SLOVENSKI STANDARD
SIST-TP CR 12587:2003

01-oktober-2003

Medicinska informatika ï Metodologija za razvijanje sporoļ il v zdravstvenem varstvu

Medical Informatics - Methodology for the development of healthcare messages

Methodik für den Entwurf von Nachrichten (Inhalte, Strukturen) im Gesundheitswesen

Méthodologie pour le développement des messages dans le domaine de la santé

Ta slovenski standard je istoveten z: CR 12587:1996

ICS:

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

SIST-TP CR 12587:2003 **en**

REPORT
RAPPORT
BERICHT

CR 12587

October 1996
Octobre 1996
Oktober 1996

English version

Medical Informatics - Methodology for the development of healthcare messages

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This CEN REPORT has been prepared by Technical Committee CEN/TC 251 "Medical informatics" and has been approved by CEN on 1996-10-23.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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TABLE OF CONTENTS

Foreword

Method for the development of healthcare messages

This CEN Report has been prepared under the direction of the European Committee for Standardisation (CEN) and is being submitted for approval by CEN/TC251 "Medical Informatics".

The preparation of this CEN Report was undertaken by CEN/TC 251/PT3-025 and covered by the European Commission under voucher BC/CEN/93/17.12

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Introduction

The main goal of WG3 is to develop standardised healthcare EDI messages. To ensure the overall consistency and coherence between the various standard messages (to be) developed, it is important that the message development activities conducted in a variety of domains are based upon the same approach and that the resulting deliverables are structured and presented consistently. The goal of this CEN Report is to describe the method to be used for the definition of character-based EDI messages to be used in healthcare, as currently no adequate method exists for this purpose[1] .

The method builds upon and extends the approach as defined and used so far by WG3 (see CR 1350:1993 and the European Prestandard for the messages for exchange of laboratory information), and contains the following main components:

- establishment of the user requirements in the selected healthcare messaging domain.
- both an informal and formal specification of the messaging scenarios. This includes the definition of the communication roles, the messaging services (functions) to be supported by these roles and the major interrelationships between the EDI message types required to cover the needs for a particular domain.
- the formal definition of the information that is shared between the communication roles, through the Domain Information Model.
- the formal definition of the messages required to support the information exchange needs (General Message Descriptions), independently of the EDI-syntax used for the implementation.
- how to translate the General Message Descriptions into hierarchical structure specifications for implementation using a standard EDI-syntax,
- how to develop Implementable Message Specifications using a standard EDI-syntax (e.g. ASN.1 and EDIFACT).

The report specifies the method to be used by CEN/TC 251/WG3 in particular, but the underlying principles may be used by other CEN/TC 251 working groups and even outside the healthcare messaging domain.

The main clauses are clause 4 and 5. Clause 4 is a summary of the overall activities in the context of the development of standard messages, clause 5 defines each activity covered by the scope of this report in detail.

The annexes deal with issues arising related to the approach:

- annex A positions the message development approach in the context of the overall healthcare communications framework and in the overall context of standards,
- annex B describes a number of management issues related to the message development process (iteration, process management, quality assurance activities, project team organisation),
- annex C defines the attribute data types, used for the specification of the messages, in detail.
- annex D gives 2 additional approaches for the transformation of an object-oriented general message description into a hierarchical general message description.
- annex E deals with the aspects when moving to implementation (mainly profiling, i.e. customisation of the message specifications towards local implementation needs).
- annex F clarifies the scope of this method when considered in the context of more tightly coupled systems.
- annex G is a paradigm annex on how to read the models included in messaging standards based upon this approach

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[1] Most methods are oriented towards the development of systems. This approach aims specifically at the definition of standardised EDI messages, in such at way that these specifications are complete, independent on the underlying implementations (implying a longer life-cycle for the specifications), easy to understand by the end-users and usable towards system developers.

- annex H is an executive summary of the approach.

How to read and use this document:

If you are new to the work of CEN/TC 251/WG3, and if you want to get the essential information about the way the Working Group develops standardised messages: after this introduction:

1. annex A,
2. annex H (executive summary)
3. clause 1 (scope),
4. clause 4 (message development overview).

