



# SLOVENSKI STANDARD

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## Zdravstvena informatika - Arhitektura storitve - 3. del: Vidik obdelave informacij

Health informatics - Service architecture - Part 3: Computational viewpoint

Medizinische Informatik - Servicearchitektur - Teil 3: Verarbeitungssicht

Informatique de santé Architecture des services - Partie 3: Point de vue traitement

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### ICS:

35.240.80	Uporabniške rešitve IT v zdravstveni tehniki	IT applications in health care technology
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English Version

## Health informatics - Service architecture - Part 3: Computational viewpoint

Informatique de la santé - Architecture des services - Partie  
3: Point de vue Traitement

Medizinische Informatik - Servicearchitektur - Teil 3:  
Verarbeitungssicht

This European Standard was approved by CEN on 16 September 2007.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Contents

Page

Foreword.....	3
Introduction .....	4
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Symbols and abbreviations .....	7
5 Methodological Principles (informative) .....	7
5.1 General.....	7
5.2 Clusters of Objects .....	7
5.3 Computational language .....	8
5.4 The computational objects and Interfaces.....	8
5.5 Interaction.....	11
6 General characteristics of the Model.....	11
6.1 The two types of computational objects .....	11
6.2 The basic methods .....	11
6.2.1 General requirement.....	11
6.2.2 “Add” basic methods .....	12
6.2.3 “Update” basic methods .....	14
6.2.4 “Delete” basic methods .....	15
6.2.5 “Detail” basic methods .....	17
6.2.6 “List” basic methods .....	19
6.3 General purpose interface .....	20
6.3.1 General.....	20
6.3.2 List of methods .....	21
6.3.3 Behavioural specifications .....	21
6.4 The complex interfaces of the workflow related computational objects .....	22
6.4.1 General.....	22
6.4.2 Complex services managing healthcare workflows .....	22
6.4.3 Interfaces supporting the “Subject of Care Workflow” .....	22
6.4.4 Interfaces supporting the “Clinical Information workflow” .....	24
6.4.5 Interfaces supporting the “Activity Management workflow” .....	25
6.4.6 Behavioural specifications, common to the complex services .....	28
6.5 Common requirements of the interfaces .....	29
6.5.1 Interface documentation and organization .....	29
6.5.2 Naming criteria.....	29
6.5.3 Data types .....	30
6.5.4 Structure and organization of the interfaces .....	30
Annex A (informative) Examples of services .....	31
Bibliography .....	33

## Foreword

This document (EN 12967-3:2007) has been prepared by Technical Committee CEN/TC 251 “Health informatics”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2008, and conflicting national standards shall be withdrawn at the latest by April 2008.

This document, together with EN 12967-1 and EN 12967-2, supersedes ENV 12967-1:1998.

This document represents part two of a three-part European standard, which is a major revision of ENV 12967-1, produced under a mandate given to CEN by the European Commission and the European Free Trade Association.

This multi-part standard under the general heading: Health informatics – Service architecture consists of the following parts:

Part 1: Enterprise viewpoint

Part 2: Information viewpoint

Part 3: Computational viewpoint

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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## Introduction

This document represents the third part of EN 12967, a multi-part standard that provides guidance for the description, planning and development of new systems as well as for the integration of existing information systems, both within one enterprise and across different healthcare organisations through an architecture integrating the common data and business logic into a specific architectural layer (i.e. the middleware), distinct from individual applications and accessible throughout the whole information system through services, as shown in Figure 1.

