

UDC

Descriptors

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English Version

Health Informatics

15 **Electronic Healthcare Record Communication - Messages for the exchange of information**

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This document is a proposed Interim Report (INR)
It is to be considered for acceptance by TC251 WGI
It was drafted by CEN/TC 251/PT29

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CEN

European Committee for Standardisation

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INTERIM REPORT FOREWORD

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This INTERIM REPORT which forms a stage in the development of a European Prestandard has been prepared under the direction of the European Committee for Standardisation (CEN) and is being submitted for consideration by CEN/TC 251 WI "Medical Informatics - Models and Communication".

The preparation of this Prestandard is being undertaken by Project Team 29 of CEN TC251 supported by the European Commission and European Free Trade Association under voucher BC/CEN.97/23.1.1.

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This release of the Report is submitted to the CEN TC251 WGI and other interested parties as a basis for comment. Project Team 29 seeks the approval of the Working Group for this document to be accepted as their Interim Report. The Project Team furthermore request permission to distribute a revised version of this document as part of the Red Cover procedure in July 1998.

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The contents of this report are of two types. Clauses 1, 2, 3 and 6 are initial drafts for material that is intended, after revision, to form part of the provisions of the Prestandard. Other clauses are included to explain issues considered by the project team. These informative elements are not expected to appear in the final Prestandard but are included in the Interim Report to stimulate wider discussion. The Interim Report is intended to serve several purposes:-

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- ❖ To indicate the general manner in which the Project Team are approaching the topic and to seek the advice of TC251 WGI on the need for any changes in this approach;
- ❖ To stimulate wider discussion of key issues and thus to enable a broader future consensus;
- ❖ To enable the PT to initiate the validation exercises in the two areas in which initial profiles are to be developed (i.e. primary care and diabetic care).

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The document includes extensive hypertext links (particularly in clause 6). These are intended to aid review of the complex inter-relations between various elements of information. Unfortunately these links are currently only supported in Word 97.

Commenting on this document

The Project Team welcome comments on all aspects of this document. However, having regard to the current status of the document, we do not recommend detailed comments on wording or typographical inconsistencies (except where these cause ambiguity).

Comments on this INR should be sent to the Project Team leader:

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Comments may be sent in any format, but comments in electronic form as a plain text E-mail or in Microsoft Word (any version) are preferred. Comments in electronic form may be sent attached to e-mail or on diskette. Please include the following information with your comments:

Title: "Comments on CEN TC251/PT29 - INR"

State your name, address, phone number, fax number and e-mail for response and possible clarification.

State whether the comments represent the view of a named organisation or a personal view.

Classify each comment as one of the following categories:

MAJOR	Serious disagreement with the approach taken or the terms of this European Prestandard.
MINOR	Minor disagreement with the approach taken or the terms of this European Prestandard. This indicates something which one feels needs discussion.
SUGGEST	Suggestion for improvement, which does not arise from any disagreement with the approach.
QUERY	Uncertain of meaning or lack of clarity.
TYPO	Technical, grammatical or typographical errors.

Comments should be separated and numbered and preferably grouped.

Comments should arrive before 1998-05-22 in order to be considered by the Project Team before the WGI meeting in Cork. However, this is not a final deadline for comments on this draft. Comments are welcome at any stage prior to the release of the next draft and all comments on this draft received before 1998-06-20 will be taken into account.

The next version of this document for widespread circulation will be available in early/mid July 1998. Interim updates and other related material may be available for viewing and/or downloading from the web; please check the following URL for the latest information:

www.clinical-info.co.uk

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INTRODUCTION

The increased use of data processing and telecommunications capabilities has made possible the interchange of information in machine readable and machine processable formats. As automated interchange of information in healthcare increases, it is essential to provide appropriate standards.

5 A combination of the following four factors provide the motivation for this particular Prestandard:

- ❖ Computer systems are used for the storage and processing of healthcare record information in many hospitals, clinical departments and doctors offices. The information stored and processed by these systems includes details of medical history, investigation results, clinical findings, diagnoses and treatments.
- 10 ❖ When healthcare professionals provide care to individual patient they often need access to healthcare record information to inform their decisions and to enable them to offer high quality healthcare. In some circumstances, access to relevant and accurate information may be essential to the safe delivery of healthcare services. In other cases, inability to access necessary clinical information leads to repeated investigation with consequent delay, inconvenience and expense.
- 15 ❖ Many patients are cared for by two or more professionals using different information systems. Population mobility means that in any one year healthcare professionals can expect at least 5% of their patients to move and thus to require their future care to be handed over to another professional. Even while living in one place, travel related to work and holidays and out-of-hours locum arrangements lead to circumstances in which different healthcare professionals provide care to the same patient.
- 20 ❖ Current practice meets the need for communication of healthcare record information by a variety of means. Most of these are either paper-based or idiosyncratic and unstructured. Therefore, users of electronic healthcare record systems are unable to exchange healthcare record information in forms that are readily accessible to users of other systems.

25 As a result of these factors there is an urgent need for a standard set of messages that can enable the electronic transfer of healthcare record information between heterogeneous clinical information systems. These messages need to address the needs and capabilities of currently used healthcare record systems. They should also take account of the more sophisticated requirements of future systems.

Implementation of the messages specified by this European Prestandard will:

- a) facilitate the transfer of electronic healthcare records or parts of these records;
- b) enable the communication of requests for transfer of electronic healthcare records;
- 30 c) reduce the need for human intervention to manually duplicate entries in different healthcare record systems;
- d) minimise the time and effort required for the introduction of information interchange agreements that support the exchange of electronic healthcare record information;
- e) reduce the development effort required by suppliers to allow their systems to communicate with a wide range of other electronic healthcare record systems;
- 35 f) reduce the cost of information interchange between clinical information systems.

When implementing information exchange based on this European Prestandard, data security services including confidentiality provisions must be ensured according to the laws actually in force in the different CEN member countries. Other European Prestandards currently under development are addressing the technical issues relating to meeting this requirement.

40 The method by which this European Prestandard has been developed is based on the recommendations of the CEN Report on Medical informatics - Methodology for the development of healthcare messages (CR 12587 :1996). However, in accord with the decisions of CEN TC251 WGI, a different modelling technique has been used. This is a subset of the Unified Modelling Language (UML) as documented in Annex A.

45 This standard is intended for use by message developers. Its provisions are directly relevant to suppliers of computer systems for use in hospitals, general practices, clinical departments and specialist clinics. Its provisions are also relevant to those planning, specifying, procuring or implementing information systems for use in departments, hospitals, general practices, clinical departments and specialist clinics.

1. Scope

This Standard specifies messages that enable exchange of electronic healthcare record information between healthcare parties responsible for the provision of clinical care to an individual patient. These messages allow information from an electronic healthcare record held by one health professional to be sent to another health professional.

These messages specified by this Standard can be used to convey:

- ❖ a complete copy of a patient's record as stored in one information system;
- ❖ parts of a patient's record that form a logically sound extract or summary of that record;
- ❖ parts of a patient's record used for updating a parallel record on another system.

The primary purpose of the exchanges supported by these messages is to support the provision of care to individual patients. The availability of consistent, continuing clinical care, when and where it is needed, requires appropriate and unambiguous communication between clinical professionals. The messages specified by this Standard are designed to meet this requirement by enabling users of different clinical information systems to exchange electronic healthcare record information. Implementation of these messages will therefore assist the maintenance of timely and appropriate patient records.

This Standard considers two distinct properties of electronic health record communication.

a) Readability

Communication of information in a form that can be rendered human-readable by the receiving system. If the exchange of electronic healthcare record information is to support individual patient care, clinicians using the receiving system need to be able to read and understand the transferred information.

b) Processability

Communication of information that can be incorporated into a record held by the receiving system in a way that enables it to be processed and retrieved as an integral part of record. The benefits of electronic healthcare records include retrieval and processing for decision support, audit and research. If these benefits are to be fully realised, information exchanged between systems needs to be in a form that enables the receiving record systems to process it in a manner that is consistent with processing of locally recorded information.

The Standard specifies messages that permit exchange of electronic health record information with different levels of structure. The least structured level is sufficient to enable any receiving system to render the information in a human-readable form. The more structured levels enable information to be transferred in a manner that facilitates subsequent retrieval and processing.

The ability of communicating systems to achieve a particular level of interoperability by using these messages depends on:

- ❖ the compatibility of the structures in which the systems store patient records;
- ❖ the mappability of different forms of representation used by those systems (e.g. languages, terminologies and coding schemes);
- ❖ the level of trust between the communicating parties.

These factors will therefore determine how the messages specified by this Standard are used.

This Standard takes account of the following issues related to the confidentiality, source and status of the transferred information.

- ❖ *Distribution rules* – The messages include provisions for conveying distribution rules that are intended to govern subsequent distribution of information. These rules may be applied to the entire message or may be attached to individual items within the message. This Standard does not mandate a particular mechanism for the enforcement of distribution rules.

(Drafting note: PT28 definition of "distribution rule" is "logical concept or rule intended to convey and govern distribution")

- ❖ *Attribution* – The messages support communication of attribution details regarding the originator and time of origin of information. Attribution information, including digital signatures, may be applied to the entire message or to individual items within the message. This Standard does not mandate a particular mechanism for secure verification of digital attribution information. However, the algorithm specified in ENV12388 should be used unless an alternative Standard is agreed by the communicating parties.

- ❖ *Integration* – The messages support the communication of information in a way that allows receiving systems to distinguish new information from information that they have already received.

Specific security requirement and the mechanisms to be used to meet these requirements are outside the scope of this Standard. Implementors of the messages specified by this Standard should ensure that the security mechanisms used satisfy national and international legislation, user requirements and ethical guidance.

The messages specified by this Standard are general in nature. They meet the requirements for transferring electronic health record information in a manner appropriate to a wide-variety of situations covering all clinical professions and specialties. However, to maximise the processability of communicated information for particular purposes, a specific profile of the messages specified in this Standard may be required. These profiles may restrict the degrees of freedom inherent in the general message.

(Drafting note: Two initial profiles for use in Primary Care and Diabetic Care have been developed as part of the validation exercise associated with the development of this Standard. Further profiles following a similar general form are likely to be required for effective use in other environments.)

The development of this Standard has been based on the principles stated in the European Prestandard on Electronic Healthcare Record Architecture (ENV 12265). However, this does not preclude the use of this message for communications between systems which do not conform to that Standard.

The messages specified by this Standard are primarily aimed at conveying textual (character-based) information between systems. The messages also provide for references to binary objects, which may form part of an EHR. However, the Standard does not specify the format of such binary objects, nor does it specify the methods by which they shall be communicated or made available to a receiving system.

The messages specified in this Standard are not designed for communication of explicit requests for services or reports of services. However, if the substance of the report can be best communicated as an extract of the EHR, communicating parties may choose to use this message for that purpose.

The messages specified by this Standard are not designed for communication with intermittently connected devices such as patient data cards or personal digital assistants. However, due account has been taken of the relevant Prestandard covering this domain (ENV12018).

These messages are not validated for the exchange of EHR information for other purposes such as administration, resource allocation, research or quality monitoring.

2. Normative References

This European Prestandard incorporates by dated or undated references, provisions from other publications. These normative references are cited in the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments and revisions of any of these publications apply to this European Prestandard only when they are incorporated in it by amendment and revision. For undated references the latest edition of the publication referred to, applies.

5	ISO/IEC 7826-1:1994	Information technology – General structure for the interchange of code values – Part 1: Identification of coding schemes
10	ISO/IEC 7826-2:1994	Information technology – General structure for the interchange of code values – Part 2: Registration of coding schemes
	ISO 2382-4:1987	Information processing - Vocabulary Part 4: Organisation of data
	ISO 5281:1977	Information interchange - Representation of human sexes
	ISO 639:1988	Symbols for languages, geographical areas and authorities
	ENV 1613 :1995	Medical informatics - Messages for exchange of laboratory information
15	ENV 12265	Medical informatics - Electronic healthcare record architecture
	CR 12587 :1996	CEN Report: Medical informatics - Methodology for the development of healthcare messages
	ENV 12018 :1997	Medical informatics - Identification, administrative, and common clinical data structure for Intermittently Connected Devices used in healthcare (including machine readable cards)
20	ENV 12537-1 :1997	Medical informatics - Registration of information objects used for EDI in healthcare - Part 1: The Register
	ENV 12537-2 :1997	Medical informatics - Registration of information objects used for EDI in healthcare - Part 2: Procedures for the registration of information objects used for electronic data interchange (EDI) in healthcare
25	ENV 12538 :1997	Medical informatics - Messages for patient referral and discharge
	ENV 12539 :1997	Medical informatics - Request and report messages for diagnostic service departments
	ENV 12612 :1997	Medical informatics - Messages for the exchange of healthcare administrative information
	ENV 12381 :1996	Medical informatics - Time standards for healthcare specific problems
	ENV 12435	Medical informatics - Expression of the results of measurements in health sciences
30	ENV 12388 :1996	Medical informatics - Algorithm for Digital Signature Services in Health Care

3. Definitions

For the purpose of this European Prestandard, the following definitions apply:

3.1 **clinical information** : Information about a patient, relevant to the health or treatment of that patient, that is recorded by or on behalf of a healthcare professional.

NOTE : Clinical information about a patient may include information about the patient's environment or about related people or animals where this is relevant.

3.2 **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 7826]

3.3 **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 7826]

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

[ENV 7826]

3.5 **concept** : unit of thought constituted through abstraction on the basis of properties common to a set of objects [ISO 1087]

3.6 **concept system** : structured set of concepts established according to the relations between them, each concept being determined by its position in the set [ISO 1087]

3.7 **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 : In this Prestandard the abbreviation DIM is used.

3.8 **electronic healthcare record ; EHR** : healthcare record in computer readable format

3.9 **electronic healthcare record system**: system for recording, retrieving and manipulating information in electronic healthcare records.

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

NOTES

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.

2: In this Prestandard the abbreviation GMD is used.

3.11 **healthcare administrative information** : Information about a subject that is requested or required by a healthcare party to enable, finance or manage the provision of healthcare services to that subject.

3.12 **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.

5 3.13 **healthcare organisation** : Organisation responsible for the direct or indirect provision of healthcare services to a subject, or involved in the provision of healthcare related services such as environmental measurement results.

NOTE : A healthcare organisation may be used stand-alone or as a superstructure containing departments and sub-departments.

10 3.14 **healthcare party** : Organisation or person responsible for the direct or indirect provision of healthcare to an individual, or involved in the provision of healthcare-related services such as environmental measurement results.

3.15 **healthcare professional** : Person who is entrusted with the direct or indirect provision of defined healthcare services to a subject or population of subjects.

EXAMPLE : Primary care physician, dentist, nurse, social worker, veterinary surgeon.

3.16 **healthcare record** : repository of information regarding the health of a subject of care.

15 3.17 **healthcare record architecture** : principles on which the logical structure of healthcare records are based.

3.18 **healthcare service** : Service provided with the intention of directly or indirectly improving the health of the people, populations or animals to whom it is provided.

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

20 NOTE : In this Prestandard the abbreviation IMS is used.

3.20 **interchange format** : Specification of a message type according to a given message syntax, covering the identification of the message type components, their arrangement, representation and interrelationships.

3.21 **intervention information** : Information about medical or surgical actions performed on or planned to be performed on a subject of investigation.

25 NOTE : Intervention information refers to clinical information related to planned or actual interventions as distinct from information obtained by observation. It includes but is not limited to prescription or administration of drugs, therapeutic and diagnostic procedures.

3.22 **message profile** : Specification derived from an implementable message specification by selecting its optional elements, appropriate to the specific business requirements of the communicating parties.

30 3.23 **message syntax** : System of rules and definitions specifying the basic component types of messages, their interrelationships and their arrangement.

3.24 **message type** : An identified, named and structured set of functionally related information which fulfils a specific business purpose.

35 3.25 **organisation** : Unique framework of authority within which a person or persons act, or are designated to act towards some purpose.

NOTE : Groupings or subdivisions of an organisation may also be considered as organisations where there is need to identify them for information interchange.

[ISO 6523-1984]

3.26 **original record item complex ; EHR original complex** : record item complex representing the original record context (information context in the record) for the information it contains.

3.27 **problem domain** : Field under consideration in the modelling process.

EXAMPLE : Information interchange in clinical chemistry.

5 3.28 **record item ; EHR record item** : architecture component for the representation of basic information elements in electronic healthcare records.

3.29 **record item complex ; EHR complex** : architecture component for the representation of the logical structure and the content within this structure of healthcare records.

10 3.30 **transmitted message** : Message instance created in a message syntax in alignment with a particular message profile and therefore in full conformance with the relevant general message description and implementable message specification.

3.31 **view record item complex ; EHR view complex** : record item complex representing another record context (information context in the record) for the information it contains.

3.32 Abbreviations

15 The following abbreviations are used for the terms defined in this European Prestandard.

	DIM	Domain Information Model
	EHR	Electronic Healthcare Record
	GMD	General Message Description
20	GP	General Practitioner
	HCP	Healthcare Party
	HGMD	Hierarchical General Message Description
	ICSI	International Coding Scheme Identifier
	IMS	Implementable Message Specification
25	MIG	Message Implementation Guide
	UML	Unified Modelling Language

4. Discussion and issues

Drafting Note: This section is included here in the Interim Report (INR) for convenience to aid an understanding of the issues that are being discussed in the preparation of the document. It is not anticipated that this section will be present in subsequent working documents. However, it will remain available throughout the development of this Prestandard to provide a record of issues resolved and outstanding unresolved issues.

In its place in the main document there will be a formal description of the Requirements for conformance to this Prestandard.

4.1 Processability of received information

Electronic communication may serve two distinct purposes:

- ❖ Making information visible to the recipient (human-readability).
- ❖ Supporting automatic processing by the receiving system (processability).

All EHR communications need to produce a human-readable result on the receiving system. However, the extent to which the communicated information needs to be processable depends on a variety of factors.

At the simplest level communication of EHR information that can be stored and displayed in a human-readable may be useful as a direct replacement for paper flows – even if it cannot be processed. Nevertheless, it is likely to be more useful if received information can be retrieved and processed as an integral part of the EHR on the receiving system. Furthermore, if the need to respect distribution rules associated with the original information are considered it may be essential for the received information to be processable to an extent that allows these rules to be respected by the receiving system.

The following levels of processability should be considered (see also HL7 Kona proposals):

- 1) *Human-readable but only in the form defined by the recipient.* A humanly-readable copy could be made available by a receiving system:
 - ◆ Separately from any locally held EHR
 - ◆ As an annotation accessible from the locally held EHR.
- 2) *Human-readable in forms produced by processing the information.* The forms of presentation will depend upon the receiving system and the structure of the message. For example items within a received message may be visible as part of the EHR on the receiving system:
 - ◆ At appropriate dates in a chronological display.
 - ◆ Integrated with local information under particular headings or views of the record.
 - ◆ With appropriate links to other items of information (e.g. problem orientation).
- 3) *Retrievable as structured information on the receiving system.* Clinical systems typically use EHR information to inform decision support tools and to enable analysis. For example:
 - ◆ Identifying contra-indications to a proposed medication.
 - ◆ Suggesting a preferred course of management.
 - ◆ Identifying a cohort of patients with a particular disease.

If communicated EHR information is to be used in this way it must be possible for the data structure and content to be mapped in a way that avoids any risk of ambiguity. As a minimum this applies to codes used to represent clinical concepts and the context in which those concepts are used. More sophisticated data retrieval algorithms may also need a common understanding of the relationships between separate entries in a patient record.

There are many practical examples of areas in which ambiguity is a real risk when EHR information is transferred between heterogeneous systems:

- ◆ "Family history of diabetes" or "Diabetes" under a section heading "Family History" may be equally clear from the perspective of human-readability. However, if a coded representation of the concept "Diabetes" is present in a record linked to a heading "Family History" the receiving system must be aware that this does not imply the patient has diabetes.
- ◆ An entry "Myocardial infarction – excluded" may be clearly understood as a piece of human-readable text but if this is represented using a code for "Abdominal tenderness" qualified by the text "- excluded", it is important that the receiving system does not treat this as a confirmed diagnosis of myocardial infarction.

- ◆ Similar important distinctions can be made between:
 - Plans for procedures and actual procedures.
 - Allergies/sensitivities to substances and administration of those substances.
 - Past history reported by a patient and past history derived from a contemporaneous patient record.