If you know a little about the approach as used by the Working Group, and if you want to get more familiar with it:

1. annex A,
2. clause 1 (scope),
3. clause 4 (message development overview) or annex F (executive summary)
4. clause 5 (detailed message development activity description) or annex G (summary of symbols).

If you are knowledgeable about the approach and the activities of CEN/TC 251/WG3, and if you want to apply it for a specific message development task:

1. clause 1 (scope),
2. clause 4 (message development overview),
3. clause 5 (detailed message development activity description),
4. annex B (message development process management issues),
5. use annex C for issues arising related to attribute data types,
6. use annex D for the troubleshooting related to the construction of hierarchical GMDs,
7. use annex E for the modification of the resulting message specifications to more local information exchange needs,

If you want to use the deliverables resulting from a message development group which followed the approach:

1. annex H (executive summary),
2. clause 4 (message development overview),
3. clause 5 (detailed message development activity description) or annex G (summary of symbols).

1. Scope.

The scope of this CEN report is to specify a method for the development of European Standard message specifications for the electronic exchange of structured character-based information, between autonomous computer systems within and between organisations, for purposes related to healthcare. Such message standards are essential if healthcare services are to obtain the benefits of open systems and avoid the constraints of proprietary interfaces. The method specifies the activities of the message development process and the structure and the components of the resulting deliverables.

The scope of this report does not include method specifications for the development of other subject areas covered by working groups of CEN/TC 251, EWOS EG-MED and WEEB/MD9.

The scope covers the development process of standardised messages, starting from the user requirements up to the delivery of message specifications using EDIFACT and ASN.1, the two international syntax standards selected in view of CR 1350:1993, but the report does not exclude other syntaxes (e.g. SGML) from being used for the syntax specific message specifications.

The scope of the Report is limited to the specification of standardised messages, therefore it does not include in its scope areas such as conformance testing of messaging applications, the implementation method for messaging standards, the maintenance of the messaging standards. It does not include in its scope issues relating to data secrecy and data protection. It does not specify methods for establishing directories of coding schemes, for data sets or for messages. It does not include specifications related to the messaging standards approval process.

The method defined by this CEN Report supports and is validated for the development of message specifications for the electronic exchange of structured character-based information in healthcare, but it does not by its nature exclude the method to be used in a wider domain (i.e. other types of information or other domains).

2. References

This report incorporates by dated or undated reference, provisions from other publications. These references are cited in the appropriate places in the text and the publications are listed hereafter.

CR 1350 :1993	Investigation of syntaxes for existing interchange formats to be used in Healthcare
ENV 1068 :1993	Medical Informatics - Healthcare information interchange -Registration of coding schemes
ENV 1613 : 1994	Medical Informatics - Messages for the exchange of laboratory information
ISO 646 : 1991	Information technology - ISO 7-bit coded character set for information interchange
ISO 2382 : 1987	Information processing - Vocabulary Part 4 : Organisation of data
ISO 6523 : 1984	Data interchange - Structure for the identification of organisations
ISO 8824-1 : 1993	Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1) Part 1 : Specification of basic notation
ISO 8825-1 : 1993	Information technology - Open Systems Interconnection - Specification of ASN.1 encoding rules Part 1 : Basic Encoding Rules (BER)
ISO 8601 : 1988	Data elements and interchange formats - Information interchange - Representation of dates and times
ISO 8859 : 1987	Information Processing - Registration of graphics character subrepertoires - Eight-bit single byte coded graphic character sets
ISO 9735 : 1992	Electronic data interchange for administration, commerce and transport (EDIFACT) - Application level syntax rules.
1991 :	CEN/CENELEC Internal Regulations : Part 3 : Rules for the drafting and presentation of European Standards (PNE-Rules).

ISO/IEC JTC1/WG3 N255 : 1994-01-31 Open-edi Reference Model Standard - Working Draft.

ISO/IEC JTC1/WG3 N268 : 1994-03-28 Concepts and notations for Open-edi Scenarios.

