceable part of a system that packages implementation and provides the realisation of a set of interfaces

[ISO/TS 19103:2005]

3.9
identifier
linguistically independent sequence of characters capable of uniquely and permanently identifying that with which it is associated

[SOURCE: ISO/IEC 11179-3:2003]

3.10
interface
named set of operations that characterise the behaviour of an entity

[SOURCE: ISO 19119:2005]

3.11
interoperability
capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units

[SOURCE: ISO/IEC 2382-1:1993]

3.12
reference frame
aggregation of the data needed by different components of an information system

3.13
resource
asset or means that fulfils a requirement

[SOURCE: EN ISO 19115:2005]

3.14
Service
delivery of value to another party, enabled by one or more capabilities

[SOURCE: OMG SoaML]

3.15
use case
specification of a sequence of actions, including variants, that a system (or other entity) can perform, interacting with actors of the system

[SOURCE: OMG UML Specification]

4 Abbreviated terms

API Application Programming Interface

AJAX Asynchronous JavaScript and XML

BPMN Business Process Model and Notation

BMM Business Motivation Metamodel

INSPIRE Infrastructure for Spatial Information in Europe

GIGAS GEOSS, INSPIRE and GMES an Action in Support

GEOSS Global Earth Observation System of Systems

GMES Global Monitoring for Environment and Security

GML Geography Markup Language

HTTP Hyper-text Transfer Protocol

IaaS Infrastructure as a Service

IT Information Technology

JSON Javascript Object Notation

OASIS Organisation for the Advancement of Structured Information Standards

ORCHESTRA Open Architecture and Spatial Data Infrastructure for Risk Management

ODP Open Distributed Processing

OGC Open Geospatial Consortium

OMG Object Management Group

ORM OpenGIS Reference Model

PaaS	Platform as a Service
REST	Representational State Transfer
RM-ODP	Reference Model of Open Distributed Processing
RPC	Remote Procedure Call
SANY	Sensors Anywhere
SaaS	Software as a Service
SDI	Spatial Data Infrastructure
SEIS	Shared Environmental Information System
SOA	Service Oriented Architecture
SoaML	Service oriented architecture Modeling Language
SOAP	Simple Object Access Protocol[3)]
SoS	System of Systems
UDDI	Universal Description, Discovery and Integration
UML	Unified Modelling Language
USDL	Universal Service Description Language
WSDL	Web Service Description Language
W3C	World Wide Web Consortium
XHTML	eXtensible HyperText Markup Language
XML	eXtensible Markup Language

5 Service-centric view on SDI

5.1 Introduction

Spatial Data Infrastructures can be regarded as a set of interconnected, distributed, information systems. Their complexity calls for a structured approach to address properly the many facets. ISO/IEC 10746-1, *Information technology - Open Distributed Processing - Reference Model: Overview* provides an overall conceptual framework for building open distributed processing systems in an incremental manner. The viewpoints of the RM-ODP standards have been widely adopted: they constitute the conceptual basis for the ISO 19100 series of geomatics standards, and they also have been employed in the OMG object management architecture [5].

This part of CEN/TR 15449 addresses the concepts of service specifications and the methodology for developing service specifications through the application of the relevant International Standards based on RM-ODP. The architecture is a set of components, connections and topologies defined through a series of viewpoints. The spatial data infrastructure of interest for this Technical Report will have multiple users, developers, operators and reviewers. Each group will view the system from their own perspective. The purpose of the architecture is to provide a description of the system from multiple viewpoints. The architecture helps to ensure that each viewpoint will be consistent with the requirements and with the other viewpoints.

3) Original meaning of the acronym SOAP, however, its use has been deprecated.

According to RM-ODP, the content of such service specifications is described from the perspective of the five viewpoints, which enable the separation of concerns:

— **The enterprise viewpoint** - service aspects from an organisational, business and user perspective.

— **The computational viewpoint -** service aspect from a system architect perspective.

— **The information viewpoint** - service aspects from a geospatial information expert perspective.