- 4) *Fully processable as an integral part of the EHR on the receiving system.* Clinical systems may process detailed EHR information in ways that may be specific to the type of system and the working practices of its users. Examples may include calling-off instances of a repeatable prescription or enacting procedures that form part of a pre-set care plan. The extent to which these specific types of EHR functionality are transferable may be limited even if retrieval functions are fully supported.

4.2 Structural form

It is possible to identify a wide range of structures in which EHR information could be communicated. The main options form a spectrum from a plain text file or e-mail message through to a detailed record structure that identifies every possible data element.

- 1) Unstructured plain text

- ◆ E.g. A text-file or email containing the equivalent of a printout of the EHR.

- 2) Structured message containing unstructured clinical text

- ◆ E.g. A message/file with defined structure providing for patient identification and/or demographic information with a plain text element that can hold a single block of plain text in which the clinical record is presented.

- 3) Structured message containing multiple blocks of clinical text.

- ◆ E.g. A message/file as in 2 but with a structure consisting of multiple items of clinical text. Each item could be dated allowing these text blocks to be arranged in chronological order. Items might also contain other key information such as references to "headings" allowing the receiving systems to arrange the information in different views of the patient record.

- 4) Structured messages consisting of multiple instances of coded, dated and attributed items of clinical information.

- ◆ E.g. A message/file as in 3 but with a defined internal structure to each item.

- ◆ At this level a key issue is the degree of granularity both in terms of the nature of each item and structure within the item itself.

- 5) Structured message containing individual items of clinical information grouped and related together in one or more ways (e.g. problem orientation, views, headings etc).

An additional dimension can be considered in respect of the layout of the text component of each of the forms discussed above. This could be:

- a) Plain text entirely at the discretion of the sender

- b) Plain text with an agreed general layout (e.g. order of different types of information, page width and rules for indenting of items under dates and/or heading could be agreed to ease viewing of records from different sources).

- c) Text including some elements of mark-up (e.g. HTML).

If a mark-up is used for the text element the question arises as to whether structured or non-textual information could or should be embedded in tags within the text. The use of XML as an overall syntax for EHR transfer has many attractions but it is probably wise to constrain any mark-up **within** identified text elements to formatting instructions. Otherwise there is a danger that proprietary complexity may be embedded in elements that are intended to be simple.

It is clear that more structured forms are required to enable more sophisticated levels of processing (see [Table 1](#)). On the other hand as the level of structure increases so do the distinctions between systems and hence the difficulties in sharing information.

Table 1. Message structures and processability of EHR information

	Human-readable					Computer-processable				
	1. Format as sent		2. Alternative format(s)			3. Structured Retrieval		4. Fully processable		
	As message	Annotated to EHR	Chronological	Views and headings	Problem orientation	General	Detailed	Simple system	Average systems	Sophisticated systems
1. Plain text	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗
2. Structure + single text block	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗
3a. Multiple dated text blocks (no heading tags)	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
3b. Multiple dated text blocks (plus heading tags)	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗
4a. Structured clinical items (coarse granularity)	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗
4b. Structured clinical items (finer granularity)	✓	✓	✓	✓	✗	✓	✓	✓	✗	✗
5a. Structured items plus links (few link types)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
5b. Structured items plus links (more link types)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

4.3 Communication control and distribution rules

EHR communication may be controlled by:

- ❖ The sender/sending system dispatching selected information to another party.
- ❖ An authorised clinician interrogating a remote or distributed system.
- ❖ The patient using a computer-readable token that contains an EHR.
- ❖ The patient using a token that contains a key that grants a clinician access to an EHR on a remote or distributed system.

Entries in the EHR may have associated access restrictions that determine who is allowed to view a particular item of information. When EHR information is communicated to another system these restrictions (or distribution rules) need to be honoured in three ways:

- ❖ Information that is restricted to the original practitioner or team should not be communicated without a deliberate decision to relax this restriction (i.e. with the consent of the patient).
- ❖ When information that is restricted is communicated the appropriate distributions rules need to be communicated with the appropriate items of information in a manner that enables the receiving system to enforce the same or equivalent restrictions.
- ❖ Information that is restricted to certain types of clinicians should not be communicated in ways that would breach those restrictions. For example:
 - ◆ As part of a free text form – unless access to the entire free text block is restricted.
 - ◆ To a system that is unable to restrict access in the manner required.

Another aspect of the control of communication is the extent to which communicated EHR information is attributable to its original author/sender/sending system.

4.4 Communication scenarios

Communication scenarios may include:

- ❖ Transfer of an EHR when care of a patient passes from one professional to another.
 - ◆ E.g. when a patient moves.
- ❖ Updating an EHR when a patient receives care from another professional for a limited period.
 - ◆ E.g. when a patient is treated for illness while on holiday.
- ❖ Updating two parallel EHRs when users of two or more EHR systems are involved in the continuing care of the same patient.
 - ◆ E.g. when a patient with diabetes receives care from a diabetic clinic and from a GP.

Where EHR information is communicated between two or more systems it is important to avoid duplication of information. When the information exchanged is in a structured form it is also important to avoid degradation of the structured information caused by repeated mapping and retransmission of the same information between the systems. A solution that involves transfer of the full EHR information during each update has superficial attractions. It allows the receiving system to decide what information has changed. However, the effectiveness of this approach must be balanced against the impact of this process on audit trails for sending and receiving data and on requirements for viewing and checking inbound clinical communications. Thus if there is a requirement to store an archival copy of the content of all messages sent and received, the impact is to treble the storage requirement of the record at each transfer. Furthermore, if the recipient is expected to view received information this will also result in increasing inefficiency.

4.5 "Context" and the EHR Message

4.5.1 Purposes of EHR communication

As noted at the start of this section electronic communication may serve two distinct purposes:

- ❖ Making communicated information visible to the recipient (human-readability).
 - ◆ This can be considered the minimum requirement for effective electronic communication of the Electronic Healthcare record.
- ❖ Supporting additional processing by the receiving system (processability).
 - ◆ For example to facilitate integration with existing information on the receiving system, decision-support, clinical-audit and research.

4.5.2 Requirements for representation of context in messages

The significance of context varies according to whether the message is being used; a) to serve the human-readability requirement only; or b) to transfer a record which will be subject to further processing and structured retrieval within receiving system.

In the case of the former, the EHR information should be conveyed in the message in a manner that allows it to be presented to the recipient in a form that is equivalent to the form in which it was sent. For example, the order of elements and their relationship to one another when viewed by the recipient should be equivalent if not identical. Such requirements can be met to a limited extent with simple ASCII and much more effectively with a text mark-up format such as HTML.

However electronic communication extends beyond simple exchange of separate documents. There is a user requirement to utilise available information rather than merely display or print it.

- ❖ When EHR information concerning a patient is received from several clinicians it may be appropriate to organise and present that information in ways that combine information from different sources. For example to provide a chronological record including information about the encounters with various clinicians.
- ❖ When EHR information is transferred between clinicians with different language abilities it may be useful to translate some of the information to provide a consistent, readable record.
- ❖ A clinician may record a serious condition that represents a contra-indication to a particular therapy and may communicate this information to other clinicians. The recipient should be able to utilise this information in their system rather than needing to manually re-enter it. For example, if the recipients system has a decision support tool that is capable of alerting a user to an allergy or contraindication when they prescribe a drug, this system must not ignore relevant information just because it was received from another system. This would be particularly dangerous if the user expects the system to be aware of such issues and to provide appropriate information.
- ❖ An EHR may be used for clinical-audit purposes. In this case, analysis tools used for comparing clinical information with best practice may need to be able to retrieve information that originated from another site. For example, a clinical audit of the management of hypertension should take due account of care provided by specialist clinics as well as care provided in general practice. Similar issues apply to the use of an EHR for research, health needs assessment of other purposes which require retrieval and analysis of clinical information.

4.5.3 Specific requirements to support EHR processing

If electronic communication of EHR information is to meet these needs for additional processing, it is important that there is no ambiguity in the meaning of the information contained in messages between systems. Furthermore, it is important that the authenticity and authority of the information accurately conveyed.

Accurate and effective communication comprises three significant elements:-

- ❖ The message structure must allow for the communication of the required information in an unambiguous form.
- ❖ The sending system must map the information to the message structure in a way that accurately reflects the information recorded on that system.
- ❖ The receiving system must map the information from the message structure and store it in that system in a manner that accurately reflects the information in the message.

These are perhaps self-evident truths. However, they highlight critical issues in mapping to and from a common message structure. Information that qualifies or provides context to a particular item of information may be implicit in one system but may need to be made explicit in a message in order to avoid misinterpretation by the recipient.

- ❖ For example, information about allergies may be stored in a specific record structure on one system while another stores the same information in a generic record structure in which an allergy is represented by a qualifier or heading. The task in defining a message that can be used between such systems is to specify the way (or ways) in which this information is to be represented within the message. The task for the system developers is to recognise the elements that need to be represented in particular ways and to represent them appropriately in the message.

When performing this type of mapping, knowledge of a system and the ways in which it is used may be required. Care must be taken to avoid mapping incorrect implicit assumptions into explicit errors in the message.

- ❖ For example, it may be that in some systems use of a particular type of diagnostic code (e.g. ICD10, Snomed, UK clinical terms, etc) in an EHR implies that the particular diagnosis has been applied to the patient. However, other systems may use the same codes within appropriate parts of the EHR or with particular qualifiers to represent Family History, possible diagnoses or even excluded diagnoses. If the default use of the code implies the diagnosis it may be reasonable to present it as such in a message. However, if it is common for such codes to be qualified in some non-specific manner (i.e. with free-text) then it may not be safe to present the information explicitly as a diagnosis within a message.

4.5.4 Categorisation of qualification according to importance in communication

The issues raised in the earlier part of this paper are being considered in liaison with PT27 (EHR term list). Resolution requires a common view of the main categories of contextual qualification to be applied to communicated information. The classification of contextual qualifications proposed by PT27 is a vital important contribution to this work. The idea of this categorisation is to distinguish between types of contextual qualification which are essential for accurate interpretation and processing and those of less importance. The proposal is summarised below.

C0: Content - The main content of an information item.

C1: Safety - Major modifiers which if not communicated could lead to dangerous misinterpretation of the information received. (E.g. If any of the following qualifications "Excluded", "Possible", "Differential diagnosis", "Family History", "Fear of", "Husband in hospital following" were applied to a diagnosis of such as "Myocardial Infarction" the loss of the qualification would change the meaning of that term in a manner that could be dangerous).

C2: Interpretation - A particular value judgement made about the role of a particular piece of information which may affect the way the information is understood but which if omitted would not result in factually incorrect information. (E.g. The qualification "Complication" or "Secondary Diagnosis" could be applied to the term "Myocardial Infarction" in a report of a discharge from hospital following a major operation. Losing these qualifiers in communication would result in loss of some information about the interpretation of the sender. However, if the receiving system cannot support the particular qualifier concept in a structured way it is neither unsafe nor factually incorrect to record the fact the patient suffered a myocardial infarction.)

C3: Intention - The sender may qualify information in a manner that indicates the way they intend it to be used. However, as with the more general interpretation the unqualified version is still safe and accurate. (E.g. a patient EHR could contain a category of "Alert" information including the diagnosis "Previous Myocardial Infarction". The loss of the "Alert" qualification would not make the information inaccurate. Conversely, and perhaps more significantly, the inclusion of the diagnosis "Myocardial Infarction" even without this qualification might be expected to be used as an "Alert" in the receiving system. Thus the absence of this qualification in the message should not preclude the recipient from adding it).

C4: Organisation - Information that may be derived from the main content but which can be separately identified as a means of organising the communicated EHR. (E.g. "Myocardial Infarction" could be stated to be part of a particular patient's "Cardiovascular" history - if the qualification "Cardiovascular" is lost in the communication process the meaning is unchanged).

4.5.5 Use of categories in the EHR message

The proposal is that categories C0 and C1 should be conveyed unambiguously in relation to all structured clinical information in the EHR message. Precise determination of the qualifiers assigned to these categories will proceed in liaison with PT27. The message will also enable the communication of additional qualifications from other categories. It is likely that the relevant C2 and C3 categories to be included in messages will be determined at the message profile level. The C4 category can be considered to be arbitrary and may be determined by professional working practices - with the proviso that receiving systems should not make any assumptions about the C4 qualifications that they may receive or under which particular items of information may be received.

4.5.6 Origin of information

Aspects related to origin of information both in terms of the person who recorded the information and the date and time of origin also provide important context to particular items of clinical information. However, these are not considered in the categorisation proposed, as these issues are general to all items of communicated information rather than specific to items of clinical information.

5. Scenarios

Drafting Note: This section is included at this point in the Interim Report (INR) to aid an understanding of the scope of the document. The authors expect that in the final Prestandard this section will become an Informative Annex. In its place in the main document there will be a formal description of communication roles.

5.1 Introduction

The messages specified in this European Standards support various communication scenarios. The ways in which the messages are populated and used depend on the particular scenarios in which they are used. This annex outlines the most common EHR communication scenarios that involve healthcare professionals involved in the care of a patient. For each of these scenarios it identifies the messages that should be used to meet the communication requirements. The general message descriptions in this Standard are permissive in relation to the inclusion of particular data items. However, in particular scenarios additional constraints may apply. With some specific exceptions these constraints are outside the scope of this Standard and should be defined in functional profiles of the messages.

(Drafting note: The authors of this Standard are producing two sample profiles for GP to GP communication and for use in Diabetic Care)

The scenarios described in this annex involve the transfer of EHR related messages in one or more directions between two or more healthcare parties. Each scenario is described using a general description, a diagrammatic representation and examples. The main communication requirements arising from each scenario are then outlined and related either to existing message Standards or to the messages specified by this Standard. In the descriptions and diagrams, the communicating parties are represented using letters (A, B and C). The examples identify particular healthcare parties that may take the general roles represented by these letters. These examples are illustrative only and many alternative examples result in similar general scenarios. The diagrammatic representation uses a timeline to indicate the flows of messages and the changing roles and responsibilities of the communicating parties. The symbols used in these timelines are shown in Figure 1.

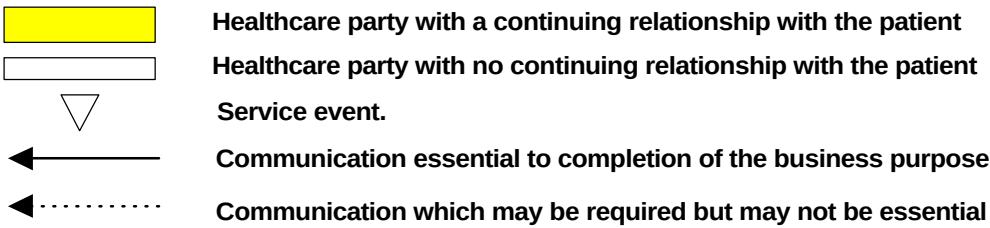


Figure 1 Key to symbols used in diagrammatic representations of scenarios

5.2 Requested "one-off" services

These scenarios are NOT in the scope of this Standard

5.2.1 General description

- 1) Party **A** is providing care to a patient and requests party **B** to provide a service to that patient.
- 2) Party **B** provides the requested service and reports the outcome to part **A**.
- 3) **A** retains responsibility for the care of the patient throughout the period of service provision.
- 4) **B** is responsible for provision of the requested service.
- 5) **B** may see the patient in order to provide the service or may give advice based on information or samples supplied by **A** (without seeing the patient).

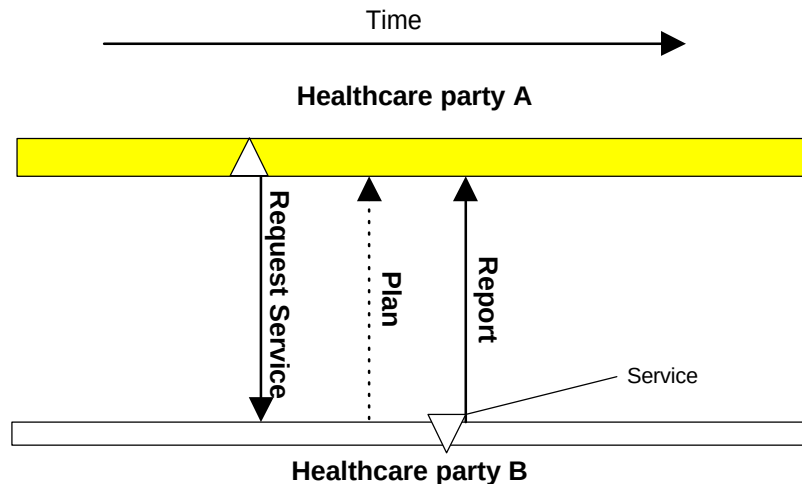


Figure 2. Communications related to a requested one-off service

5.2.2 Examples

- ❖ A GP sends a request for haemoglobin estimation to a haematology laboratory. The laboratory sends the result to the GP.
- ❖ A specialist requests a barium meal X-ray. The radiology department informs the specialist of the plan to do this on a particular day. After the examination the radiology department sends the specialist a report.
- ❖ A surgeon requests a district nurse to remove a patient's stitches. The nurse may inform the surgeon that this has been done.
- ❖ A GP requests advice on management of a particular clinical problem. The specialist responds with his opinion.

5.2.3 Communication requirements

❖ Request

- ◆ A requests a specific service for a particular patient from B.
- ◆ In this request A may provide B with information about the reason for the request and other clinical information relevant to the provision of the service.

❖ Plan

- ◆ B may respond to the request by informing A that they have accepted the request and may state when they intend to undertake the service. The need for this communication depends on the nature of the service requested and the relationships between the parties.

❖ Report

- ◆ B may send a report to A including information about the service provided.
- ◆ The report may contain additional clinical information obtained during service provision.

5.2.4 European Standard Messages

These requirements are already met by a combination of the Laboratory and Diagnostic Service and Referral and Discharge messages.

5.2.5 Messages Specified by this Standard

NONE: These requirements are therefore outside the scope of this Standard.

5.3 Referral or request for involvement in care

These scenarios are NOT in the scope of this Standard

5.3.1 General description

- 1) Party A is providing care to a patient and requests party B to become involved in providing for a particular aspect of that patient's care.
 - a) Party A's general responsibility for the care of the patient continues. However, a specific part of that responsibility is taken by B while a series of services are provided.
 - b) B usually sees the patient one or more times while providing the requested service.
 - c) B generally carries out its responsibility independently of A or B may make recommendations to A that A is then responsible for undertaking.

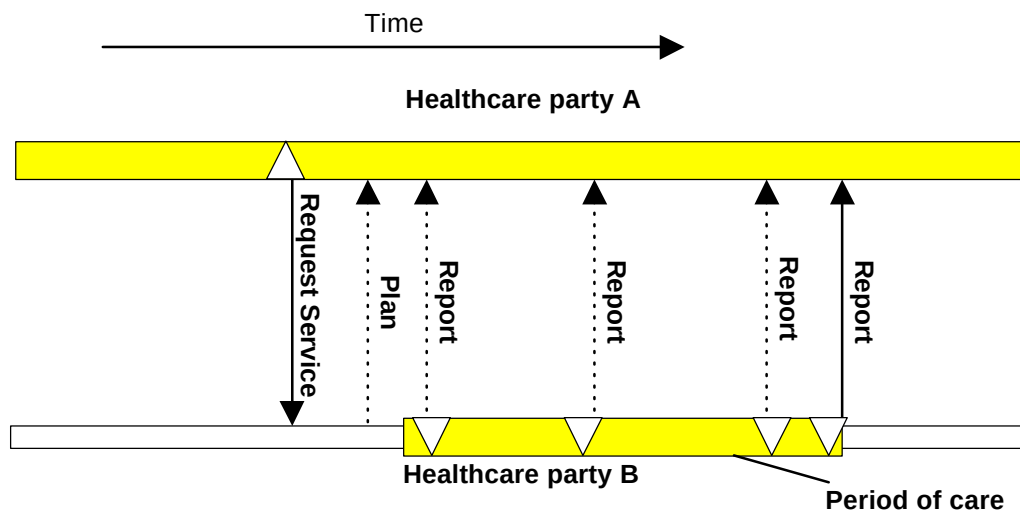


Figure 3 Communication related a to a referral

5.3.2 Examples

- ❖ A referral by a GP to a hospital specialist who sees the patient several times as an outpatient.
- ❖ A referral by a GP to a district nurse for regular dressings to a leg ulcer.
- ❖ A referral by a midwife to a hospital antenatal clinic.
- ❖ A referral by a rheumatologist to an orthopaedic surgeon, or hospital department, for a joint replacement.