3. Definitions & Acronyms

3.1. Definitions

For the purposes of this report, the following definitions (listed in alphabetical order) apply:

code meaning: Element within a coded set.

EXAMPLE: "Paris Charles-De-Gaulle" which is mapped on to the three-letter abbreviation "CDG" by the coding scheme for three-letter abbreviations of airport names.

[ENV 1068]

code value: Result of applying a coding scheme to a code meaning.

EXAMPLE: "CDG" as the representation of "Paris Charles-De-Gaulle" in the coding scheme for three-letter representations of airport names.

[ENV 1068]

[ISO 2382-1987], modified

coding scheme: Collection of rules that maps the elements of one set on to the elements of a second set.

[ENV 1068]

[ISO 2382-1987], modified

communication party: The party involved in the communication.

communication role: The role of a party related to communication

domain information model: Conceptual model describing common concepts and their relationships for communication parties required to facilitate exchange of information between these parties within a specific domain of healthcare.

NOTE 1: In this report the abbreviation DIM is used.

NOTE 2: The DIM may be regarded as, but is not necessarily limited to, a super-set of the General Message Descriptions defined for a given healthcare EDI domain.

general message description: Subset of a domain information model prescribing the information content and semantic structure of a healthcare message used to meet one or more identified information interchange requirements.

NOTE 1: General message descriptions are independent of the syntax used for constructing an actual message. They provide statement of the information interchange requirements in a form that can be implemented using different syntaxes.

NOTE 2: In this report the abbreviation GMD is used.

GMD profile: Specification derived from an general message description, supporting all the GMD mandatory components, but supporting a subset only of the GMD optional elements, appropriate to the specific business requirements of the communicating parties.

healthcare coding scheme designator: Unique permanent identifier of a healthcare coding scheme registered for use in information interchange under the terms of the European Prestandard ENV 1068.

healthcare EDI application: The functional and technological solution which supports a healthcare EDI service.

healthcare EDI domain: A practical grouping of the healthcare EDI services for the purpose of standardisation which sets the scope for a H-EDI standard.

EXAMPLE: Information interchange in clinical chemistry.

healthcare EDI service: The medical or administrative service provided by one healthcare party to other healthcare parties by use of EDI

healthcare message : An identified, named and structured set of functionally related information which fulfils a specific healthcare business purpose in the context of information interchange.

hierarchical general message description: a general message description specified using a strictly hierarchical structure with the same functionality as the corresponding non-hierarchical general message description.

NOTE 1: A hierarchical general message description must have a single root.

NOTE 2: A lower level component of a hierarchical general message description must always have exactly one parent component.

NOTE 3: In this report the abbreviation H-GMD is used.

implementable message specification: Specification of a general message description in a particular message syntax.

NOTE: In this report the abbreviation IMS is used.

IMS profile: Specification derived from an implementable message specification, supporting all the IMS mandatory components, but supporting a subset only of the IMS optional elements, appropriate to the specific business requirements of the communicating parties.

message syntax: System of rules and definitions specifying the basic components, their interrelationships and their arrangement within messages

3.2. Acronyms

ASN.1: Abstract Syntax Notation One

DIM: Domain Information Model

EDI: Electronic Data Interchange

GMD: General Message Description

HCD: Healthcare Coding Scheme Designator

H-EDI: Electronic Data Interchange in Healthcare

H-GMD: Hierarchical General Message Description

ICD: International Coding scheme Designator

IMS: Implementable Message Specification

MIG: Message Implementation Guidelines

PNE-rules: The rules for the drafting of European Standards

UN/EFIFACT: United Nations Electronic Data Interchange for Administration, Commerce and Transport

UNSM: United Nations Standard Message

4. Summary of the overall activities in the context of standard healthcare EDI message development.

The method described here builds on the recommendations contained in the CEN Report produced by CEN/TC 251 (Medical Informatics) on "Investigation of syntaxes for existing interchange formats to be used in Healthcare" (CR 1350:1993). The application of the method for message development purposes by CEN/TC 251/PT3-008 in the domain of messages for the exchange of laboratory information and the experience of users in identifying and agreeing implementable subsets at national or more local level have made a particular contribution to this approach.

