

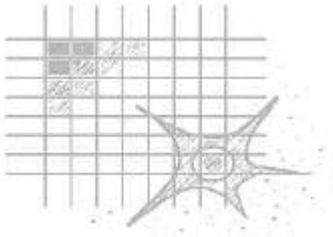
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## **Advice nr 4 of the Telematics Commission**

"Telematics Standards in relation to the Health Sector"

### **Working group 'Data'**

Approved by the 24/04/2001 session of the plenary committee



## **Electronic Health Care Messages**

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### **General Objectives of the Working Group**

To promote standards for electronic exchange of health care data between actors in the health care domain.

- The working group will focus by priority on the exchange of clinical data across organisations' boundaries (hospitals, ambulatory health care practitioners, other health care institutions,...).
- The working group will give a lower priority to the exchange of administrative data within the boundaries of a same organisation (one hospital for example).

The following constraints were considered:

- To take into consideration well spread de facto standards that exist on national and international level.
- To progress through a flexible and incremental method for the development of messages with various complexity levels, rather than addressing a complete conceptual model of electronic health care record.

## **Recommendations regarding national development of standardized electronic health care messages**

### **- Recommendation 1 : XML**

The use of the XML (eXtensible Markup Language) format is recommended as a syntax for health care messaging implementation.

Advantages of XML are its widespread industry acceptance, almost total support for XML throughout the world and global availability of an ever-increasing number of tools such as editors and browsers. In addition, it is demonstrated that XML has a number of benefits for storage or exchange of medical record information.

### **- Recommendation 2 : Generic message structure**

The generic message structure defines a simple, minimal and practical framework for the exchange of clinical data.

## **Overview**

- A message is composed of a header (including the communication parties - sender and recipients, and the date and time of the creation of the message) and one or more exchanged documents related to one or more patients.
- A document is a container for an amount of information that is linked to one and only one single patient.

A document contains one or more transactions related to the patient concerned by the document.

- A transaction is defined as the information generated about a patient by a single author (who is responsible of the accuracy of the information) at one point of time (the creation date and time).

A transaction is commonly linked to a contact of the related patient within the health care system or an interaction, when the patient is not present, between a health care practitioner and the record of the patient.

The information contained by a transaction encapsulates a cohort of clinical findings (or data entries) organized in items and/or collections.

A transaction does not contain other transactions.

Each transaction relates to a single transaction type (or name).

- An item is an elemental unit of data entry and is the smallest unit of information which remains meaningful when considered alone.

Each item relates to a single item type (or name) and has a content (or value).

The content of an item can be atomic (one single element) or compound (multiple elements).

The elements of an item can be a wide range of data types including text strings, numeric values, dates, files or reference to external stored files.

An item content can then accommodate any textual, numerical, quantity, time-related, coded (referring to a given coding scheme) or multi-media data type.

- A collection contains groups of data entries : it is a recursive structure for aggregation of additional collections, items or a mixture of the two.

Each collection relates to a single collection type (or name).

The collection structure allows contained item(s) and other collection(s) to be hierarchically organized and grouped under common data subject.

## Detailed and formal description

The message and the message elements have the following minimal structure :

### Message

➤ Message = Header + Document(s)

A message is composed of an header and one or more exchanged documents.

### Message Header

➤ Header = [ ID + Date + Time + Sender + Recipient(s) + Version/Level] + Services

The message header contains identification elements and services elements.

Identification elements are

- unique message identifier (ID),
- creation date and time,
- identification elements of communication parties – sender and recipient(s),
- version (*see recommendation 8*) and level (*see recommendation 3*) of the standard to which the message complies.

Service elements are

- request for acknowledgement,
- indication of urgency,
- references to other messages.

### Document

➤ Document = [ ID + Patient ] + Transaction(s)

A document contains identification elements and one or more transaction elements.

Identification elements are

- unique document identifier (ID),
- patient identification element.

## Transaction

➤ Transaction = [ ID + Date + Time + Author + Agents + Type ] + Item(s) + Collection(s)

A transaction contains identification elements and at least one collection or item.

Identification elements are

- unique transaction identifier (ID),
- creation date and time,
- author,
- one or more other related agents (validator, requester, provider) attributes (identification, date and time),
- type of transaction (coded).

## Collection

➤ Collection = [ ID + Type ] + Item(s) + Collection(s)

A collection contains identification elements and at least one collection or item.

Identification elements are

- unique collection identifier (ID),
- type of collection (coded).

## Item

➤ Item = [ ID + Type ] + Content

An item contains identification elements and a content (made of elements).

Identification elements are

- unique item identifier (ID),
- type of item (coded).

## - Recommendation 3 : Standardization levels

Four standardization levels are defined to allow a phased approach of the complexity of the messages implemented using the generic message structure.

### Overview

The level A implements message, message header, document, transaction types, the file item type (*the content of the item is a file*) and the free item type (*the content of the item is a user-defined XML structure*).

The level B implements collection types in addition to level A.

The level C implements other item types in addition to level B.

The level D implements coded item content in addition to level C.

Basic data types will be implemented while required.

### Level A : Normalized Transaction Type

A message of level A contains transactions with one single file or free item. Collection and other item types are not used.

- Transaction = [ ID + Date+Time + Author + Agents + Type ] + Item
- Item = [ ID + (TypeFile | TypeFree) ] + [ File | Free ]

### Level B : Normalized Collection Type

A message of level B contains transactions with collections of file and/or free items. Collection types are used. Other item types are not used.

- Transaction = [ ID + Date+Time + Author + Agents + Type ] + Collection(s)
- Collection = [ ID + Type ] + Item(s) + Collection(s)
- Item = [ ID + (TypeFile | TypeFree) ] + [ File | Free ]

### Level C : Normalized Item Type

Same as level B plus the use of other item types without coded item contents. Same as generic message structure but coded item contents are not used.