5.3.3 Communication requirements

❖ Request

- ◆ **A** requests a service for a patient from **B**. **A** provides **B** with information about the reason for the request and other relevant clinical information that may be relevant to the provision of the service.

5 ❖ Plan

- ◆ **B** may respond to the request by informing **A** that they have accepted the request and may state when they intend to undertake the requested service. The need for this communication depends on the nature of the service requested and the working or contractual relationship between the parties.

❖ Report

- 10 ◆ **B** usually sends one or more reports to **A** about the service provided and its results. These reports may include information about the clinical condition of the patient and changes in treatment that they carry out, initiate or recommend. These reports may also provide information about admission to hospital, discharge from hospital and discharge from the care of **B** when the service requested has been completed. They may also include information about further plans for seeing or admitting the patient.

15 5.3.4 European Standard Messages

The Referral and Discharge (Specialist Service) Messages meet these requirements.

5.3.5 Messages Specified by this Standard

NONE: These requirements are therefore outside the scope of this Standard.

5.4 Referral with continuing period of shared care

These scenarios are *PARTIALLY* within the scope of this Standard

5.4.1 General description

- 1) Party A is providing care to a patient and requests party B to become involved in providing for a particular aspect of that patient's care.
 - a) Party A's general responsibility for the care of the patient continues. However, a specific part of that responsibility is shared with B while a series of services are provided.
 - b) B usually sees the patient two or more times while providing the requested service.
 - c) During the period during which B is sharing responsibility, A may also see the patient one or more times.

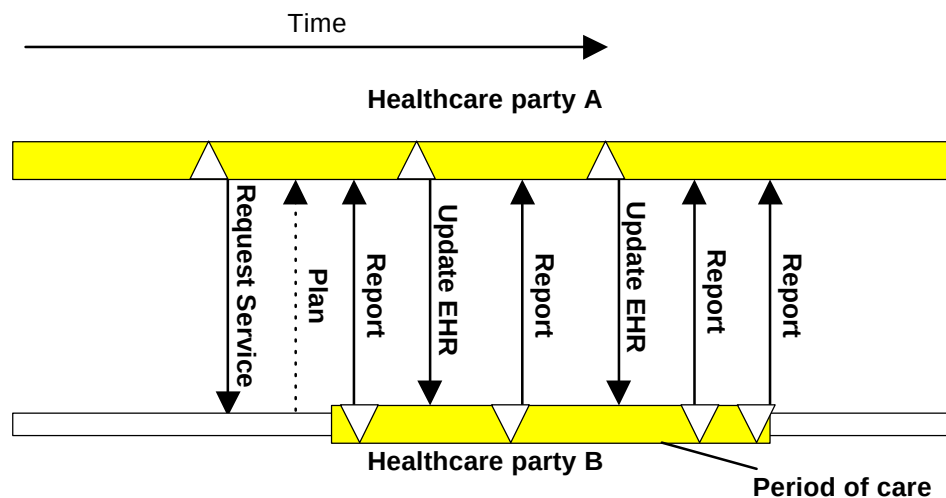


Figure 4. Communications related to a period of shared responsibility

5.4.2 Examples

- ❖ GP and diabetic specialist providing care to a diabetic patient.
- ❖ GP and Midwife and/or Obstetrician providing antenatal care.

5.4.3 Communication requirements

The main requirements are as for other referrals:

- ❖ Request
- ❖ Plan
- ❖ Report

In addition there is a requirement for the original requester to be able to provide updated clinical information.

- ❖ Update
 - ◆ Party A may also send updated EHR information to Party B (e.g. about changes in the clinical condition of the patient) and about any changes in treatment.
 - ◆ This may involve automated sharing of common EHR information or semi-manual selection of the information to be shared.
 - ◆ From a simple perspective the Update can be viewed as equivalent to a Report message flowing in the opposite direction. However, this additional communication requirement adds to the complexity of the process by creating a risk of cumulative duplication of information. Furthermore updating needs to be managed in a way that prevents incorrect information from revising or superseding information previously sent. Managing these two issues has implications for message content and structure as it becomes more important to uniquely identify the items of information that have been communicated.

5.4.4 European Standard Messages

The Referral and Discharge (Specialist Service) Messages meet the requirements, for requesting and reporting. However, the Referral and Discharge message does not address the need to update clinical information during a period of continuing care without issuing a new referral request.

5 5.4.5 Messages Specified by this Standard

❖ *Provide EHR message*

This message addresses the requirement for provide updates of clinical information during a period of continuing care. It may be appropriate to use the *Request EHR message* and *Provide EHR message* messages in this scenario rather than the Referral and Discharge messages.

10

5.5 Unsolicited service provision

These scenarios are *PARTIALLY* within the scope of this Standard

5.5.1 General description

- 1) A patient who usually receives care from Party **A** consults party **B** for a particular service (which Party **A** has not requested from Party **B**).
 - a) Party **B** provides the service to the patient.
 - b) Party **B** may request information from Party **A** regarding the past/current clinical history.
 - c) Party **B** may report the service provided and relevant clinical information to Party **A** during or on completion of the period during which they provide care to the patient.

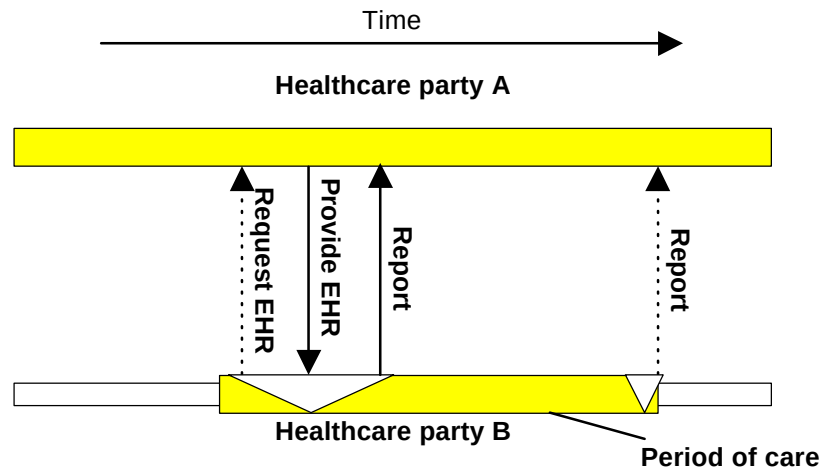


Figure 5. Communications required to support unsolicited service provision

5.5.2 Examples

- ❖ A patient attends an Accident Emergency department at a hospital.
- ❖ A patient self-refers to a particular specialist in accordance with the normal practice in a particular country of region.
- ❖ A patient requires healthcare services while out of their home area.
- ❖ A patient requires urgent healthcare services out of the normal office hours of their doctor and these services are provided by an out of hours deputising service.
- ❖ A patient consults another GP (in countries where patients may see more than one GP).

5.5.3 Communication requirements

- ❖ Request for information
 - ◆ Party **B** may need to request information from Party **A** to enable them to provide appropriate care to the patient.
- ❖ Provision of clinical information
 - ◆ Party **A** may (subject to confidentiality constraints) provide the requested information to Party **B**.
- ❖ Report of services provided
 - ◆ During and/or at the end of the period of care Party **B** may send a report to Party **A**.

The main difference from the referral scenario is the request for and subsequent provision of requested information.

5.5.4 European Standard Messages

The Discharge message covers the reporting requirement. However, current European Standard Messages do not cover the requirements to request and provide clinical information in a manner that supports this scenario.

5.5.5 Messages Specified by this Standard

- ❖ *Request EHR message*

- ❖ *Provide EHR message.*

5 These messages address the requirement to request and provide clinical information about a patient in a manner that supports this scenario. The *Provide EHR message* may also be used in place of the Discharge message for the report element of this scenario.

5.6 Transfer of care

These scenarios are FULLY within the scope of this Standard

5.6.1 General Description

- 1) **A** hands over their clinical responsibility for a patient to **B**.
- 2) **A** does not expect to have any continuing clinical responsibility for the care of the patient.
- 3) **B** assumes the responsibilities of **A**.

There are two general scenarios that may apply.

- ❖ The existing care provider may request the new provider to take over the care of the patient
- ❖ The patient may approach the new care provider who then requests any required information from the previous provider.

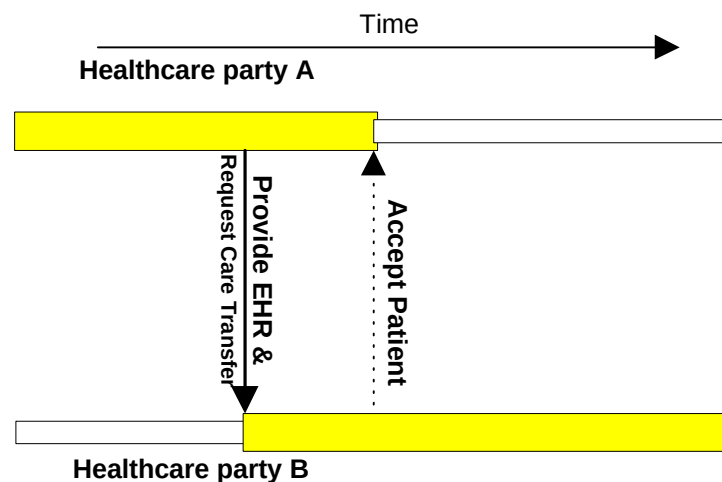


Figure 6. Communications related to a request for transfer of care

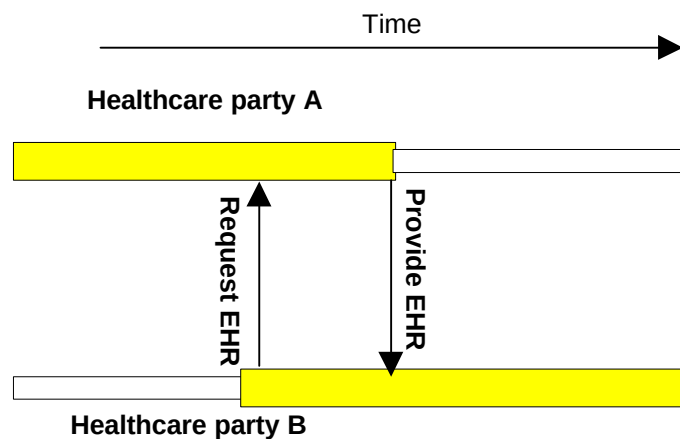


Figure 7. Communications related to transfer of care initiated by a new carer

5.6.2 Examples

- ❖ A GP hands over care of a patient moving to another area.
- ❖ A diabetologist assumes responsibility for a patient who was previously under the care of a diabetic clinic in another area.
- ❖ A patient chooses to change the GP or specialist that they consult.

5.6.3 Communication requirements (transfer originated by party A)

- ❖ Request transfer and provide clinical information

- ◆ A requests that B takes over the care of the patient.
- ◆ A provides B with complete or summarised clinical information about the patient.
- ❖ Accept transfer
 - ◆ B may respond to the request by informing A that they have accepted the request and have assumed clinical responsibility for the patient.

5.6.4 Communication requirements (transfer originated by party B)

- ❖ Report transfer and request clinical information
 - ◆ B takes over the care of the patient (e.g. at the request of the patient) and requests A to provide the relevant clinical information from the patient's existing record.
- ❖ Provide clinical information
 - ◆ A provides B with complete or summarised clinical information about the patient.

5.6.5 Transfer with subsequent return transfer of care

A special case exists if the transfer involves transfer of information back to a healthcare party that has previously been responsible for providing healthcare services to this patient.

- ❖ Ensuring the record:
 - ◆ is complete;
 - ◆ does not contain unnecessary duplications as a result;
 - ◆ does not degrade original information originated by Party B when they are transferred back by Party A.

5.6.6 European Standard Messages

Current European Standard Messages do not cover the request and provision of clinical information when patients move.

5.6.7 Messages Specified by this Standard

- ❖ *Request EHR message*
- ❖ *Provide EHR message.*

These messages address the requirement to request and provide clinical information about a patient in a manner that supports this scenario. The *Provide EHR message* also addresses specific issues raised by transfers with a subsequent return transfer of care.

- ❖ *Patient Care Acceptance or Rejection*

This message may required in the scenario in which the transferring clinician needs to know that the recipient is prepared to assume responsibility for the continuing care of the patient. This can also be viewed as a simple instance of a plan report message similar to the Diagnostic Service Plan report.

5.7 Variations on the main scenarios

5.7.1 Introduction

This section summarises variations that may apply to one or more of the scenarios described in the previous sections.

5.7.2 Sender-initiated scenario

5.7.2.1 Description

- 5 The transfer of EHR information may be initiated either by the current holder of the information (party **A**) or by the party that wishes to receive the information (party **B**). The sender-initiated scenario is the simplest case and involves the use of a single message.

This is the case for most of the communications during continuing periods of shared care (see 4) and for some transfer scenarios (see 6.3).

5.7.2.2 Use of the Provide EHR message

10 Case

- ❖ Party **A** holds an EHR for a patient.
- ❖ Party **A** is aware that party **B** requires information from that EHR.

Action

- ❖ Party **A** sends the *Provide EHR message* to party **B**.

15 5.7.3 Recipient-initiated scenarios

5.7.3.1 Description

The recipient-initiated scenario involves party **B** requesting EHR information from party **A**.

This is the case for the unsolicited service scenario (see 5) and for some transfer scenarios (see 6.4).

- 20 The method used for requesting EHR information should follow procedures established between the communicating parties. These procedures need to take account of legislation and ethical guidelines to ensure that they protect patient confidentiality.

5.7.3.2 Use of the Request EHR message

Case

- ❖ Party **A** holds an EHR for a patient.
- ❖ Party **B** requires information from that EHR.

Actions

- 25
- ❖ Party **B** sends the *Request EHR message* to party **A**.
 - ❖ If party **A** accepts the request, they send the *Provide EHR message* to party **B**.
 - ❖ If party **A** does not or cannot accept the request they send the *Reject Request for EHR message* to party **B** (see 7.3.4)

5.7.3.3 Alternative request communications

- 30 An alternative means of communication may be used in place of the *Request EHR message*. For example, a request might be faxed, phoned or otherwise communicated. In these cases, the subsequent communication scenario is equivalent to the sender-initiated scenario (see 7.2).

5.7.3.4 Rejection of requests

In some cases, party **A** may respond to a *Request EHR Message* by rejecting the request. In this case, party **A** sends the *Reject Request for EHR message* to party **B**.

- 35 The *Reject Request for EHR message* can be used to reject the entire request. There are many possible reasons for rejecting a request. For example, the recipient of the request may not hold an EHR for that patient or the requester may not be authorised to receive the record.

The *Reject Request for EHR message* can also be used to reject part of a request for specific information (see 7.3.5). For example, if party **A** cannot provide the selected content or if their system is unable to send EHR information the requested structural form.

5.7.3.5 Requesting specific content or structure

The *Request EHR message* can be used to convey selection criteria that determine the items of EHR information that party **B** requires. For example, it can request information about a particular event or information recorded or modified since a specified date.

The *Request EHR message* can also be used to specify the structural form or forms that the system used by party **B** can accept. For example, it can request that the information be provided as text or in a more structured form.

5.7.3.6 Referencing a request

Party **A** may send a *Provide EHR message* or a *Reject Request for EHR message* in response to a *Request EHR message* from party **B**. When this response is received party **B** may need to reconcile this with the appropriate request. To facilitate this, the *Provide EHR* and *Reject Request for EHR messages* include references to the relevant request message.

5.7.4 Scenarios involving a third party

5.7.4.1 Description

Some scenarios may involve a third party (party **C**). Party **C** may act as a clearing-house where parties are not sure to whom they should send requests (see 7.4.2) or EHR information (see 7.4.3). Party **C** may also act as a Trusted Third Party either confirming that a requested is authorised to receive EHR information (see 7.4.4) or authenticating the source of the EHR information (see 7.4.5).

5.7.4.2 Indirect communication initiated by the recipient

Case

- ❖ Party **B** wishes to receive EHR information but does not know who holds this information

Action

- ❖ Party **B** sends the *Request EHR message* to party **C**.
- ❖ Party **C** establishes the location of a party who holds relevant EHR information.
- ❖ Party **C** forwards the *Request EHR message* to party **A**.
- ❖ Party **A** responds by sending a *Provide EHR message* or a *Reject Request for EHR message* either directly to party **B** or to party **C** as an intermediary.
- ❖ If party **C** is used as an intermediary then the message received from party **A** is forwarded by party **C** to party **B**.

5.7.4.3 Indirect communication initiated by the sender

Case

- ❖ Party **A** is aware that another party will require EHR information but is not aware of the identity of that party.
- ❖ Party **C** acts as a clearing-house.

Action

- ❖ Party **A** sends a *Provide EHR message* to party **C**.
- ❖ Party **C** retains the record acting as a clearing-house.
- ❖ Party **B** sends a *Request EHR message* to party **C**.
- ❖ Party **C** checks whether the relevant *Provide EHR message* has been received and also checks that party **B** is authorised to receive this message.
- ❖ Party **C** either forwards the *Provide EHR message* to party **B** or generates and sends an appropriate *Reject Request for EHR message* to party **B**.

The second part of this scenario is superficially similar to the direct request scenario (see 7.3.2). However, there are two important differences in requirements. The first is that the *Provide EHR message* must identify its origin (party **A**) as well as the intermediary. The second is that the intermediary may need to be aware of the distribution rules applied at the point of origin in order to determine whether party **B** is authorised to receive the *Provide EHR message*. The messages provide allow this information to be conveyed but the security mechanisms for enforcing these provisions are outside the scope of the Standard.

5.7.4.4 Confirming the entitlement of a requester to EHR Information

If the *Request EHR* message is used between two parties with an existing relationship of trust it may be sufficient for the request message to confirm its source and authenticity (for example using a digital signature). However, in the case of transfers within a wider community, the holder of the EHR (party **A**) may need to check the status of the requester (party **B**) before responding to a request. This check may be done using various mechanisms that are outside the scope of this Standard. However, some of the possible mechanisms impose additional requirements on the message.

- ❖ The *Request EHR* message may need to convey a reference to a third party (party **C**) recognised by party **A** as being authorised to vouch for the status of party **B**.
- ❖ The *Request EHR* message may need to convey information that allows it to be routed via a third party (party **C**) responsible for logging and checking the validity of requests before forwarding valid requests to party **A**.
- ❖ The *Request EHR* message may need to convey a password or key provided by the patient to party **B**, which is recognised by party **A** as indicating authorisation by that patient for the EHR to be provided.
- ❖ The *Provide EHR* message may need to be capable of being sent without recognisable identification information. This "unidentified" EHR may then be recombined with the appropriate identification information provided by a recognised third party who is able to provide a link between the information in this message and the appropriate patient.

5.7.4.5 Authenticity of origin of EHR Information

If the *Provide EHR* message is used between two parties with an existing relationship of trust it may be sufficient for the message to confirm its source and authenticity (for example using a digital signature). However, in the case of transfers within a wider community, the recipient (party **B**) may need to check the status of the sender (party **A**) before accepting the validity of the EHR information provided. This check may be done using various mechanisms that are outside the scope of this Standard. However, some of the possible mechanisms impose additional requirements on the message.

- ❖ The *Provide EHR* message may need to convey a reference to a third party (party **C**) recognised by party **B** as being authorised to vouch for the status of party **A**.
- ❖ The *Provide EHR* message may need to convey information that allows it to be routed via a third party (party **C**). The third party only forwards the message if it recognises the status of party **A**.

5.8 Summary of communication requirements

The following messages, required to support the scenarios, are covered by existing message Standards:

- ❖ **Service Request:** According to the nature of the service: Laboratory Service Order (ENV1613) Specialist Service Request (ENV12538) Diagnostic Service Request (ENV12539).
- ❖ **Plan Report:** According to the nature of the service Specialist Service Plan Report (ENV12538) Diagnostic Service Plan (ENV12539).
- ❖ **Service Report:** According to the nature of the service Laboratory Service Report (ENV1613) Specialist Service Report (ENV12538) Diagnostic Service Report (ENV12539).