4.1. The context and purpose of the message development activity.

Note 1: see annex A for a detailed description of the healthcare communications framework.

The increased used of computer systems and computer networks has created a new generation of healthcare EDI-applications (H-EDI applications). An example of a H-EDI application is the exchange of laboratory requests and reports between GP medical record systems and laboratory systems via EDI.

When developing these applications, the healthcare aspects (end-user requirements, privacy needs, ...) and the technological aspects (EDI-syntaxes, computer platforms, ...) must be considered together with the organisational context where the H-EDI application is to be used.

The objective of a H-EDI application is to support healthcare EDI services (H-EDI services). Examples of H-EDI services are the electronic transfer of information related to the ordering and reporting of laboratory investigations, radiological investigations, admission and discharge to and from hospital, statistical information related to healthcare activities, transfer of medical records, reimbursement, etc...

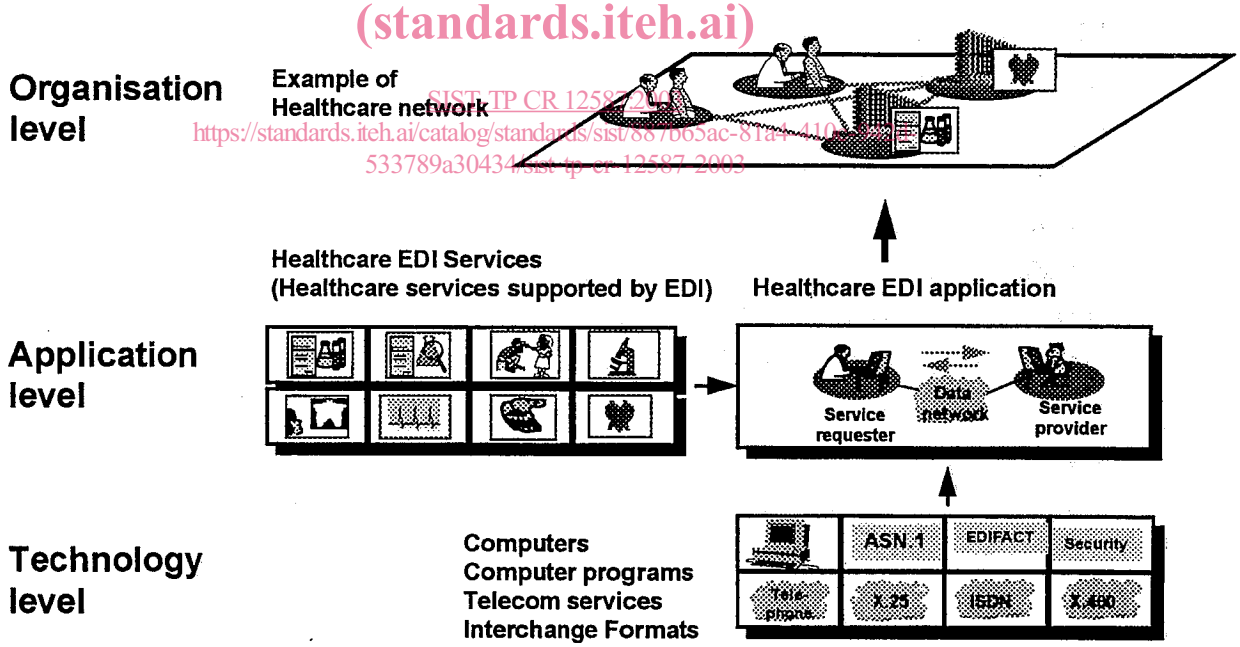

Figure 1: Context of healthcare communications and messages

H-EDI-services define the purpose of the communication between the communicating parties and thus the purpose for the messages exchanged between these parties. Based on the H-EDI-service needs, the information required for the interchange can be determined.

In order to obtain the objective of EDI which is to ensure unambiguous interpretation and a shared understanding of the data in a message, it is essential that only commonly defined information is exchanged with EDI. There is, therefore, a need to determine the information which is to be exchanged between the parties involved in the communication.