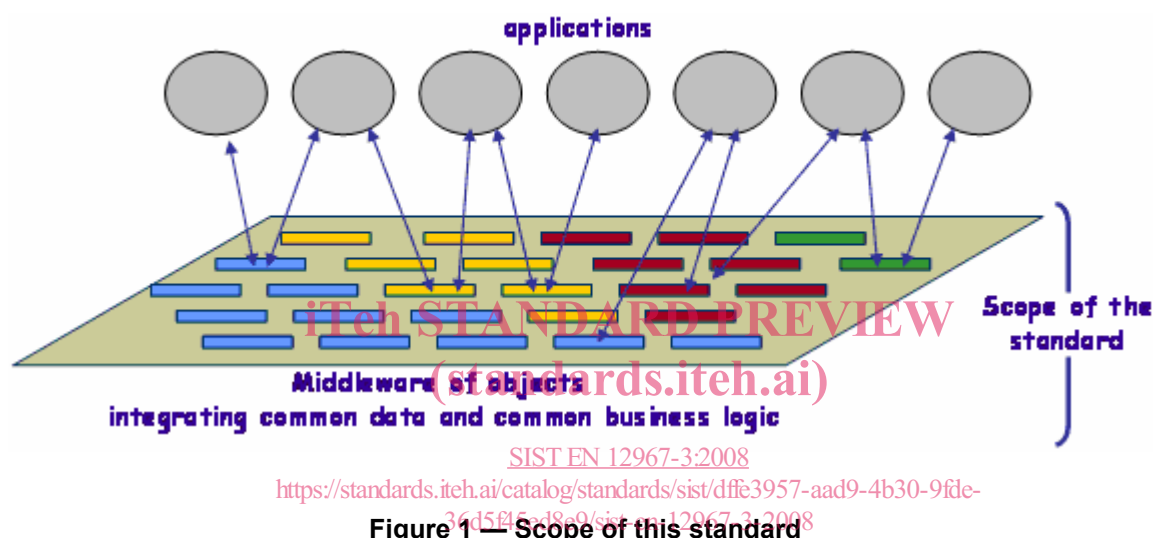


Figure 1 — Scope of this standard

The overall architecture specified by the EN 12967 standard is formalised according to ISO/IEC 10746 and is therefore structured through the three viewpoints:

- a) Enterprise Viewpoint that specifies a set of fundamental common requirements at enterprise level with respect to the organisational purposes, scopes and policies that must be supported by the information and functionality of the middleware. It also provides guidance on how one individual enterprise (e.g. a regional healthcare authority, a large hospital or any other organisation where this model is applicable) may specify and document additional specific business requirements, with a view of achieving a complete specification, adequate for the characteristics of that enterprise.

Enterprise Viewpoint is specified in Part 1 of the standard; document EN 12967-1.

- b) Information Viewpoint that specifies the fundamental semantics of the information model to be implemented by the middleware to integrate the common enterprise data and to support the enterprise requirements formalised in the Enterprise Viewpoint. It also provides guidance on how one individual enterprise may extend the standard model with additional concepts, needed to support local requirements in terms of information to be put in common.

Information Viewpoint is specified in Part 2 of the standard; document EN 12967-2.

- c) Computational Viewpoint that specifies the scope and characteristics of the services that must be provided by the middleware for allowing the access to the common data as well as the execution of the business logic supporting the enterprise processes identified in the Information and Enterprise

Viewpoints. It also provides guidance on how one individual enterprise may specify additional services, needed to support local specific requirements in terms of common business logic to be implemented.

Computational Viewpoint is specified in Part 3 of the standard; document EN 12967-3.

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## 1 Scope

HISA specifies fundamental requirements for 'information infrastructure' and healthcare specific middleware services.

This part of the standard specifies the fundamental characteristics of the computational model to be implemented by a specific architectural layer of the information system (i.e. the middleware) to provide a comprehensive and integrated interface to the common enterprise information and to support the fundamental business processes of the healthcare organisation, as defined in the document "Health Informatics – Service Architecture - Part 1: Enterprise Viewpoint". The computational model is specified without any –explicit or implicit– assumption about the physical technologies, tools or solutions to be adopted for its physical implementation in the various target scenarios. The specification is nevertheless formal, complete and non-ambiguous enough to allow implementers to derive an efficient design of the system in the specific technological environment that will be selected for the physical implementation.

The computational model provides the basis for ensuring consistency between different engineering and technology specifications (including programming languages and communication mechanisms) since they must be consistent with the same computational object model. This consistency allows open inter-working and portability of components in the resulting implementation.

This specification does not aim at representing a fixed, complete, specification of all possible interfaces that may be necessary for any requirement of any healthcare enterprise. It specifies only a set of characteristics – in terms of overall organisation and individual computational objects, identified as fundamental and common to all healthcare organisations, and that are satisfied by the computational model implemented by the middleware.