The following additional messages are required to support these scenarios and are specified in this Standard:

- ❖ [Request EHR](#) message - To request clinical information about a patient
- ❖ [Provide EHR](#) message - To provide or update clinical information about a patient. This message may also indicate that the sender wishes to transfer their responsibility for the clinical care of a patient to the recipient.
- ❖ [Reject Request for EHR](#) message - To decline to *Provide EHR* message when this has been requested. There may be many reasons for refusal (e.g. confidentiality constraints, lack of (relevant) information, etc).
- ❖ [Patient Care Acceptance](#) or Rejection - To allow a healthcare party to respond to a request to take over the care of a patient. This is a simplified version of the plan report messages specified previous message Standards - i.e. the Specialist Service Plan Report (ENV12538) and the Diagnostic Service Plan (ENV12539).

Additional general purpose messages that may also be required to manage some of these scenarios (e.g. to acknowledge receipt of a message or to report errors in a message). These messages are outside the scope of this Standard.

6. The EHR Message Domain Model

6.1 Model diagrams and textual summaries

6.1.1 The Top Level EHR domain model

6.1.1.1 Introduction

Figure 8 illustrates the relationships between:

- ❖ The communicating parties involved in the exchange of EHR information;
- ❖ The messages specified by this Prestandard;
- ❖ The core elements of the EHR.

6.1.1.2 Communicating Parties

The message includes information about the two principal communicating healthcare parties:

- ◆ The [EHR destination](#) – an actual or intended receiver of EHR information.
- ◆ The [EHR source](#) – an actual or potential sender of EHR information.

The message may also include information about any other parties involved as intermediaries in the communication. An [EHR intermediary](#) may be a forwarding agent or a party that independently verifies the status of the other parties.

6.1.1.3 Messages

The four messages specified by this standard are:

- ◆ [Request EHR](#)
- ◆ [Provide EHR](#)
- ◆ [Reject request for EHR](#)
- ◆ [Patient care acceptance](#)

These messages are specialisations of one of two general classes of message:

- ❖ [messages from an EHR destination](#) (the [request EHR](#) and [patient care acceptance](#) messages);
- ❖ [messages from EHR source](#) (the [provide EHR](#) and [reject request for EHR](#) messages).

6.1.1.4 Core elements of the electronic healthcare record

The EHR elements shown in Figure 8 are:

- ◆ [Patient demographic details](#) – identification, name, age, sex and address information.
- ◆ The [EHR root complex](#) – a top level object which contains all the EHR information in an EHR message about a particular patient. The detailed information content is within other objects which are themselves part of the EHR root complex.

The [request EHR](#), [reject request for EHR](#) and [patient care acceptance](#) messages identify the patient concerned by including [EHR patient demographic details](#).

The [provide EHR](#) message includes the [EHR root complex](#). This root object logically includes [EHR patient demographic details](#). However, the model allows for circumstances in which the patient identification information is deliberately separated from the main content of the EHR.

6.1.1.5 Supported scenarios

The scenarios supported by these messages are detailed in Section 5. These scenarios are variants or parts of the following outline scenario:

- ❖ An [EHR destination](#) sends the [request EHR](#) message to an [EHR source](#) to request all or part of a patient's EHR.
- ❖ The [EHR source](#) sends a message to the [EHR destination](#). This may be either:
 - ◆ a [provide EHR](#) message containing all or part of a patient's EHR (this may also be sent unrequested); or
 - ◆ a [reject request for EHR](#) message referring to the preceding request.
- ❖ If a [provide EHR](#) message requests that the [EHR destination](#) takes responsibility for the care of the patient, they may respond by sending the [patient care acceptance](#) message to accept or reject this responsibility.

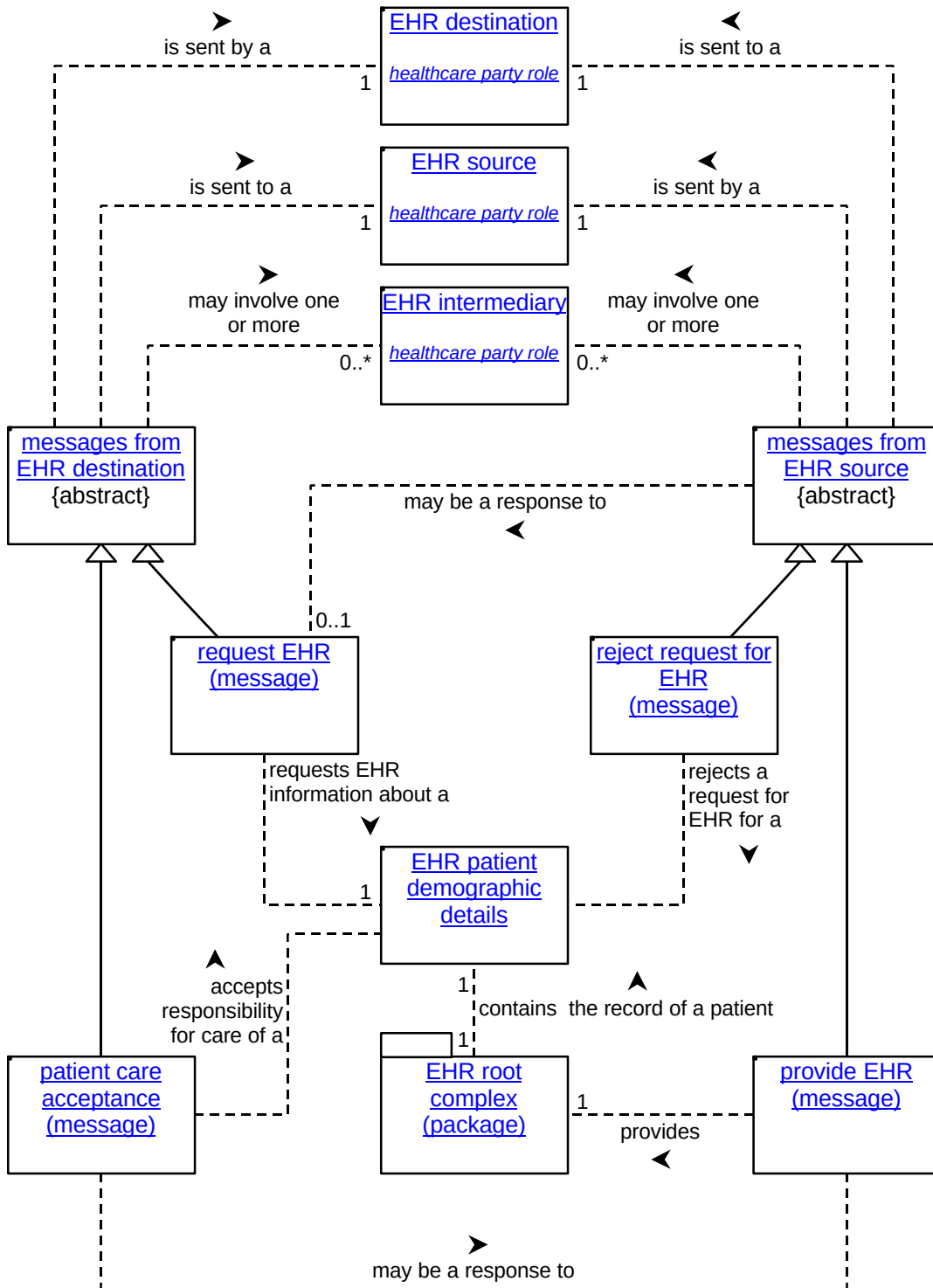
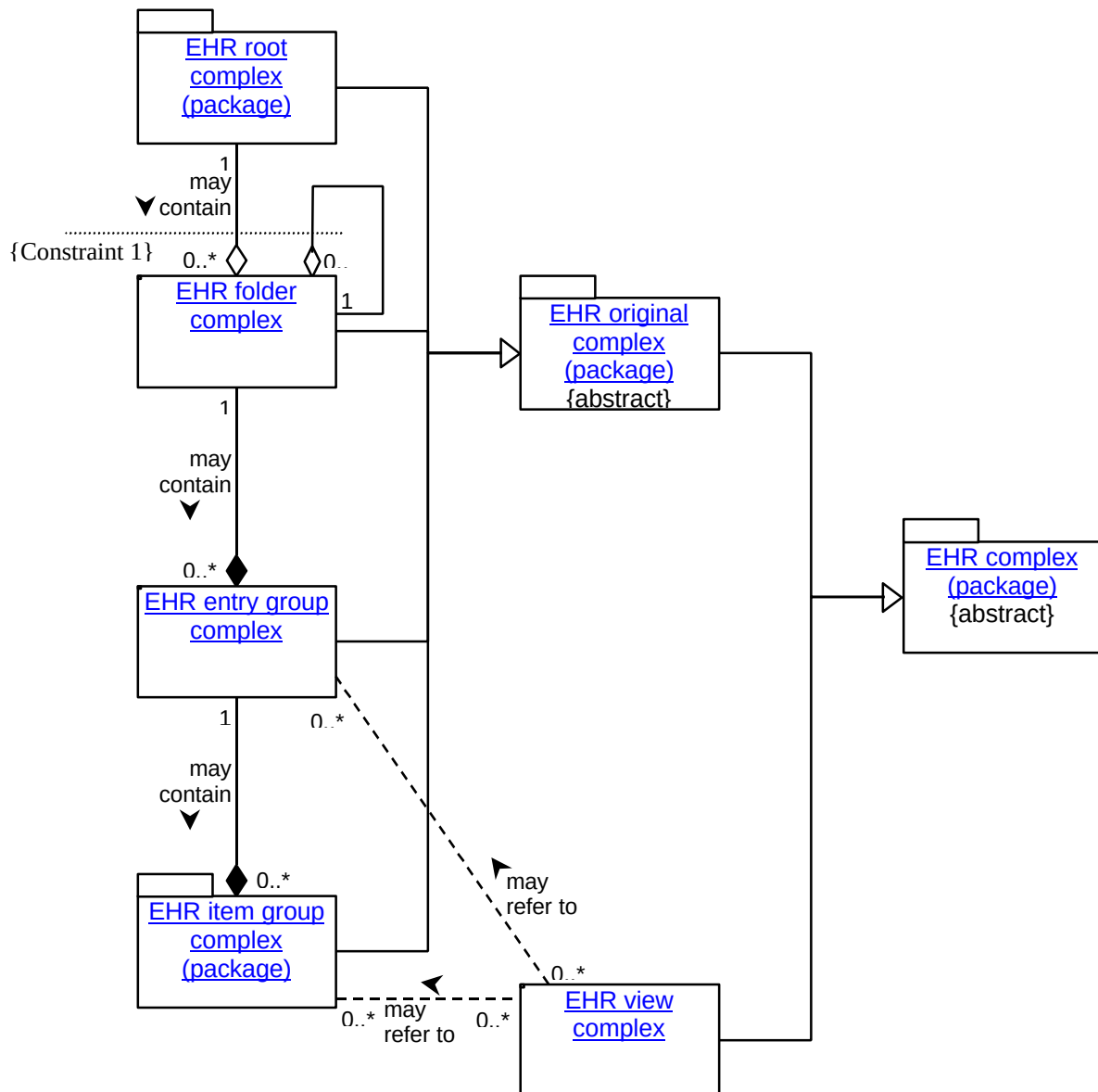


Figure 8. Domain Model - Top Level of EHR



Constraint 1: An EHR folder complex shall be part of the EHR root complex **or** part of another EHR folder complex.
 5 An EHR folder complex shall not be part of both the EHR root complex and another EHR folder complex.

Figure 9. Domain Model - EHR complexes - overview

6.1.2 EHR complexes

6.1.2.1 Introduction

Figure 9 provides an overview of the relationships between the different EHR components supported by this Prestandard EHR message. There are three distinct types of relationship between these components:-

- ❖ specialisation-generalisation;
- ❖ hierarchical whole-part;
- ❖ associations.

The differences between these relationships are important to an understanding of the domain model.

6.1.2.2 Specialisations and generalisation

All the components shown in Figure 9 are "record item complexes", based on the principals of ENV12265. In this Prestandard "record item complexes" are referred to as [EHR complexes](#)¹.

The specialised EHR complexes shown on the left of Figure 9 share many common attributes and characteristics. These commonalities are inherited from the general classes on the right of the figure. Thus all EHR complexes inherit the attributes and relationships of [EHR complex](#) (see Figure 10). In line with the provisions of EV12265 all [EHR complexes](#) in the EHR message are also specialisation of one of two general classes [EHR original complexes](#) and [EHR view complexes](#). Each specialisation of [EHR original complexes](#) inherits the common attributes and relationships of that class (see Figure 11).

Drafting Note: The current draft does not provide details of the common attributes of [EHR view complexes](#) nor does it identify any further specialisations of this class.

ENV12265 proposes two types of view complexes depending on whether they contain record items or other complexes. The applicability and relevance of this specialisation to the EHR message have yet to be considered.

6.1.2.3 Hierarchical whole-part relationships

[EHR original complexes](#) are related in a hierarchy with a single axis. These relationships are shown running from top to bottom on the right of Figure 9. All EHR information in the message is part of one, and only one, [EHR original complex](#). With the single exception of the top level [EHR root complex](#) every [EHR original complex](#) is itself part of one, and only one, other [EHR original complex](#). Thus all EHR information in the message is part of the [EHR root complex](#) either directly or as part of a hierarchy of intermediate [EHR original complexes](#).

The unique status of the [EHR root complex](#) makes it a distinct specialisation of the general class [EHR original complex](#). The additional attributes and relationships associated with this specialisation are shown in Figure 12. EHR complexes are either sub-specialisations of [EHR original complex](#) or of [EHR view complex](#). Figure 11 illustrates the additional attributes applicable to an [EHR original complex](#).

The simplest messages supported by this Prestandard consist only of a single [EHR root complex](#). In these messages the EHR information content is conveyed in a textual form in the [EHR complex as text](#) attribute (see Figure 11).

Structured information of various types is conveyed in individual [EHR record items](#). These are grouped together into meaningful aggregations in [EHR item group complexes](#) (see Figure 13). [EHR item group complexes](#) are used to convey items which have a close temporal and logical relationship to one another. For example, multiple numeric values associated with a single investigation or measurement.

[EHR item group complexes](#) can be grouped together into [EHR entry group complexes](#). These groupings are used to convey information recorded during a single session or encounter. If a system is unable to distinguish separate encounters or sessions during the same day, an [EHR entry group complex](#) may contain all EHR information recorded by a healthcare party on the same day.

[EHR entry group complexes](#) may themselves be grouped into [EHR folder complexes](#). The manner in which items are grouped into [EHR folder complexes](#) is arbitrary but may designate a defined episode or period of care. Unlike all the other [EHR original complexes](#) defined in the Prestandard, [EHR folder complexes](#) may be nested within one another to provide additional depth to the hierarchical structure. An [EHR folder complex](#) is either part of another [EHR folder complex](#) or part of the [EHR root complex](#).

6.1.2.4 Associations

An [EHR view complex](#) is associated with any number of [EHR item group complexes](#) or [EHR entry group complexes](#) that contain the information content of that view. Similarly an [EHR item group complex](#) or [EHR entry group complex](#) may be associated with any number of [EHR view complexes](#).

Additional relationships which are not shown in the diagrams may associate various items or complexes together. Examples include, the relationship between a requested service and the report of that service or the relationship between a procedure and a complication or outcome.

¹ Drafting Note: The shorter name "EHR complex" can be more readily extended to name specialisations of this class. For example, "EHR root complex" seems clearer than "root record item complex". Furthermore, most of the specialisations of "EHR complex" are not allowed to contain "record items" but may only contain other complexes. Therefore the name "record item complex" is not strictly accurate and may be misleading. An alternative would be to use the abbreviation "RIC" and this substitution can be made in future drafts if preferred by WGI members.

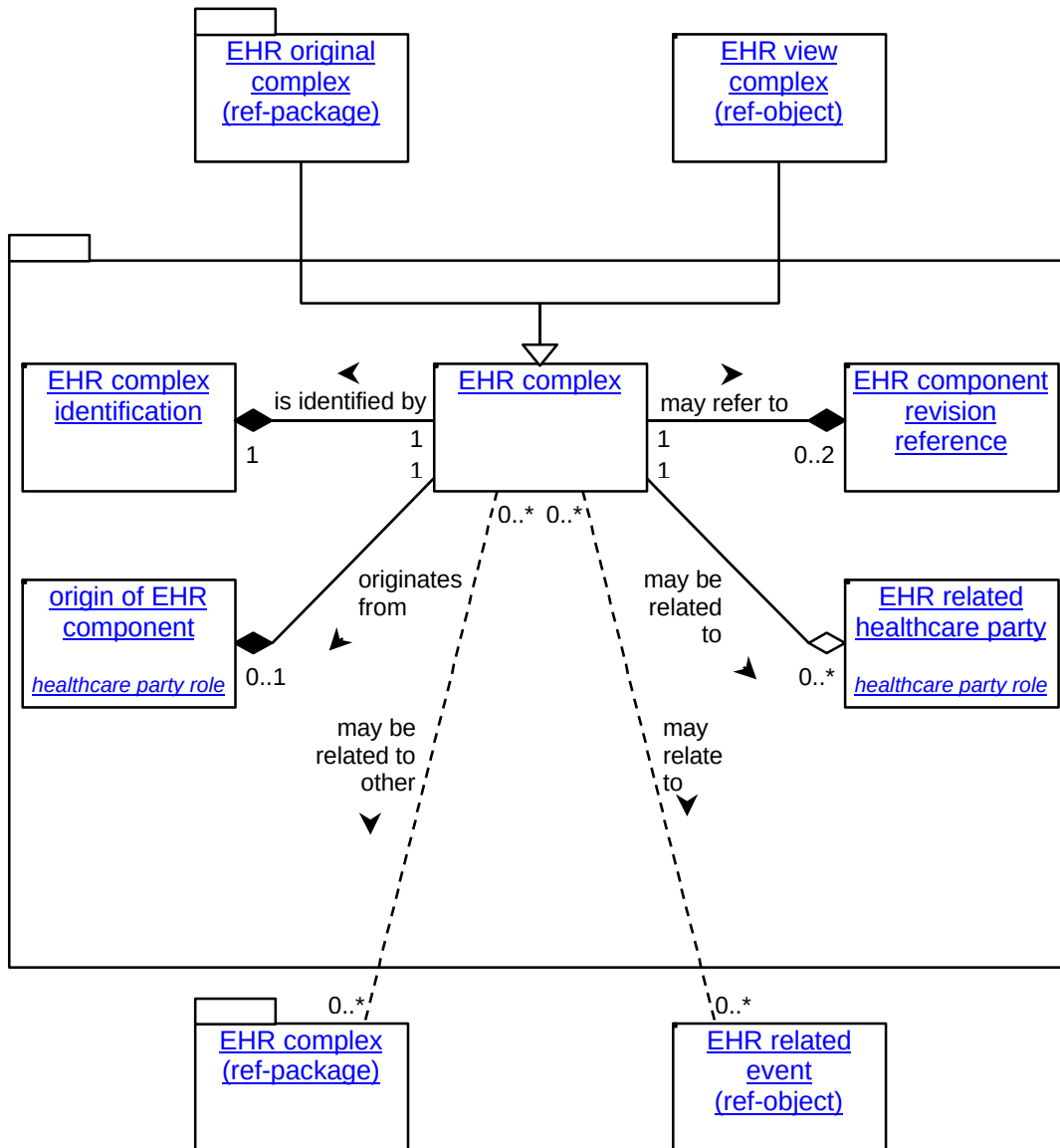


Figure 10. Domain Model - EHR complex - abstract package

5 6.1.3 The EHR complex

The components of the general class [EHR complex](#) shown in Figure 10 include:

- ❖ [EHR complex identification](#) - a unique identifier of the complex.
- ❖ [origin of EHR component](#) - the identity of the healthcare party responsible for recording the complex and the time and date of origin.
- ❖ [EHR related healthcare parties](#) - other healthcare parties related to the information included in a particular complex. For example, the person who performed a procedure recorded by another person or the person ultimately responsible for a particular record.
- ❖ [EHR component revision reference](#) - references to a previous complex that is superseded by this complex or to a subsequent complex which has replaced or modified this complex.