An EDI standard message enables the transfer of structured computer processable information conforming to agreed standards, from one independently managed computer system to another.

The purpose of the message development activity is to use the healthcare requirements, the technological solutions, the organisational needs (including existing standards in these areas) for the development of a standard EDI message specification, implementable by system developers and satisfying the user needs. This report addresses the method within the overall context of the message development activity.

4.2. The overall standard message development process

The message development activity is basically a three-fold process:

- it starts with the identification of the healthcare EDI messaging needs,
- the activities part of the message development approach described in this report are the central component,
- it ends with the preparation for implementation of the standardised messages.

After implementation change management mechanisms are required for all message development results.

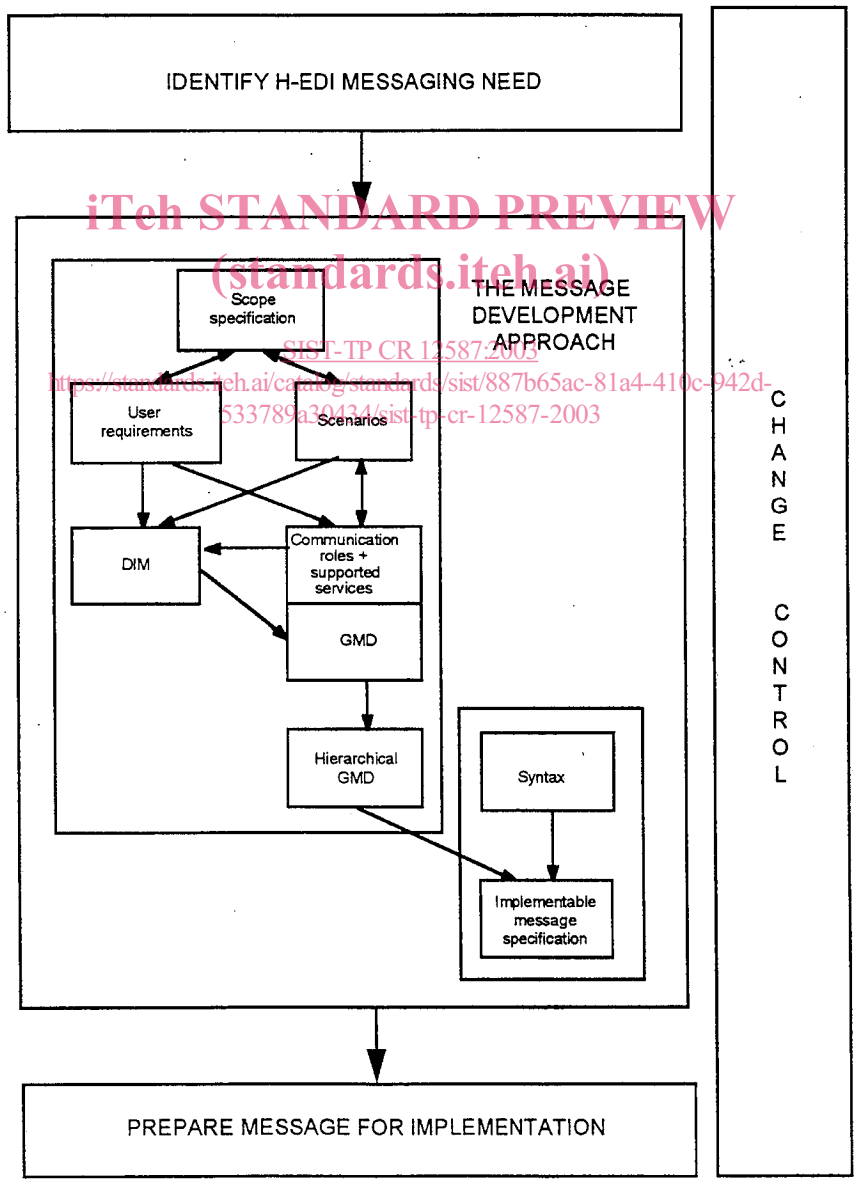

Figure 2: Overview of the message development activities.