Preserving consistency with the provisions of this standard, physical implementations shall allow extensions to the standard computational model in order to support additional and local requirements. Extensions shall include both the definition of additional properties in the objects of the standard model and the implementation of entirely new objects.

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Also this standard specification shall be extendable over time according to the evolution of the applicable standardisation initiatives. The specification of extensions shall be carried out according to the methodology defined in paragraph 7 "Methodology for extensions" of document EN 12967-1 "Health Informatics – Service Architecture - Part 1: Enterprise Viewpoint", which identifies a set of healthcare common information services, describing their need and the methodology through which they will be used. These are only the minimal identifiable set of services according to the needs of the healthcare enterprise, and constituting the 'middleware' platform (i.e. integration platform) to serve as the basis for healthcare applications, e.g. EHR or patient administration.

## 2 Normative references

Not applicable.

## 3 Terms and definitions

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

### 3.1 interface

abstraction of the behaviour of an object that consists of a subset of the possible interaction mechanisms of that object, together with the set of constraints when that interaction occurs



### 3.2

#### computational object

object as seen in a computational viewpoint representing the functional decomposition of a system showing a state and behaviour as well as interactions through interfaces with other computational objects

## 4 Symbols and abbreviations

HISA Health Informatics - Service Architecture

ODP Open Distributed Processing

UML Unified Modelling Language

EHR Electronic Health Record

## 5 Methodological Principles (informative)

### 5.1 General

This part three of the standard encompasses the computational viewpoint, which is concerned in answering HISA middleware design aspects through the functional decomposition of the system into a set of computational objects that interact at interfaces, also enabling distribution. The Health Informatics Service Architecture will thus be further specified in terms of computational objects, which manage information and provide services, and their interfaces, starting from the Clusters of objects identified in part 1 Enterprise Viewpoint and further detailed in part 2 Information Viewpoint.

### 5.2 Clusters of Objects

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The **Enterprise Viewpoint** has identified the scope need for, and use of the HISA standard by both developers and end users. It has described the scope of the business objects from the organisation viewpoint, by summarizing the related user activities and requirements through natural language. During this process the main Healthcare Common clusters of objects have been identified:

#### — Subject of care objects

These objects handle the information necessary for supporting the users' activities identified in the "Subject of Care workflow" of the Enterprise Viewpoint.

#### — Activity management objects

These objects handle the information necessary for supporting the users' activities identified in the "Activity Management workflow" of the Enterprise Viewpoint.

#### — Clinical information objects

These objects handle the information necessary for supporting the users' activities identified in the "Clinical Information workflow" of the Enterprise Viewpoint.

#### — Users and authorisation objects

These objects handle the information necessary for supporting the users' activities related to the management of users and authorisations, as identified in the Enterprise Viewpoint.

— **Resources objects**

These objects handle the information necessary for supporting the users' activities related to the management of resources, as identified in the Enterprise Viewpoint.

— **Classification objects**

These objects handle the information necessary for supporting the users' activities related to the management of classifications, coding criteria and dictionaries, as identified in the Enterprise Viewpoint.

— **Messaging objects**

These objects handle the information necessary for supporting the structuring of data and the communications with other systems through messaging mechanisms, as identified in the Enterprise Viewpoint.

The **Information Viewpoint** has formalised the conceptual model of the information being manipulated by the services, arising from the textual descriptions contained in the Enterprise Viewpoint. For each of the clusters of objects, an information model composed of information objects has been identified in the information viewpoint.

This **Computational Viewpoint** shall define the computational model, composed of computational objects, capable of meeting the requirements described in the Enterprise Viewpoint. It is necessary here to identify its relationship to the information model, and the interfaces or access mechanisms it provides to access the information handled by the system, which in the following shall also be referred to as methods or services.

The individual methods provided by the computational objects shall be described illustrating how they allow actual access to the information handled by the system (identifying the interfaces, the constraints, as well as which information of the underlying overall information model is accessed), and eventual parallel actions to be taken.

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### 5.3 Computational language

The computational viewpoint is directly concerned with the distribution of processing but not with the interaction mechanisms that enable distribution to occur. The computational specification decomposes the system into objects performing individual functions and interacting at well-defined interfaces.