An [EHR complex](#) may be associated with other [EHR complexes](#). For example, to link a procedure to an outcome or complication.

An [EHR complex](#) may be associated with an [EHR related event](#). For example, to link a record to a clinic attendance during which the record was made.

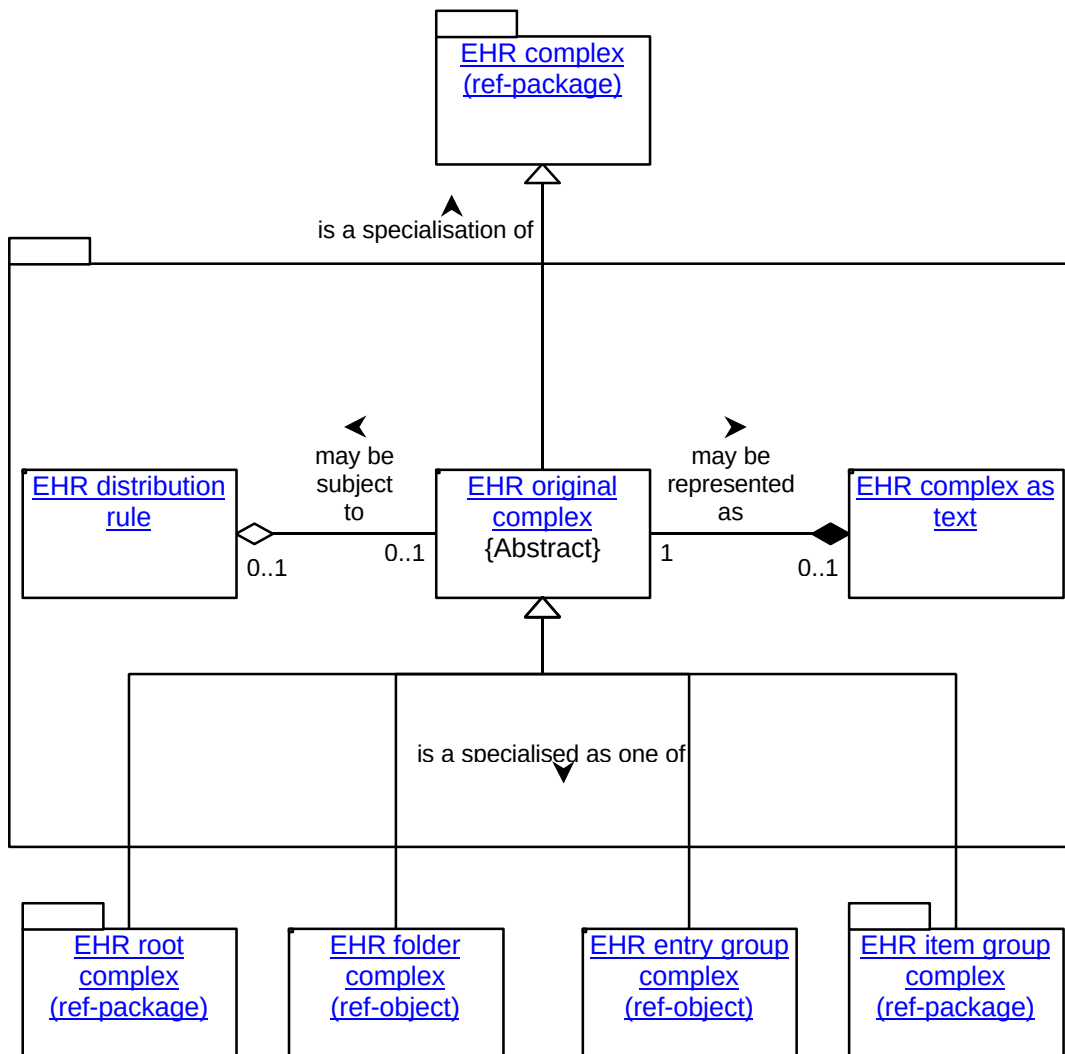


Figure 11. Domain Model - EHR original complex - abstract package

5 6.1.4 The EHR original complex

[EHR original complexes](#) are specialisation of [EHR complex](#) and thus include all the attributes and relationships of that general class.

Four specialisations of the [EHR original complexes](#) are used in the messages specified by this Prestandard. These are the [EHR root complex](#), [EHR folder complexes](#), [EHR entry group complexes](#) and [EHR item group complexes](#).

10 The additional attributes of [EHR original complex](#) shown in Figure 11 are [EHR distribution rule](#) and [EHR complex as text](#).

The [EHR distribution rule](#) conveys rules about distribution and confidentiality constraints applicable to the complex and its components.

Drafting Note: The content of the distribution rule object will be resolved in liaison with CEN TC251 PT28.

15 The [EHR complex as text](#) attribute is an optional element in all [EHR original complexes](#) to convey a textual representation or summary of the information which forms part of that [EHR original complexes](#) and its hierarchical descendants. Although an [EHR source](#) may populate the richer structures supported by the constituent components of a complex, the [EHR complex as text](#) is useful for [EHR destinations](#) that are unable to process the full structured content of the message. The simplest messages supported by this Prestandard consist only of a single [EHR root complex](#). In these messages the EHR information content is conveyed in a textual form in the [EHR complex as text](#) attribute within the [EHR root complex](#).

20

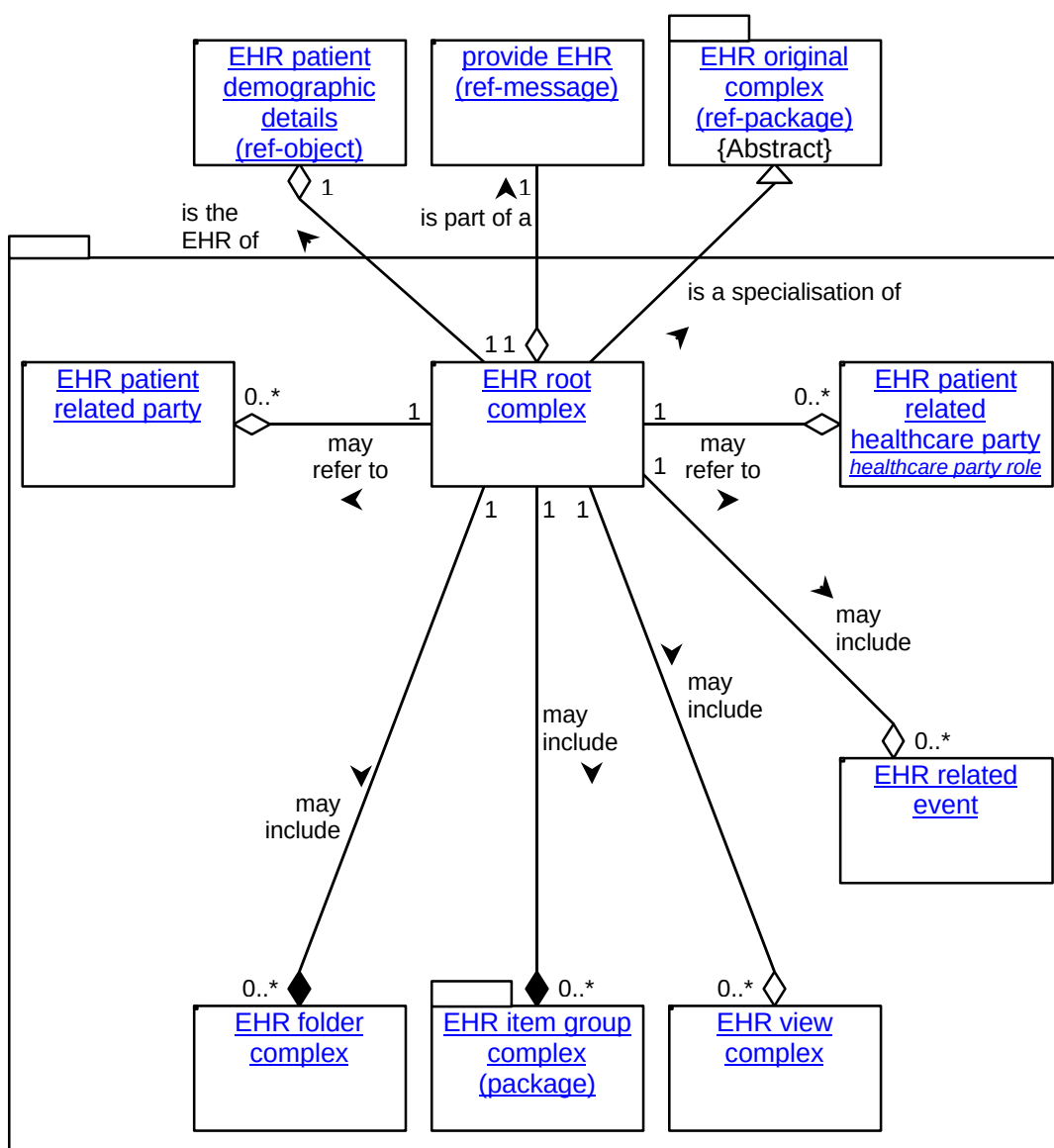
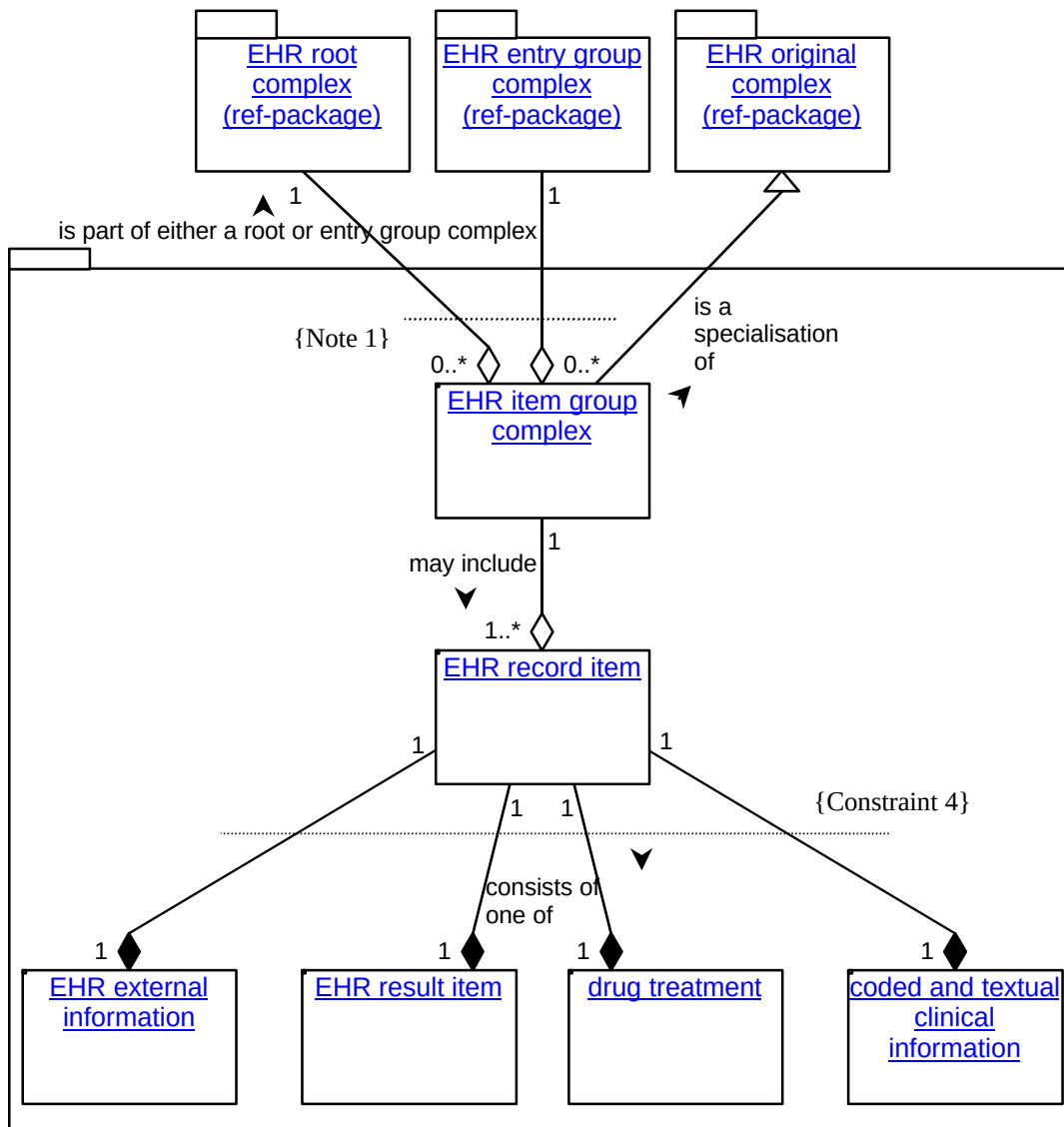


Figure 12. Domain Model - EHR root complex - package

6.1.5 The EHR root complex

- 5 In each [provide EHR](#) message there is one and only one [EHR root complex](#). [EHR root complex](#) is a specialisation of [EHR original complex](#) which is in turn a specialisation of the general class [EHR complex](#). It therefore inherits the attributes and relationships of these (see Figure 10 and Figure 11). The additional specialised contents of the [EHR root complex](#) (shown in Figure 12) includes:
- ❖ [patient demographic details](#) - identification, name, age, sex, address(es) and telecommunication numbers.
 - ❖ [EHR related events](#) - for example, appointments, admissions and clinic attendances.
 - ❖ [EHR folder complexes](#) - and directly or indirectly other specialised [EHR original complexes](#)
 - ❖ [EHR view complexes](#) - that provide alternative structures to the EHR.
 - ❖ [EHR patient related parties](#) - for example, family members, friends, employers, school attended, etc.
 - ❖ [EHR patient related healthcare parties](#) - for example, usual physician, GP, nurse, "key-worker", etc.
- 10
- 15 The [EHR root complex](#) specified in this Prestandard appears in all [provide EHR](#) messages. Since this message may be used to convey a part of the EHR it follows that the [EHR root complex](#) within the message need not be equivalent to the root object of the EHR within the [EHR source](#) system.



Constraint 4: An instance of an EHR record item may contain one and only one of the types of information identified at the bottom of this figure.

Note 1: A decision is required here about whether to permit the EHR item group to be a member of the EHR group complex. The intention of this would be to support simpler implementations. This is not shown elsewhere in the model at present.

Figure 13. Domain Model - EHR item group package

6.1.6 EHR record item and EHR item group complex

Figure 13 illustrates the lowest level of the EHR message domain model.

At this stage in the development of this Prestandard, four types of EHR record item have been identified.

❖ **coded and textual clinical information**

- ◆ This is provided for conveying any clinical information that can be represented as a combination of text and one or more clinical code values.
- ◆ This is broadly similar to the "observation" class in ENV1613 and other CEN TC251 messaging Prestandards. It has been renamed as it is clear that the use of this information type is far broader than the recording of observations.

❖ [drug treatment](#)

- ◆ This is provided for conveying information about prescribing, dispensing, administration and medication history. It is intended to convey information about what has happened or what is planned and should not to be used to be used to send prescriptions to a pharmacy or instructions to administer a particular drug.

- ◆ This is similar to the class with the same name in ENV1613 and other CEN TC251 messaging Prestandards.

❖ [EHR result item](#)

- ◆ This is a general purpose class for conveying results of investigations or measurements. It includes provision for numeric values, references ranges and units.

❖ [EHR external information](#)

- ◆ This is a class that can be used to refer to information or objects that are related to the EHR but which exist in a physical form. For example, a paper record or an X-ray film.
- ◆ It can also be used to refer to digital information held within the EHR or accessible using a separate system or interface.

6.1.7 Healthcare party roles

Wherever the EHR model refers to a healthcare party it does so using a specialisation of the abstract class healthcare party role. The relationships of healthcare party roles are shown in Figure 14.

This view of healthcare party role differs from the one adopted in previous CEN TC251 messaging Prestandards. It is including in this Interim Report as a point for discussion. The overall structure of this Prestandard could also accommodate a variety of other approaches to modelling healthcare parties. However, the merits of the proposal in Figure 14 are outlined below.

Both healthcare party role and healthcare party are recognised as abstract classes. This means that within the messages healthcare party roles only exists as instances of particular specialisations of that class and healthcare parties only exist as either professionals or organisations.

There is a separation between healthcare party and healthcare party role. Healthcare party is a generalisation of healthcare organisation and healthcare professional which usefully allows them to share common attributes. However, healthcare party role is in practice a pointer to either a healthcare professional or a healthcare organisation. The fact of this choice is independent of the fact that they share attributes. In fact in earlier messaging models there is confusion about whether the healthcare party attributes and relationships are repeated or shared between related healthcare organisations and professionals. The proposed model thus recognises that healthcare parties exist outside their particular roles in the message.

This separation also makes it possible to have "healthcare professional roles" in future revisions of messages where the role can only be fulfilled by a person but not by an organisation.

Whereas healthcare professionals and healthcare organisations could also be considered as specialisations of healthcare party role, the proposed model treats them as optional parts of the role. This reduces the ambiguity associated with recursive links between healthcare organisations – in the previous approach these were healthcare parties which in theory could then have a different healthcare party role.

An additional, though arguable, limitation has been placed on the recursive relationships of healthcare organisations as part of other organisations. It is true that a department may be part of a unit, which is part of a hospital, which is part of a group of hospitals, etc but it is very unlikely that this level of complexity needs to be represented simply to identify the healthcare party and this is the objective of healthcare party role in these messages.

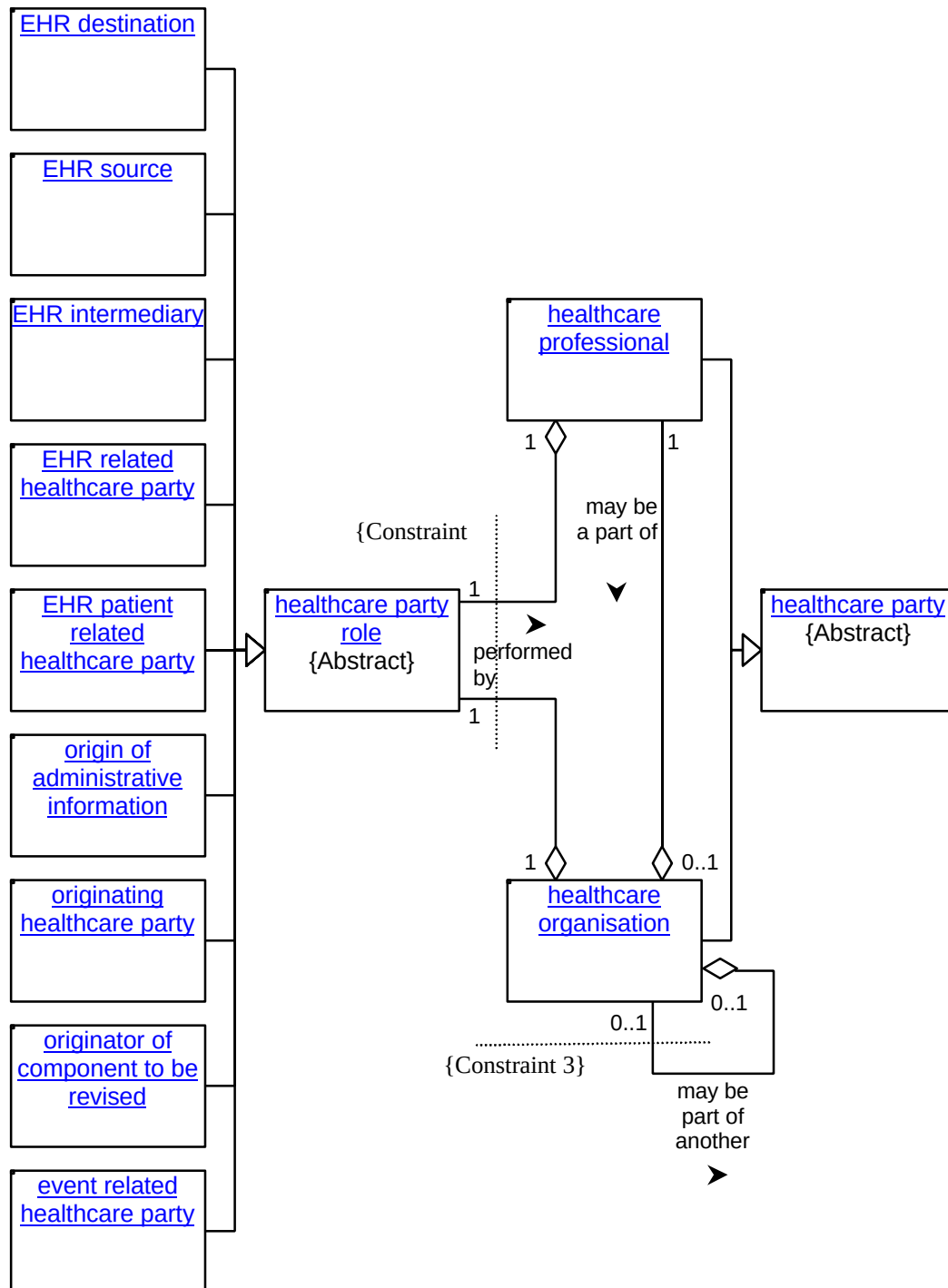


Figure 14. Domain Model - EHR healthcare parties

Constraint 2: Each healthcare party role shall be performed by either a healthcare professional or a healthcare organisation.