- Transaction = [ ID + Date + Time + Author + Agents + Type ] + Item(s) + Collection(s)
- Collection = [ ID + Type ] + Item(s) + Collection(s)
- Item = [ ID + Type ] + Uncoded content

## Level D : Normalized Item Content

Same as level C plus the use of coded item contents.  
Same as generic message structure.

- Transaction = [ ID + Date + Time + Author + Agents + Type ] + Item(s) + Collection(s)
- Collection = [ ID + Type ] + Item(s) + Collection(s)
- Item = [ ID + Type ] + Coded content

### - Recommendation 4 : Priority list for implementation

The working group recommends the following priority list for implementation :

#### Transaction types

- Contact report
- Admission notification
- Discharge notification
- Death notification
- Admission letter
- Provisional discharge letter
- Discharge letter
- Laboratory test request
- Laboratory result
- Procedure request
- Procedure result
- Drug prescription
- Note
- Alert
- RCM/MKG
- RIM/MVG
- RPM/MPG
- Epidemiological survey

#### Item types

- Free item : the content of the item is a user-defined XML structure
- File item : the content of the item is a file
- Drug and drug therapy item
- Laboratory test and result item
- Clinical coded item

## Basic data types

- Patient (including person identification and demographic data)
- Healthcare party (including person or institution identification and address representation)
- Code (with reference to a given coding scheme)
- Moment (date and time representation)
- Number (real, integer)
- Text (string and set of string)
- Boolean (logical data)
- File (embedded file or reference to external file)

Necessary collection, other item and basic data types will be implemented while required.

### **- Recommendation 5 : Creation and maintenance of a national XML templates repository server and a national terminology server**

It is recommended that the generic message structure and necessary related elements should be implemented in the form of XML templates (DTD - document type definitions or Schema) using English terms.

The resulting templates, together with help documents for users, should be freely available on a national templates public repository web server.

The English terms of the templates should be translated and explained in national Belgian languages and these informations should be freely available on a national terminology public web server.

An permanent expert team for maintenance of the results and users assistance should be available.

### **- Recommendation 6 : Standard coding systems - Creation and maintenance of a national multilingual coding systems server**

Standard coding systems should be recommended.

The corresponding code lists, with the texts (in English and national Belgian languages) describing the code definitions, should be freely available, together with help documents for users, through a national multilingual coding systems public web server.

An expert team for maintenance of the results and users assistance should be available.

- **Recommendation 7 : Existing international standards**

As for the current recommendation, the working group will consider CEN (Comité Européen de Normalisation - European Committee for Standardization) 13606 pre-norm (Electronic healthcare communication) and GEHR (Good European Health Record) european model, together with national initiatives, namely Prorec conceptual model based on CEN 12265 pre-norm and the KMEHR (Kindly Marked-Up Electronic Health Care Record) project results, for further recommendations and developments about clinical health care exchange messages.

The working group acknowledges HL7 as a widely used international exchange standard for deployment within health care institutions. The reuse of HL7 messages, in particular administrative 'admission – discharge – transfer' (ADT) and orders messages, is recommended whenever appropriated.

- **Recommendation 8 : Further actions**

The working group will validate a concrete XML (*recommendation 1*) implementation of the generic message structure (*recommendation 2*) and the proposed priority list of types (*recommendation 4*).

The working group will consider in the future an enlarged list of transaction, collection, item and data types.

It is also proposed to enrich the generic message structure elements with attributes and modifiers fields.

As the generic message structure will evolve, a simple linear version scheme will be proposed having the following characteristics : a new version will be based on the previous version and each version will be uniquely identified with a systematic revision identifier.

To allow secure and efficient data communication in complex contexts and environments, distribution rules have to be formalized and implemented.

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## References

### Publications

Considerations for a Memorandum of understanding on Intensifying the collaboration between CEN/TC 251 and HL7 (CEN/TC 251 doc no N99-106).

Harmonising CEN and HL7 work – Some issues for discussion  
CEN/TC 251 chairman (CEN/TC 251 doc no N00-003) 2000-01-30.

Health Informatics - Electronic Healthcare Record Communication - Part 4 Messages for the Exchange of Record Information CEN/TC 251 PT029.

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HL7 Standard version 2.3, 1997, Health Level Seven publication.

HL7 Version 2.3 and Progress Toward HL7 version 3.0, M.J. Shafarman.

Projet KMEHR : Rapport final, version 1.0, October 99.

Carenet : objectives, functionalities, planning.

Long-term storage of electronic healthcare information in XML format  
Hans Peterson, The Park project, 01-01-2000.

### Internet sites

CEN model	<a href="http://www.centc251.org">http://www.centc251.org</a>
HL7	<a href="http://www.mcis.duke.edu/standards/HL7/hl7.htm">http://www.mcis.duke.edu/standards/HL7/hl7.htm</a>
GEHR	<a href="http://www.gehr.org">http://www.gehr.org</a>
KMEHR project	<a href="http://www.users.skynet.be/mb/kmehr.htm">http://www.users.skynet.be/mb/kmehr.htm</a>
PROREC model	<a href="http://www.users.skynet.be/mb/kmehr/kmehr4.htm">http://www.users.skynet.be/mb/kmehr/kmehr4.htm</a>
XML	<a href="http://www.w3.org/XML">http://www.w3.org/XML</a>
XML implementation of PT29	<a href="http://www.clinical-info.co.uk/xmlpr.htm">http://www.clinical-info.co.uk/xmlpr.htm</a>

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