— **The engineering viewpoint** - service aspects from a system designer perspective.

— **The technology viewpoint** - service aspects from a system builder and implementer perspective.

This Technical Report focuses on platform independent descriptions of services, from the viewpoints of different stakeholders and concerns. References are given to relevant standards that can be used further for this, both for platform-independent and platform-dependent descriptions related to services. Figure 1 (adopted from [5]) illustrates the main focus of each of the five RM-ODP viewpoints, and the main question that each viewpoint addresses.

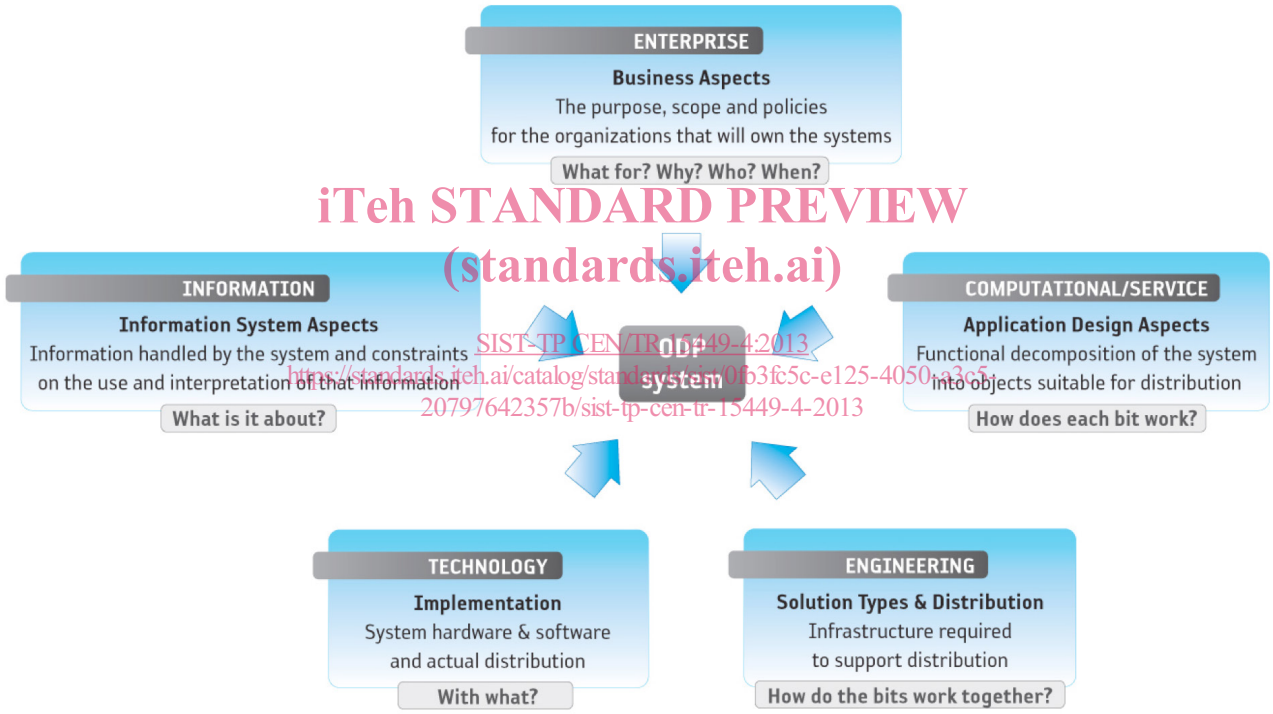

Figure 1 — ISO RM-ODP viewpoints

5.2 Use of RM-ODP viewpoints

5.2.1 The enterprise viewpoint

The enterprise viewpoint is concerned with the purpose, scope and policies of an enterprise or business and how they relate to the specified system or service. An enterprise specification of a service is a model of that service and the environment with which the service interacts. It covers the role of the service in the business and the human-user roles and business policies related to the service. *In the context of the service centric view there is a particular focus on the use cases and external functionally related to the particular services.*