- 5 Constraint 3: Only one recursion of healthcare organisation as part of another healthcare organisation is permitted for use in EHR messages.

6.2 Messages

6.2.1 patient care acceptance

Type: message

5 Specialisation of: [messages from EHR destination](#)

Description: A message used to indicate that a [healthcare party](#) has accepted a request to take over clinical responsibility for a patient.

Note: This message is intended to be used in response to a [provide EHR](#) message that indicates that the sender intends to transfer responsibility to the recipient.

10 **Related to:** [provide EHR](#) message

Occurrences: 0..1

Relationship: may be a response to

Additional attributes

[acceptance status](#)

15 Type: [C/S](#) [1]

Description: Indication of whether and on what basis the [EHR destination](#) has accepted clinical responsibility for the patient.

[EHR patient demographic details](#)

20 Type: class [1]

Description: Information about a person receiving, or registered to receive, healthcare services.

6.2.2 provide EHR

Type: message

Specialisation of: [messages from EHR source](#)

25 **Description:** A message used to convey all or part of the information in an EHR from one [healthcare party](#) to another [healthcare party](#).

Additional attributes

[specification of provided EHR information](#)

Type: sub class [1]

30 Description: A group containing elements that specify the language content and structural level of the EHR information provided.

[EHR root complex](#)

Type: class [1]

Description: An original [EHR complex](#) that represents the complete EHR content of the message.

6.2.3 reject request for EHR

Type: message

Specialisation of: [messages from EHR source](#)

Description: A message that indicates that the sender is declining to send all or part of an EHR in response to a [request EHR](#) message.

Note: A request may be rejected for various different reasons. These include the following:

- the party from whom the record was requested does not hold an EHR for the patient.
- the EHR does not hold the information requested
- the EHR or the requested information cannot be divulged due to confidentiality constraints imposed by the patient, by legislation or by ethical guidelines.

Additional attributes

[EHR patient demographic details](#)

Type: class [1]

Description: Information about a person receiving, or registered to receive, healthcare services.

6.2.4 request EHR

Type: message

Specialisation of: [messages from EHR destination](#)

Description: A message used to request that all or part of the EHR held by a [healthcare party](#) is sent to another [healthcare party](#).

Related to: [messages from EHR source](#)

Occurrences: 0..*

Additional attributes

[EHR patient demographic details](#)

Type: class [1]

Description: Information about a person receiving, or registered to receive, healthcare services.

[specification of requested EHR information](#)

Type: sub class [1]

[reason for request](#)

Type: [C+S](#) [0..1]

Description: reason why the request was sent.

6.3 Classes

6.3.1 actual event

Type: class

Description: Information about an [EHR related event](#) that has already taken place.

Part of: [EHR related event](#)

Attributes

period of event

Type: [period](#) [0..1]

Description: [period](#) during which the event occurred.

occurrence outcome of actual action event

Type: [occurrence outcome](#) [0..1]

6.3.2 coded and textual clinical information

Type: class

Description: Clinical information which is not about [drug treatment](#) and does not include the result of a previous investigation or [measurement](#).

Example(s): Family history (e.g. father diabetic), symptoms (e.g. headache), signs (e.g. hepatomegaly), problems (e.g. weight loss or loss of body mass), diagnoses (e.g. thyrotoxicosis, both known and tentative), operative procedures (e.g. pancreatectomy), information given to the patient or relative.

Part of: [EHR record item](#)

Additional attributes

observation description

Type: [LC+S](#) [0..1]

Example(s): Gastric carcinoma, abdominal pain, axillary lymphadenopathy, airline pilot, failure to thrive.

comment to observation

Type: [S](#) [0..*]

6.3.3 drug treatment

Type: class

Description: Information about a patient's previous, planned or current treatment with a substance or chemical compound for the prevention, alleviation or treatment of a medical condition.

Note: This differs from procedure step where the specific intention is to administer the drug or undertake a procedure for diagnostic purposes prior to or as part of a diagnostic investigation. drug treatment may influence the results and/or interpretations of diagnostic investigations; this includes those drugs whose administration is being monitored by [measurement](#) of drug levels; may include 'presentation' (e.g. tablets, capsules, injection, inhaler, syrup) as well as the drug itself.

This should not be used for conveying prescriptions or treatment instructions as this is outside the scope of this European Prestandard.

Part of: [EHR record item](#)

Additional attributes

drug information status

Type: [V](#) [1]

Description: Information which describes the status of the [drug treatment](#) information.

Example(s): Reported (treatment information reported by sender to receiver of the message), prescribed (treatment for which a prescription has been issued to the patient), prescription ceased (pre-existing prescription stopped), dispensed (drug for which a supply has been dispensed to the patient - recognises implicitly that it was also prescribed), recommendation to prescribe (that the colleague receiving the message should prescribe), recommendation to cease (that the colleague receiving the message should cease treatment), patient advised to take, patient advised to cease.

identification of drug

Type: [C/S](#) [1]

Note: This identification may provide either a brand identification or the generic identification of the drug. In addition, it may identify the form of presentation (e.g. tablets, inhaler, patch).

The scope of this attribute includes the possibility of it conveying both drug identification information and form of presentation information since code lists which combine these are in widespread current use. It is expected that in the future this information will be carried in several distinct attributes.

Example(s): Salbutamol inhaler, salbutamol syrup, Ventolin, paracetamol, warfarin tablets, soluble insulin, lignocaine, dobutamine, gluten-free flour.

dosage and administration specification of drug

Type: [LC+S](#) [0..*]

Description: Information which, together with the drug identification, provides a full specification of the patient's treatment with the drug.

Note: Form of presentation (e.g. tablets, inhaler); route of administration (e.g. oral, sublingual, topical, intravenous injection); unit dose (e.g. 3 tablets, 250 mg, 2 puffs); dosage regime (e.g. one unit dose three times daily, one twice daily and two at night, one before administration trigger, one after administration trigger, one at 10:00 am); maximum permitted daily dose (e.g. 8 unit doses); trigger for administration (e.g. chest pain, meals, exercise); precautions (e.g. stop if indigestion, report any sore throat).

Form of presentation not normally included if indicated by the identification of the drug.

Example(s): 100 micrograms daily (of drug thyroxine), 3 mg in the evening (of drug warfarin tablets), 2 puffs before exercise (of drug salbutamol inhaler) 1 mg patch twice weekly (of drug oestrogen), 80 mg intravenously every 8 h (of drug gentamicin injection), 2 tablets by mouth every four hours as required for pain, with a maximum of eight tablets a day (of drug paracetamol).

intended duration of drug treatment

Type: *sub class single use* [0..1]

Description: Information on the length of time that the party recommending or prescribing the drug intends that it be taken.

days supply

Type: [I](#) [0..1]

quantity of drug supplied

Type: [measurement](#) [0..1]

Note: This attribute group consists of the attributes [numerical value](#) of quantity and unit of quantity.

comment to drug treatment

Type: [S](#) [0..1]

Note: To convey any unstructured comment about the patient's treatment with the drug.

6.3.4 EHR complex

Type: class

Description: The EHR complex is a generalised class representing the elements common to all EHR complexes and items.

5 **Note:** This class is only instantiated as instances of the specialisations.

May be specialised as one of the following:

[EHR original complex](#)

[EHR view complex](#)

Attributes

10 service type of EHR complex

Type: [V](#) [0..1]

Description: Indication of whether the information contained in an object is to be added, deleted or used to make a modification.

Example(s): Add, delete, modify.

15 EHR complex identification

Type: class [1]

Description: A unique identification of an [EHR complex](#) or item and its origin.

origin of EHR component

Type: class [0..1]

20 Description: Identifies the origin of this EHR component. This includes the [healthcare party](#) who recorded this EHR component on the system on which that component originated and the date and time at which it was recorded.

EHR component revision reference

Type: class [0..2]

25 Description: A unique identification of an earlier version of an EHR component that is to be revised.

EHR distribution rule

Type: class [0..*]

Description: Information about rules applicable to distribution of one or more [EHR complex\(es\)](#).

EHR related healthcare party

30 Type: class [0..*]

Description: Information about a [healthcare party](#) that has a role in relation to an [EHR complex](#) other than as the originator of that [EHR complex](#).

6.3.5 EHR complex as text

Type: class

35 **Description:** Text that conveys the a human-readable rendering of the [EHR complex](#) or which it forms part.

Note: The text contained in EHR complex as text is intended to duplicate more structured forms of representation within the constituent parts of the [EHR complex](#). In the least structured use of this the [provide EHR](#) message, the entire content of the EHR may be present in the EHR complex as text that forms part of the [EHR root complex](#).

May be part of: [EHR original complex](#)

40 **Attributes**

text blocks with heading

Type: sub class [0..*]

Description: Blocks of text with a related text or coded heading.

6.3.6 EHR complex identification

Type: class

Description: A unique identification of an [EHR complex](#) or item and its origin.

Note: Includes the Unique instance [identifier](#) attribute (ENV 12265 clause 4.6.2) and an indication of the scope in which the [identifier](#) (as used in the messages) is unique.

Part of: [EHR complex](#)

Attributes

EHR complex identifier

Type: [S](#) [1]

Description: This identification shall uniquely identify an instance of an [EHR complex](#) from all other instances belonging to the same record. The scope within which this identification is unique may be limited as indicated by the attribute "scope of object identifier".

Note: Equivalent to ENV 12265 clause 4.6.2 Unique instance [identifier](#) attribute.

scope of EHR complex identifier

Type: [V](#) [0..1]

Description: An indication of whether the identifier is unique within this message or a globally unique identifier within the EHR held by its originator

Note: The identification of the object should be unique within the scope of the EHR held by the originator. However, systems that do not support identification of record components in a manner compatible with ENV12265 may use this attribute to indicate that the [identifier](#) is unique within a more limited scope.

Values: Unique within message

Unique within originator's EHR for this patient

Unique within originator's system

6.3.7 EHR component revision reference

Type: class

Description: A unique identification of an earlier version of an EHR component that is to be revised.

Note: This attribute is equivalent to ENV12265 clause 4.6.4 Revised Version.

Additional information is provided to enable references to EHR components from other originators.

Part of: [EHR complex](#)

Attributes

EHR component revision reference type

Type: [V](#) [1]

Description: An indication of whether the associated identifier refers to an original instance of this component or to the most recent previous revision of this component.

Values: Original version

Most recent previous version.

identifier of component to be revised

Type: [S](#) [1]

Description: The identifier assigned to a previous revision of this component by the originator [healthcare party](#) of the component.

originator of component to be revised

Type: class [0..1]

Description: The identification of the originator of the EHR component to be superseded by this EHR component.

recording date and time of component to be revised

Type: [TOCD](#) [0..1]

Description: The date and time of origin of the EHR component that is to be superseded.

Note: This attribute may be required by some communicating parties to support unique identification of EHR components when communicating between systems that have different record structures and which as a result may not use a common scheme of EHR component identifiers.

6.3.8 EHR destination

Type: class

Specialisation of: [healthcare party role](#)

Description: A [healthcare party](#) that requests or receives EHR information from another [healthcare party](#) (an [EHR source](#)).

Part of: [messages from EHR source](#)

Part of: [messages from EHR destination](#)

6.3.9 EHR distribution rule

Type: class

Description: Information about rules applicable to distribution of one or more [EHR complex](#)(es).

Note: The structure of this class remains to be determined. It will be as specified by the Distribution Rules work item CEN TC251 PT28 or an appropriate subset of this according to the status and progress of that work.

Part of: [EHR original complex](#)

Attributes#Distribution rule attributes

Type: [#TO BE ADDED](#) [1]

Description: To be defined in the next draft or following further discussion of relationship to CEN TC251 PT28.

6.3.10 EHR entry group complex

Type: class

Specialisation of: [EHR original complex](#)

Description: An [EHR original complex](#) that aggregates a number of [EHR item group complex](#)es collected during the same encounter or at least on the same date.

Part of one of the following:

[EHR root complex](#)

[EHR folder complex](#)

Related to: [EHR related event](#)

Occurrences: 0..*

Related to: [EHR view complex](#)

Occurrences: 0..*

Additional attributes[EHR item group complex](#)

Type: class [0..*]

Description: An [EHR original complex](#) that aggregates together a logically related set of items.

6.3.11 EHR external information

Type: class

Description: Information that is logically part of the full healthcare record for a patient but which is not stored within the EHR.

5 **Usage:** This class & object allows a record of a clinical investigation result item to refer to a physical or digital record made during an investigation.

10 **Note:** This differs from the full form of the class & object study product, which is a specialisation of analysed object and is associated with diagnostic investigation result item. It includes those attributes in analysed object, collected analysed object and study product which are needed to refer to an study product. It omits additional information regarding the object and is used in the context of a past investigation result which forms a part of the clinical information item related to a patient.

Example(s): An X-ray image, a series of X-ray images, part of an X-ray image (in a digitised form or as a film), an electrocardiograph (ECG) monitor tracing, a twelve lead ECG.

May be part of: [EHR item group complex](#)

15 Attributes

[EHR external information type](#)

Type: [C/S](#) [1]

Description: The general type of [EHR external information](#).

Choice of : [1]

20 *[reference to related digital information](#)*

Type: [reference to related information](#)

Description: Pointer to the location and format of external information held in a digital form.

[reference to a physical entity as part of the EHR](#)

Type: [reference to a physical entity](#)

25 6.3.12 EHR folder complex

Type: class

Specialisation of: [EHR original complex](#)

Description: An EHR folder complex is a [EHR complex](#) that aggregates a group of [EHR complexes](#) in a manner determined by the originator of that information.

30 **Part of one of the following:**

[EHR root complex](#)

[EHR folder complex](#)

Related to: [EHR related event](#)

Occurrences: 0..*

35 Additional attributes

[EHR folder complex](#)

Type: class [0..*]

Note: EHR folder complex.

[EHR entry group complex](#)

40 Type: class [0..*]

Description: An [EHR original complex](#) that aggregates a number of [EHR item group complexes](#) collected during the same encounter or at least on the same date.

6.3.13 EHR intermediary

Type: class

45 **Specialisation of:** [healthcare party role](#)

Description: A [healthcare party](#) other than the [EHR source](#) or [EHR destination](#) who is involved in the communication of EHR information.

Note: An EHR intermediary may act as a forwarding agent for messages that request or provide EHR information. An EHR intermediary may be a Trusted Third Party that confirms that the [EHR destination](#) is entitled to receive a particular [provide EHR](#) message.

An EHR intermediary may be a Trusted Third Party that confirms that the [EHR source](#) is an appropriately qualified or accredited party that is recognised as a provider of EHR information.

An EHR intermediary may act as a Trusted Third Party confirming that the EHR provider is qualified and/or registered to [provide EHR](#) information.

May be part of: [messages from EHR source](#)

May be part of: [messages from EHR destination](#)

Additional attributes

EHR intermediary role

Type: [V](#) [1]

Description: The role of the [EHR intermediary](#) in a particular transfer.

Values:

- Clearing-house or routing agent conveying request EHR messages to an EHR source.
- Clearing-house or routing agent conveying provide EHR messages from an EHR source to an EHR destination.
- Authorising body or TTP able to verify that the EHR destination is entitled to receive provide EHR messages.
- Authorising body or TTP able to verify that the EHR source is qualified or registered to send provide EHR messages.
- A party able to provide supporting information to identify the patient to whom an anonymous provide EHR message refers.

6.3.14 EHR item group complex

Type: class

Specialisation of: [EHR original complex](#)

Description: An [EHR original complex](#) that aggregates together a logically related set of items.

Part of one of the following:

[EHR root complex](#)

[EHR entry group complex](#)

Related to: [EHR view complex](#)

Occurrences: 0..*

Additional attributes

EHR record item

Type: class [1..*]

EHR item major modifiers

Type: sub class single use [1]

6.3.15 EHR original complex

Type: class

Specialisation of: [EHR complex](#)

Description: An EHR original complex is an [EHR complex](#) that groups together other [EHR complexes](#) in a manner that establishes the primary relationships between .

Note: The message supports four distinct specialisations of the Original [EHR complex](#). These range from the largest aggregation represented by the [EHR root complex](#) to the smallest represented by [EHR item group complex](#). The two intermediate forms of the [EHR complex](#) are the [EHR entry group complex](#) (a collection of [EHR item group complex](#) recorded during a particular event or encounter) and the [EHR folder complex](#) which can be used for other arbitrary grouping of original complexes.

The relationships between Original complexes are constrained so that any EHR or any part of the EHR will be represented as a simple hierarchy of these complexes in the message. Additional [EHR view complexes](#) can be included to provide alternative structures.

May be specialised as one of the following:

[EHR root complex](#)

[EHR folder complex](#)

[EHR entry group complex](#)

[EHR item group complex](#)

Additional attributes

[EHR distribution rule](#)

Type: class

[0..1]

Description: Information about rules applicable to distribution of one or more [EHR complex\(es\)](#).

[EHR complex as text](#)

Type: class

[0..1]

Description: Text that conveys the a human-readable rendering of the [EHR complex](#) or which it forms part.

6.3.16 EHR patient demographic details

Type: class

Description: Information about a person receiving, or registered to receive, healthcare services.

Part of: [request EHR](#) message

Part of: [EHR root complex](#)

May be part of: [reject request for EHR](#) message

May be part of: [patient care acceptance](#) message

Attributes

service type of record

Type: [V](#)

[1]

Description: Indication of whether the information contained in an object is to be added, deleted or whether the characteristics of the object are to be modified.

Example(s): Add, delete, modify.

patient identification

Type: [party identification](#)

[1]

patient name

Type: [person name details](#)

[1]

patient address

Type: [address](#)

[0..*]

patient telecommunication

Type: [telecommunication](#)

[0..*]

alternative person name

Type: [person name details](#) [0..*]

Note: This attribute group consists of the attributes alternative person name type and alternative person name value.

5 healthcare administrative data for patient

Type: sub class single use [0..1]

Description: Demographic and other administrative information related to a patient.

language details of patient

Type: [language details](#) [0..*]

10 confidentiality constraint on patient data

Type: [C/S](#) [0..*]

Description: Information that is of relevance in determining the type of patient information which may be shared by staff in the receiving [healthcare organisation](#) and the degree/extent to which it may be shared.

Note: The confidentiality constraints on patient data may also be defined by the patient.

Example(s): In some countries, the patient's consent must be obtained before computer-held data is transmitted to a third party.

precautions relevant to service provider

Type: sub class single use [0..*]

Description: Information about the patient that is given to a service because of its relevance to persons involved in providing that service.

6.3.17 EHR patient related healthcare party

Type: class

Specialisation of: [healthcare party role](#)

Description: Information about a [healthcare party](#) who has a role in the provision of healthcare services to an individual patient.

Note: This covers any role in the healthcare of a patient that is not more specifically covered by the other [healthcare party](#) roles defined in the DIM.

This may be a healthcare sub-department, department, organisation or person.

May be part of: [EHR root complex](#)

30 **Additional attributes**service type of record

Type: [V](#) [1]

Description: Indication of whether the information contained in an object is to be added, deleted or whether the characteristics of the object are to be modified.

Example(s): Add, delete, modify.