The heart of the computational language is the computational object model, which constrains the computational specification by defining:

- form of interface that an object can have;
- way the interfaces can be bound and the forms of interaction which can take place at them;
- actions an object can perform, in particular the creation of new objects and interfaces.

### 5.4 The computational objects and Interfaces

The computational objects provide the interfaces through which it is possible to access and manipulate the information managed by the information objects described in the information viewpoint. Each cluster itself can be seen as a computational object, providing interfaces that comprise all interfaces of the objects belonging to such cluster. The computational objects shall be defined at the level of the HISA object.

For each cluster of objects there will be a set of computational objects providing interfaces allowing the management of the common information and business logic relevant to the organization. Two types of computational objects are foreseen per cluster:

- basic computational objects deriving directly from the corresponding information object (i.e. one computational object per information object);
- complex, higher-level computational objects providing interfaces achieving higher-level complex business logic.

Thus, the majority of the computational objects shall derive directly from the corresponding information objects. The further higher-level of computational objects also envisaged shall provide interfaces achieving higher-level complex business logic on possibly multiple information objects within the same operation. Such more complex business logic is described in the Enterprise Viewpoint and has to do with the main workflow processes (i.e. patient management, activity management, etc.).

NOTE 1 The term patient is used in this specification as a synonym of Subject of Care as has been done in the other parts of this standard

The basic computational objects, corresponding one to one to the information objects, will be equipped with standard lower-level basic interfaces having the scope of adding, updating and deleting – in short maintaining, listing, and getting one instance of the main classes described in the information viewpoint. These basic methods allow the access to and the manipulation of each element of the underlying model and secure the openness of the system.

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The following figure shows an example:



**Figure 2 — Example of "basic services"**

NOTE 2 The actual basic services that shall be available for HISA objects are detailed in section 6.2

The higher-level computational objects implement more complex business transactions on the objects of the information model, simplifying and ensuring consistency of developments and building common fundamental procedures of the organisation.

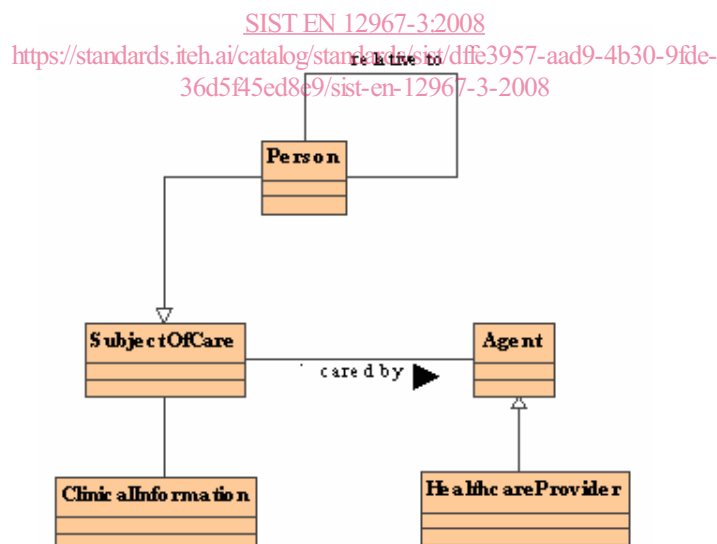
EXAMPLE:

Patient/person area, including registering a person, patient administration, merging patient identifiers, period of care, etc.

Activity management and life cycle, including requests, planning, booking, etc.

Clinical and EHR, including terminologies, classifications, problem-orientation, etc.

Resource management, including standard usages, etc.



**Figure 3 — Example of "complex service"**

NOTE 3 The actual complex services that shall be available for HISA objects are detailed in the clauses of section 6.4

The HISA middleware shall also provide a set of interfaces relating to functionalities of general utility for the management of the overall system, with respect to the execution of particular functionalities. These services do not pertain to any specific middleware component, and are related to general-purpose issues like session management (logging in and out of the system, setting system variables, etc.), transaction management, etc. These services will be provided by at least a further computational object equipped with appropriate methods, namely the general purpose interface.