35 relationship details of patient related healthcare party

Type: [relationship details](#) [1]

6.3.18 EHR patient related party

Type: class

Description: Information about a person or organisation who has a role in the care of a patient other than as a [healthcare professional](#) or organisation.

Note: If a message needs to refer to any person other than a [healthcare professional](#) or the patient they are represented as a patient related party. The relationship may be family (e.g. a parent or spouse), institutional (e.g. a prison officer) or incidental (e.g. a friend bringing a patient for an appointment).

An instance of patient related party can also be used to convey information about a patient's next of kin or a person who should be contacted in the event of problems in planning or undertaking a diagnostic investigation.

May be part of: [EHR root complex](#)

Attributes

service type of record

Type: [V](#) [1]

Description: Indication of whether the information contained in an object is to be added, deleted or whether the characteristics of the object are to be modified.

Example(s): Add, delete, modify.

identification of patient related party

Type: [party identification](#) [0..1]

Description: Identification of a patient related party assigned by a national healthcare authority.

relationship type of patient related party

Type: [V](#) [1]

Description: Relationship of the patient person in connection with the patient.

Example(s): Next of kin, wife, carer, father, guardian, prison officer, friend.

relationship period

Type: [period](#) [0..1]

Description: [period](#) during which when [healthcare party](#) performed the specified role in the care of the patient.

name of patient related person

Type: [person name details](#) [0..1]

organisation name details

Type: [S](#) [0..1]

address of patient related party

Type: [address](#) [0..*]

telecommunication of patient related party

Type: [telecommunication](#) [0..*]

patient related party sex

Type: [V](#) [0..1]

Note: Represented by the abbreviations specified in ISO 5281.

patient related party occupation

Type: [C/S](#) [0..1]

language details of patient related party

Type: [language details](#) [0..*]

6.3.19 EHR record item

Type: class

Part of: [EHR item group complex](#)

Attributes

5 **Choice of :** [1]

[coded and textual clinical information](#)

Type: class

Description: Clinical information which is not about [drug treatment](#) and does not include the result of a previous investigation or [measurement](#).

10 [drug treatment](#)

Type: class

Description: Information about a patient's previous, planned or current treatment with a substance or chemical compound for the prevention, alleviation or treatment of a medical condition.

[EHR result item](#)

15 *Type:* class

Description: Set of information including all essential or useful data relevant to the result of a single EHR investigation.

[EHR external information](#)

Type: class

20 Description: Information that is logically part of the full healthcare record for a patient but which is not stored within the EHR.

6.3.20 EHR related event

Type: class

Description: Information about a planned or actual event that relates to the care process for an individual.

25 **Note:** EHR related events include:

- individual contacts between health professionals and patients (e.g. consultations, phone calls)
- admission, transfers and discharges
- identifiable periods of care (e.g. episodes)

Related to: [EHR entry group complex](#)

30 Occurrences: 0..*

Related to: [EHR folder complex](#)

Occurrences: 0..*

Attributes

[origin of administrative information](#)

35 *Type:* class [0..1]

Description: Information about a known source of administrative information.

[service type of record](#)

Type: [V](#) [1]

40 Description: Indication of whether the information contained in an object is to be added, deleted or whether the characteristics of the object are to be modified.

Example(s): Add, delete, modify.

[event identification](#)

Type: [V](#) [0..1]

Description: A unique identifier assigned to an [EHR related event](#) by the originator of the event record.

administrative category of eventType: [V](#) [0..1]

Description: Administrative type of the event that is requested, proposed or carried out.

Example(s): First out-patient attendance, subsequent out-patient attendance, admission, day care, domiciliary visit, telephone consultation, direct access to procedure/operation, emergency admission.

urgency status of eventType: [V](#) [0..1]

Description: Classification of event in terms of urgency.

Example(s): Emergency, elective.

expected duration of eventType: [time interval](#) [0..1]Description: the length of time that a single [EHR related event](#) is expected to last from the [start date and time](#) of event (in the case of actual action events) or [date and time scheduled](#) (in the case of planned events).comment to eventType: [C/S](#) [0..*]administrative outcomeType: [C/S](#) [0..*]

Description: Information relevant to further action.

Note: If a request that is rejected or a planned investigation is postponed there may be further plans (e.g. a new appointment may be issued automatically or only on further request). The reason for postponement may impact future plans (e.g. non attendance for the appointment, admission or death of the patient).

Example(s): patient did not attend appointment, patient died, another appointment given, open appointment, appointment to be given at a later date, no further arrangements will be made.

user defined data of eventType: [user defined data](#) [0..*]event locationType: [location related information](#) [0..*]Description: Information about a [location](#) that is directly related to the provision of care to a patient, e.g. the [location](#) immediately prior to an [EHR related event](#), the [location](#) at which the action event takes place or the [location](#) immediately subsequent to the action event.event related healthcare party

Type: class [0..1]

Description: Information about a [healthcare party](#) who has a role in the provision of healthcare services related to an action event.EHR related event

Type: class [0..*]

Description: Information about a planned or actual event that relates to the care process for an individual.

Choice of : [1]actual event

Type: class

Description: Information about an [EHR related event](#) that has already taken place.planned event

Type: class

Description: Information about an [EHR related event](#) that is planned.

6.3.21 EHR related healthcare party

Type: class

Specialisation of: [healthcare party role](#)

Description: Information about a [healthcare party](#) that has a role in relation to an [EHR complex](#) other than as the originator of that [EHR complex](#).

Note: EHR related healthcare party provides a mechanism for referring to healthcare parties with other roles related to the information recorded in the [EHR complex](#). These roles include the Responsible Healthcare Agent (ENV12265 clause 4.6.9)

Part of: [EHR complex](#)

Additional attributes

relationship type of related healthcare party

Type: [V](#) [1]

Description: Indication of the relationship between an item in the EHR and the related healthcare party

6.3.22 EHR result item

Type: class

Description: Set of information including all essential or useful data relevant to the result of a single EHR investigation.

Note: An EHR result item may be subdivided into several constituent EHR investigation result items. Therefore, an EHR result item may include the overall result of an EHR investigation comprising several constituent investigations or the results of one of the constituent investigations.

An EHR result item comprises one or more of: a numeric, textual or coded representation of a result. It also includes additional data that is essential to the interpretation of the result including: the status of the result, relevant dates and times, units of measurement and designation of the coding scheme from which code values in the result item are derived.

An EHR result item may be the result of any investigation or measurement.

Part of: [EHR record item](#)

Attributes

date and time of EHR investigation

Type: [TOCD](#) [0..1]

Note: To indicate the date and time at which the clinical investigation was finished.

status of EHR investigation result item

Type: [V](#) [0..1]

Example(s): Unverified, pending, new, intermediate, modified.

date and time of status change for clinical investigation result item

Type: [TOCD](#) [0..1]

Note: To indicate the date and time at which the status of a result or of an investigation changed to its communicated status.

deviating result indicator

Type: [V](#) [0..1]

Description: Indicator of degree of deviation from reference values of a [measurement](#) result.

comment to EHR investigation result item

Type: [C/S](#) [0..*]

Note: To cover any kind of free-style comment related to a clinical investigation result item.

reference limit of EHR investigation result item

Type: [reference limit](#) [0..*]

Choice of : [1]*numerical result EHR result item*Type: [numerical result](#)*date value of EHR investigation result item*Type: [TOCD](#)

Description: Value of result expressed as a date.

Example(s): Estimated date of obstetric delivery.

*text value of EHR investigation result item*Type: [LC/S](#)

Description: A result expressed using text or codes.

Note: In early implementations and according to specific interchange agreements this attribute may be used to carry in free style the entire clinical investigation result item value.

6.3.23 EHR root complex**Type: class****Specialisation of:** [EHR complex](#)**Description:** An original [EHR complex](#) that represents the complete EHR content of the message.**Note:** A message that conveys all or part of an EHR shall contain one and only one Root [EHR complex](#).The simplest instance of a message based on this standard consists of a one Root [EHR complex](#) using the "EHR complex as text" attribute to convey a plain text record.Particular instances of the message may contain selected parts or summaries of the EHR. In this case, the message still contains a Root [EHR complex](#) although it will not correspond to the equivalent root object of the EHR held by the [EHR source](#).**May be part of:** [provide EHR](#) message**Additional attributes**[EHR patient demographic details](#)

Type: class [1]

Description: Information about a person receiving, or registered to receive, healthcare services.

[EHR patient related healthcare party](#)

Type: class [0..*]

Description: Information about a [healthcare party](#) who has a role in the provision of healthcare services to an individual patient.[EHR patient related party](#)

Type: class [0..*]

Description: Information about a person or organisation who has a role in the care of a patient other than as a [healthcare professional](#) or organisation.[EHR view complex](#)

Type: class [0..*]

Description: An [EHR complex](#) that provides a particular view of a patient record by associating together other EHR components for a particular purpose.[EHR folder complex](#)

Type: class [0..*]

Description: An EHR folder complex is a [EHR complex](#) that aggregates a group of [EHR complexes](#) in a manner determined by the originator of that information.[EHR item group complex](#)

Type: class [0..*]

Description: An [EHR original complex](#) that aggregates together a logically related set of items.

6.3.24 EHR source**Type:** class**Specialisation of:** [healthcare party role](#)**Description:** A [healthcare party](#) to whom a request for EHR information is submitted or from who this information is received.**May be part of:** [messages from EHR source](#)**May be part of:** [messages from EHR destination](#)**6.3.25 EHR view complex****Type:** class**Specialisation of:** [EHR complex](#)**Description:** An [EHR complex](#) that provides a particular view of a patient record by associating together other EHR components for a particular purpose.**Note:** View complexes differ from "original" complexes in that they are not essential to the integrity of the EHR. However, they do provide a means for alternative structures to be applied to records.**May be part of:** [EHR root complex](#)**Related to:** [EHR entry group complex](#)

Occurrences: 0..*

Related to: [EHR item group complex](#)

Occurrences: 0..*

6.3.26 event related healthcare party**Type:** class**Specialisation of:** [healthcare party role](#)**Description:** Information about a [healthcare party](#) who has a role in the provision of healthcare services related to an action event.**Note:** This concept can refer to a healthcare sub-department, department, organisation or person.**Part of:** [EHR related event](#)**Additional attributes***relationship type of event related healthcare party*Type: [V](#) [1]*Description:* Role of a [healthcare party](#) in connection with the provision of healthcare services.*Example(s):* Clinic at which action event takes place, [healthcare professional](#) in charge.

6.3.27 healthcare organisation

Type: class

Specialisation of: [healthcare party](#)

Description: Information about an organisation responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.

Note: A healthcare organisation may be used stand-alone or as a superstructure containing departments and sub-departments.

Part of: [healthcare professional](#)

Part of: [healthcare organisation](#)

Additional attributes

[healthcare party](#)

Type: class [1]

Description: Information about an organisation or person responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.

[name of healthcare organisation](#)

Type: [S](#) [0..1]

[type of healthcare organisation](#)

Type: [V](#) [0..1]

Example(s): University hospital, private diagnostic service provider.

[healthcare organisation](#)

Type: class [0..1]

Description: Information about an organisation responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.

6.3.28 healthcare party

Type: class

Description: Information about an organisation or person responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.

Note: This may be a healthcare sub-department, department, organisation or person.

May be specialised as one of the following:

[healthcare organisation](#)

[healthcare professional](#)

Attributes

[Identification of healthcare party](#)

Type: [party identification](#) [1]

[address of healthcare party](#)

Type: [address](#) [0..*]

[telecommunication of healthcare party](#)

Type: [telecommunication](#) [0..*]

[language details of healthcare party](#)

Type: [language details](#) [0..*]

[medical specialty of healthcare party](#)

Type: [C/S](#) [0..*]

Description: Particular subject area or branch of medical science, offered by a [healthcare party](#).

6.3.29 healthcare party role**Type:** class**Description:** Information about the role of a [healthcare party](#) in relation to a message.**Values:** No changes.**May be specialised as one of the following:**[EHR intermediary](#)[EHR destination](#)[EHR source](#)[EHR related healthcare party](#)[EHR patient related healthcare party](#)[event related healthcare party](#)[origin of administrative information](#)[originating healthcare party](#)[originator of component to be revised](#)**Attributes****Choice of :** [1][healthcare professional](#)*Type:* class*Description:* Information about a person who is entrusted with the direct or indirect provision of defined healthcare services to a patient or population of patients.[healthcare organisation](#)*Type:* class*Description:* Information about an organisation responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.**6.3.30 healthcare professional****Type:** class**Specialisation of:** [healthcare party](#)**Description:** Information about a person who is entrusted with the direct or indirect provision of defined healthcare services to a patient or population of patients.**Example(s):** Primary care physician, dentist, nurse, social worker.**May be part of:** [healthcare party role](#)**Additional attributes**[healthcare party](#)*Type:* class

[1]

Description: Information about an organisation or person responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.[type of healthcare professional](#)*Type:* [V](#)

[0..1]

Example(s): Medical doctor, nurse, pharmacist, diagnostic service worker.[name of healthcare professional](#)*Type:* [person name details](#)

[0..1]

[position of healthcare professional](#)*Type:* [C/S](#)

[0..1]

Example(s): Head of department, trainee GP, hospital consultant.

qualification of healthcare professionalType: [C/S](#) [0..*]

Note: This information is provided as supplied by the [healthcare professional](#) or the organisation within which they work and is not proof of qualification to undertake healthcare services.

Example(s): MD, M.Sc.

military rank of healthcare professionalType: [C/S](#) [0..1]

Example(s): Captain, Major.

[healthcare organisation](#)

Type: class [0..1]

Description: Information about an organisation responsible for the direct or indirect provision of healthcare services, or involved in the provision of healthcare related services.

6.3.31 messages from EHR destination

Type: class

Description: A generalisation including messages requesting the transfer of EHR information and messages accepting the care of a patient whose EHR has been received.

Note: This class is only instantiated as instances of the specialisations. These are the [request EHR](#) and [patient care acceptance](#) messages.

May be specialised as one of the following:

[request EHR](#) message

[patient care acceptance](#) message

Attributes[EHR destination](#)

Type: class [1]

Description: A [healthcare party](#) that requests or receives EHR information from another [healthcare party](#) (an [EHR source](#))..

[EHR source](#)

Type: class [1]

Description: A [healthcare party](#) to whom a request for EHR information is submitted or from who this information is received.

[EHR intermediary](#)

Type: class [0..*]

Description: A [healthcare party](#) other than the [EHR source](#) or [EHR destination](#) who is involved in the communication of EHR information.

[EHR message general information](#)Type: [general message information](#) [1]

Description: Information common to all EHR messages.

[EHR message identification](#)Type: [message identification](#) [1]

6.3.32 messages from EHR source

Type: class

Description: A class representing a generalisation of messages sent by an [EHR source](#) to an [EHR destination](#).

Note: This class is only instantiated as instances of the specialisations. These are the [provide EHR](#) and [reject request for EHR](#) messages.

May be specialised as one of the following:

[provide EHR](#) message

[reject request for EHR](#) message

Related to: [request EHR](#) message

Occurrences: 0..1

Attributes

[EHR destination](#)

Type: class [1]

Description: A [healthcare party](#) that requests or receives EHR information from another [healthcare party](#) (an [EHR source](#))..

[EHR source](#)

Type: class [1]

Description: A [healthcare party](#) to whom a request for EHR information is submitted or from who this information is received.

[EHR intermediary](#)

Type: class [0..*]

Description: A [healthcare party](#) other than the [EHR source](#) or [EHR destination](#) who is involved in the communication of EHR information.

[EHR message general information](#)

Type: [general message information](#) [1]

Description: Information common to all EHR messages.

[EHR message identification](#)

Type: [message identification](#) [1]

6.3.33 origin of administrative information

Type: class

Specialisation of: [healthcare party role](#)

Description: Information about a known source of administrative information.

Part of: [EHR related event](#)

Additional attributes

[date and time made available](#)

Type: [TOCD](#) [0..1]

Description: Date and time at which this information was made available by the originator.

[date and time of validity](#)

Type: [period](#) [0..1]

Note: this attribute group consists of the attributes start date and time of validity and end date and time of validity.

[reason for updating information](#)

Type: [C/S](#) [0..1]

Description: Reason for changing or updating the information given by the originator.

date and time of administrative information

Type: [TOCD](#) [0..1]

Description: Date and time at which this information was recorded or received by the originator (the original record keeper).

5 **6.3.34 origin of EHR component**

Type: class

Description: Identifies the origin of an [EHR complex](#). This includes the [healthcare party](#) who recorded this [EHR complex](#) on the system on which it originated and the date and time at which it was recorded.

10 Note: Includes the Recording healthcare agent attribute (ENV12265 clause 4.6.8) and the recording date and time attribute (ENV12265 clause 4.6.7).

This attribute is mandatory for EHR complexes but optional for EHR clinical information items which inherit the same origin as the EHR complex to which they belong.

Attributesoriginating healthcare party

15 Type: class [1]

Description: An attribute identifying the healthcare party that included it in the record.

recording date and time

Type: [TOCD](#) [1]

Description: Date and time on which the record or [EHR complex](#) was created and/or included in the record.

20 Note: Equivalent to ENV12265 clause 4.6.7 recording date and time attribute.

6.3.35 originating healthcare party

Type: class

Specialisation of: [healthcare party role](#)

Description: An attribute identifying the [healthcare party](#) that included it in the record.

25 Note: Equivalent to ENV12265 clause 4.6.8 Recording healthcare agent attribute.

Part of: [origin of EHR component](#)

6.3.36 originator of component to be revised

Type: class

Specialisation of: [healthcare party role](#)

30 Description: The identification of the originator of the EHR component to be superseded by this EHR component.

Note: This attribute is required unless the EHR component identifiers are unique to both the [EHR source](#) and [EHR destination](#).

Part of: [EHR component revision reference](#)

6.3.37 planned event

Type: class

Description: Information about an [EHR related event](#) that is planned.

Part of: [EHR related event](#)

5 Additional attributes

planning stage

Type: [C](#) [0..1]

Description: The stage that has been reached in planning the delivery of this diagnostic investigation.

Example(s): Accepted, proposed, scheduled, completed, rejected, postponed, cancelled.

10 status of plan

Type: [V](#) [0..1]

Example(s): Interim, confirmed.

comment on plan status

Type: [C/S](#) [0..1]

15 Description: A note of any conditions on which an plan is dependent.

Example(s): An abdominal radiological investigation may be planned for a particular date but this may depend on the patient's menstrual cycle.

date and time of planning

Type: [TOCD](#) [0..1]

20 Description: The date and time at which the [planning stage](#) indicated was reached by the diagnostic service provider.

Example(s): The date on which a request was accepted, the date on which an appointment was made.

date and time scheduled

Type: [TOCD](#) [0..1]

25 Description: Date and time on which the service is scheduled to be undertaken.

expected delay before event

Type: [expected delay](#) [0..1]

Description: [expected delay](#) with reference to the issue date of the report.

transport arrangements for planned event

30 Type: [transport arrangements](#) [0..1]

6.4 Subclasses

6.4.1 EHR item major modifiers

Type: sub class single use

Description: A collection of attributes which may significantly modify the meaning of an associated [EHR record item](#).

Drafting Note: *The precise details of these attributes will be agreed in liaison with PT27 EHR TermList. This issues is discussed in [Clause 4.5.4](#).*

Part of: [EHR item group complex](#)

Attributes

certainty modifier

Type: [V](#) [1]

Description: Indication of the degree of certainty that the record has asserted about a particular piece of information.

Example(s): Possible inferior myocardial infarction.

negation modifier

Type: [B](#) [1]

Description: An indication that the information states the absence of, rather than the presence of a particular observation or diagnosis.

Example(s): No evidence of ischaemic heart disease.

subject of information modifier

Type: [V](#) [1]

Description: An indication of whether the associated item of information applies directly to the patient or applies to someone else such as a member of their family, a contact of or another related person.

Example(s): Family history of diabetes. Recent contact with meningitis.

warning to avoid modifier

Type: [V](#) [1]

Description: An indication that the information record is a warning to avoid a particular treatment rather than a record of or plan for that treatment.

Example(s): Allergy to penicillin.

knowing mode modifier

Type: [V](#) [1]

Description: An indication of whether the information was derived from direct observation by the person recording it, or is based on an assessment of available evidence, or is based on information provided by the patient, a family member or another third party.

Example(s): Patient reports that they suffer from a stomach ulcer but the person recording this is not aware of any direct clinical evidence for this.

6.4.2 healthcare administrative data for patient

Type: sub class single use

Description: Demographic and other administrative information related to a patient.

Note: Includes date of birth, sex, marital status, religion, nationality, occupation etc.

Attributes

marital status of patient

Type: [V](#) [0..1]

Example(s): Single, married, divorced, widowed.

religion of patient

Type: [C/S](#) [0..1]

nationality of patient

Type: [C/S](#) [0..1]

patient administrative sex

Type: [V](#) [0..1]

Description: The gender of the patient as recognised by the organisation responsible for administration of healthcare services.

Note: In rare cases this may differ from genetic or anatomical gender which may be recorded as clinical information.

Represented by the abbreviations specified in ISO 5281.

date and time of birth

Type: [TOCD](#) [0..1]

Note: In case the exact date and time is unknown, year only or year + month or year + month + day are sufficient.

date and time of death

Type: [TOCD](#) [0..1]

Note: In case the exact date and time is unknown, year only or year + month or year + month + day are sufficient.

patient occupation

Type: [C/S](#) [0..*]

Values: New attribute

basis of entitlement to health services

Type: [C](#) [0..1]

Example(s): National, E111 holder, resident of other country with reciprocal rights, not entitled to public health services.

6.4.3 healthcare organisation at location

Type: sub class single use

Description: A [healthcare organisation](#) responsible provision of services at a specified [location](#).

Attributes

- 5 Identification of healthcare organisation at location
 Type: [party identification](#) [0..1]
 name of healthcare organisation at location
 Type: [S](#) [0..1]
 type of healthcare organisation
 10 Type: [V](#) [0..1]
 Example(s): University hospital, private diagnostic service provider.

6.4.4 intended duration of drug treatment

Type: sub class single use

15 **Description:** Information on the length of time that the party recommending or prescribing the drug intends that it be taken.

Attributes

Choice of : [1]

- numerical duration of drug treatment
 Type: [time interval](#)
 20 Note: This attribute group consists of the attributes numerical value of duration of drug treatment and unit of value of duration of drug treatment.
 textual description of duration of drug treatment
 Type: [S](#)

6.4.5 precautions relevant to service provider

25 **Type:** sub class single use

Description: Information about the patient that is given to a service because of its relevance to persons involved in providing that service.

Note: May include warnings of dangers posed by the patient for the service provider or of circumstances of the patient which may adversely affect the patient if they are not known to the service provider.

30 **Attributes**

- precaution
 Type: [C+S](#) [0..1]
 Description: The nature of a precaution of which the requester is informing the service provider.
 Note: This may include statements that a precautionary factor is absent or not known.
 35 Example(s): Violent patient, detention status, infection risk, radioactive, immunologically compromised, amputee, blind, deaf, pregnant, breast feeding, last menstrual [period](#).
 associated date of precaution
 Type: [TOCD](#) [0..1]
 Description: A date associated with the [precaution](#).
 40 Example(s): Date of the first day of the last menstrual [period](#).

6.5 Common subclasses

6.5.1 address

Type: sub class

Description: An address expressed in a structured or unstructured form.

Attributes

address type

Type: [V](#) [0..1]

Example(s): Home [address](#), vacation [address](#), work [address](#).

period of address validity

Type: [period](#) [0..1]

Choice of : [0..1]

structured address

Type: sub class

unstructured address

Type: sub class

6.5.2 expected delay

Type: sub class

Description: The [time interval](#) of, and reason for, a delay.

Attributes

duration of expected delay

Type: [time interval](#) [1]

comments to expected delay

Type: [S](#) [0..1]

6.5.3 general message information

Type: sub class

Description: Information applicable to all messages.

Note: Includes urgency of the message, request for acknowledgement, comments and [language](#).

Attributes

urgency of message

Type: [V](#) [1]

Description: Indication by the administrative information originator of the urgency with which the receiver should examine and consider the report.

Note: This information may allow a receiving system to draw special attention to its users for some reports.

Example(s): High priority, medium priority, low priority.

message receipt acknowledgement request

Type: [B](#) [1]

Description: Indication of whether or not the issuer of a report requests acknowledgement of the report receipt by the recipient.

originator's comment on message

Type: [C/S](#) [0..*]

Description: (narrative) comment from the administrative information originator that can not be expressed by any other existing attribute.

message languageType: [V](#) [0..1]Description: The [language](#) in which the diagnostic service report is expressed.

Note: Represented by the abbreviations specified in ISO 639.

5 **6.5.4 identifier****Type: sub class****Description:** A general purpose identifier that can be qualified by the identification scheme from which the identifier is derived.**Part of:** [reference to a physical entity as part of the EHR](#)10 **Part of:** [EHR external information](#)**Part of:** [Identification of healthcare party](#)**Attributes**identification schemeType: [V](#) [0..1]

15 Description: The identification scheme from which an associated identifier is derived.

Note: Where there is appropriate agreement between communicating parties this may include partner agreed identifiers.

identifier valueType: [S](#) [1]20 **6.5.5 language details****Type: sub class****Description:** [language](#)(s) in which a person is willing and able to converse for the purposes of providing or receiving healthcare services.**Attributes**languageType: [V](#) [0..1]

Note: Represented by the abbreviations specified in ISO 639.

ability in languageType: [V](#) [0..1]30 Example(s): First [language](#), preferred, fluent, fair, poor, none.

6.5.6 location details

Type: sub class

Description: Information about a geographical location or type of location, expressed without a formal postal [address](#).

Example(s): In the patient's home, in hospital, on a ward, in a diagnostic department, on a particular ward, in a particular room within a department.

Part of: [reference to a physical entity as part of the EHR](#)

Part of: [reference to a physical entity](#)

Attributes

location type

Type: [C](#) [0..1]

Example(s): Hospital ward, patient's residence, outpatient clinic, accident & emergency department, prison, nursing home, diagnostic department.

location identification

Type: [S](#) [0..1]

Description: A partner agreed identification of the [location](#).

Note: The location identification may if necessary be specified as a concatenation of the [identifier](#) of a general [location](#) and a sub-location (e.g. a hospital identification followed by a ward identification within that hospital). The format of these combined identifiers must be agreed by the communicating parties.

location description

Type: [S](#) [0..1]

Description: A textual description of the [location](#).

6.5.7 location related information

Type: sub class

Description: Information about a [location](#) including associated information.

Note: Associated information may include [period](#) of time at a [location](#), the [address](#), [telecommunication](#) and [healthcare organisation](#) responsible for a [location](#).

Attributes

location role

Type: [V](#) [0..1]

Description: Role of [location](#) where the patient has received or is to receive care. or where the patient was located immediately prior to or immediately after receiving care.

Example(s): [location](#) at which diagnostic service was performed, intended [location](#) of diagnostic service, [location](#) prior to diagnostic service, [location](#) after completion of diagnostic service.

period at location

Type: [period](#) [0..1]

Note: If the [location](#) is a hospital or ward this is the date of admission or transfer to that [location](#).

location

Type: [location details](#) [0..1]

address of location

Type: [address](#) [0..1]

telecommunication of locationType: [telecommunication](#) [0..*]healthcare organisation at location

Type: sub class single use [0..1]

5 Description: A [healthcare organisation](#) responsible provision of services at a specified [location](#).

user defined data for locationType: [user defined data](#) [0..*]**6.5.8 measurement****Type: sub class**

10 **Description:** A measurement expressed as a numeric value and [unit of measurement](#).

Attributesnumerical valueType: [R](#) [1]

Example(s): 140 when a result is 140 mmol/l.

15 unit of measurement

Type: [V](#) [1]**6.5.9 measurement range****Type: sub class**

Description: A measurement range expressed as two numeric values and [unit of measurement](#).

20 **Attributes**

lower limit valueType: [R](#) [0..1]upper limit valueType: [R](#) [0..1]

25 unit of measurement

Type: [V](#) [1]**6.5.10 measurement with comparator****Type: sub class**

30 **Description:** A [measurement](#) expressed as a numeric value and [unit of measurement](#) with an optional mathematical comparator

Note: Used where it is rational for a [measurement](#) to be expressed as greater than or less than a specified value.

Attributesnumerical valueType: [R](#) [1]

35 Example(s): 140 when a result is 140 mmol/l.

unit of measurementType: [V](#) [1]arithmetic comparatorType: [V](#) [0..1]

40 Example(s): >, >=, =, <=, <.

6.5.11 message identification**Type: sub class**

Description: The originators identification of a message and its time of origin.

Attributesidentification of message by originatorType: [S](#) [1]

Description: identifier assigned by the originator of a message

Note: This [identifier](#) must be globally unique across all messages originating from a particular healthcare party. The originator shall not assign the same [identifier](#) to any other message that conforms with a European Standard or European Prestandard promulgated by CEN Technical Committee 251 Healthcare Informatics.

issue date and time of messageType: [TOCD](#) [1]

Description: Date and time at which a diagnostic service request is completed within the requesting information system.

Note: This is not the date/time at which the order is dispatched to the message Handling Service or network service provider.

6.5.12 numerical result**Type: sub class**

Description: A result expressed as a [measurement](#) together with an optional [arithmetic comparator](#) and an optional uncertainty interval.

Attributesnumerical result measurementType: [measurement with comparator](#) [1]uncertainty interval of a measurement resultType: [measurement range](#) [0..1]

Description: Value range, not statistically based, defining a lower and upper limit between which a [measurement](#) result falls.

Note: Is related to precision and detection limits, not to accuracy.

This attribute group consists of the attributes lower limit of uncertainty interval of a [measurement](#) value, upper limit of uncertainty interval of a [measurement](#) value and unit of uncertainty interval values.

Example(s): 0 - 10 mg.

6.5.13 occurrence outcome**Type: sub class**

Description: Whether an event has occurred and optionally a [reason for non-occurrence](#).

Attributesoccurrence statusType: [V](#) [1]

Description: Describes whether the planned patient (or patient related person) contact actually occurred or not.

Example(s): action event occurred, originator initiated cancellation, cancelled by patient without notification, cancelled by service requester.

reason for non-occurrenceType: [S](#) [0..1]

6.5.14 party identification**Type: sub class**

Description: A general structure of identifier that may be applied to a [healthcare party](#), a patient or another person or party.

Attributesidentifier

Type: *sub class*

[1..*]

Description: A general purpose identifier that can be qualified by the identification scheme from which the identifier is derived.

6.5.15 period**Type: sub class**

Description: A period expressed as a start and end date.

Attributesstart date and time

Type: [TOCD](#)

[0..1]

Description: Date and time when a standing (laboratory) service order is to commence.

end date and time

Type: [TOCD](#)

[0..1]

Description: Date and time when a standing (laboratory) service order is to end.

6.5.16 person name details**Type: sub class**

Description: The structured or [unstructured name](#) of a person.

Attributesperson name type

Type: [V](#)

[0..1]

Example(s): Alias name of patient (artificial or assumed name by which a patient has been or is known; any code may serve as an alias, sometimes temporarily because proper identity is unknown or to preserve anonymity; a given person may have more than one alias), maiden name of patient (when female patients change their [family name](#) - e.g. upon marriage - this item carries their previous [family name](#)), former name of patient, mother's maiden name of patient (may be required to distinguish between patients with the same birth date and [family name](#) when registry files are very large and when no other means of unique [patient identification](#) by name is available), preferred name.

period of name validity

Type: [period](#)

[0..1]

Choice of : [0..1]

structured person name

Type: *sub class*

unstructured name

Type: [S](#)

Note: Used instead of structured names when communication parties do not support structured names. In some cases it may be impossible to distinguish which parts or a name should be placed in which name elements.

Example(s): "Adelin Albert", "Alexandre le Grand", "Lord George Christoper"

6.5.17 reference limit**Type: sub class**

Description: Limit expressed as a numeric [measurement range](#) or in a textual form. The limits may be applicable to a particular population and may be of a specified type.

5 **Example(s):** Normal range for patients of a specified age and sex.

Attributesnumerical reference limit

Type: [measurement range](#) [0..1]

10 **Note:** This attribute group consists of the attributes numerical value of lower reference limit of quantity, numerical value of upper reference limit of quantity and unit of numerical reference limit values.

textual reference limit

Type: [LC/S](#) [0..1]

Note: A [reference limit](#) may be expressed as a string (e.g. "Between 10 and 20%").

reference population definition

15 Type: [LC/S](#) [0..1]

Note: To indicate the meaning of the [reference limit](#).

Example(s): Sex, age, race, smoker/non-smoker, clinical status.

type of reference interval

20 Type: [V](#) [0..1]

Example(s): Therapeutic (in the case of drug-monitoring).

6.5.18 reference to a physical entity**Type: sub class**

Part of: [EHR external information](#)

Attributes25 EHR physical entity nature

Type: [C/S](#) [1]

Description: The nature of the referenced physical entity.

EHR physical entity identifier

30 Type: [identifier](#) [0..1]

Description: An identifier applied to a physical entity that is related to the EHR.

EHR physical entity location

Type: [location details](#) [0..1]

Description: The current location of the referenced physical entity.

6.5.19 reference to related information

Type: sub class

Description: External reference to information stored in a digital form.

Note: A digital representation of an image such as an X-ray or a signal such as an electrocardiograph may be stored on or transferred between computer systems in a manner that makes it accessible to the sender and recipient of a message. The reference pointer attribute group allows a message to refer to information of this type.

The message has no internal knowledge of the format of the digital information and use of the reference pointers requires that the sender and recipient of the message have a shared understanding of the information types referred to.

Attributes

EHR external information identifier

Type: [identifier](#) [1]

Description: A unique identifier applied to an item or collection externally referenced digital information..

external reference pointer

Type: [S](#) [1]

Description: Unique identifier for the referenced information as assigned by the system/application that stores the data.

Note: The precise form of expression is determined by the [external reference application](#) attribute.

Example(s): A directory path-name and file-name, a database and a uniquely identified record within that database, a uniquely identified instance of an object.

external reference application

Type: [S](#) [0..1]

Description: Unique identifier of a system and/or application in or through which the externally referenced information is accessible to the recipient of a message.

Note: The [identifier](#) must be understood unambiguously by the communicating parties.

external reference information type

Type: [C](#) [1]

Description: A code that represents the type of information.

Note: The coding scheme should include appropriate imaging and signal standards and should be extended to include commonly used proprietary formats and new standards as they emerge.

Example(s): X-ray image, electrocardiograph signal etc.

external reference indirect pointer

Type: [S](#) [0..1]

Description: A reference to an internal pointer or marker within an external referenced source of information.

Note: This attribute can only be used if the information type referenced contains an internal referencing system for annotations. The form of expression depends on the information type referenced.

Example(s): A reference to an annotation or marked area of an X-ray film.

A diagnostic result item may refer to an analysed object which itself refers to a specific annotations or set of annotations in a diagram. This is illustrated by figure ##REF in informative Annex C.

Values: This is suggested as an extension to the HL7 and DICOM approaches to add specificity if the digital format permits this.

date and time of related information acquisition

Type: [TOCD](#) [0..1]

6.5.20 relationship details

Type: sub class

Description: A type of relationship and the [period](#) during which that relationship applied.

Attributes

5 relationship type

Type: [V](#) [1]

Description: Relation of a related party to the patient.

Example(s): Patient's usual GP, patient's registered GP, responsible community nurse.

relationship period

10 Type: [period](#) [0..1]

Description: [period](#) during which when [healthcare party](#) performed the specified role in the care of the patient.

6.5.21 specification of provided EHR information

Type: sub class

15 **Description:** A group containing elements that specify the language content and structural level of the EHR information provided.

May be part of: [provide EHR](#) message

Attributes

20 EHR language

Type: [V](#) [0..1]

Description: The language in which the EHR is provided.

EHR selection criteria

25 Type: [#TO BE ADDED](#) [0..1]

Description: EHR selection criteria to enable the [EHR source](#) to inform the [EHR destination](#) about the selection criteria applied to determine the content and structural detail of the EHR information included in the message will be added to the next version of this document.

6.5.22 specification of requested EHR information

Type: sub class

Attributes

30 requested EHR language

Type: [V](#) [0..1]

Description: The language in which the requested EHR should be provided.

EHR requested selection criteria

35 Type: [#TO BE ADDED](#) [0..1]

Description: EHR requested selection criteria to enable an [EHR destination](#) to request a particular part of a particular level of structural detail to be applied to EHR information will be added to the next version of this document.

6.5.23 structured address**Type: sub class****Attributes**

5	<u>street name</u>	
	Type: S	[0..1]
	<u>number or name of house</u>	
10	Type: S	[0..1]
	<u>apartment number</u>	
	Type: S	[0..1]
15	<u>PO box number</u>	
	Type: S	[0..1]
	Note: PO is post office.	
20	<u>city district</u>	
	Type: C/S	[0..1]
	Description: Part of a city.	
25	<u>postal code</u>	
	Type: S	[0..1]
	<u>city</u>	
30	Type: S	[0..1]
	<u>area of country / county</u>	
	Type: C/S	[0..1]

6.5.24 structured person name**Type: sub class****Attributes**

25	<u>family name</u>	
	Type: S	[0..1]
	Note: "last name" is ambiguous, especially in the case of persons of Far Eastern extraction.	
30	<u>first given name</u>	
	Type: S	[0..1]
	Note: "first name" is ambiguous, especially in the case of persons of Far Eastern extraction; "Christian name" may cause offence.	
35	<u>middle name</u>	
	Type: S	[0..1]
	Note: If the complete name consists of more than one name besides family name and given name, initials of the other names may be substituted for the middle name.	
40	<u>title</u>	
	Type: S	[0..1]
	Example(s): Mr, Mrs, Sir, Lord, Dr, Ms, Miss, Rev.	
45	<u>generation qualifier</u>	
	Type: S	[0..1]
	Note: Usage of this name component is common in the United States of America.	
50	Example(s): Jnr, Snr, II, III, IV.	

6.5.25 structured telecommunication number**Type: sub class****Attributes**telecommunication country code5 Type: [S](#) [0..1]telecommunication area codeType: [S](#) [0..1]telecommunication numberType: [S](#) [0..1]10 telecommunication extension numberType: [S](#) [0..1]**6.5.26 telecommunication****Type: sub class****Description:** Telephone, facsimile and other telecommunication numbers in a structured or unstructured form.15 **Attributes**telecommunication typeType: [V](#) [0..1]

Example(s): Voice telephony, fax, e-mail.

address type of telecommunication20 Type: [V](#) [0..1]*Description:* Relates a [telecommunication number](#) to a particular [address](#) or [location](#) specified using an associated instance of the [address](#) message.*Note:* The code list used should be the same similar to that used for L-address type so that where several addresses and numbers are given for a person or organisation these can be related to one another.

25 Example(s): Home, work, vacation, mobile.

period of telecommunication number validityType: [period](#) [0..1]**Choice of :** [0..1][structured telecommunication number](#)

30 Type: sub class

unstructured telecommunication numberType: [S](#)*Note:* Used instead of structured number when communication parties do not support structured [telecommunication](#) numbers or when the structure of the number does not match the components available in the [telecommunication](#) common attribute group.35 Example(s): X.400 [address](#).

6.5.27 text blocks with heading**Type: sub class****Description:** Blocks of text with a related text or coded heading.**Attributes**text block headingType: [C/S](#) [0..1]

Description: A heading for a section of text.

Note: This attribute provides an optional heading for one or more paragraphs of text. It may also be applied as a heading to a group of related coded items.

Example(s): Macroscopic appearance, microscopic appearance, interpretation.

text blockType: [S](#) [0..*]

Description: A block of text which represents a logical paragraph.

Note: Each instance of this attribute represents a paragraph of text.

6.5.28 time interval**Type: sub class****Description:** An interval of time expressed a number and a unit of time.**Attributes**numerical value of time intervalType: [R](#) [1]Description: Number of the value for the [time interval](#)unit of time intervalType: [V](#) [1]Description: The unit of time in which the value of the [time interval](#) is expressed**6.5.29 transport arrangements****Type: sub class****Description:** Information about the arrangement or requirements for the transportation of a patient to and from a healthcare [location](#).**Attributes**transport arrangement responsibility indicatorType: [V](#) [1]

Description: Indicator showing whether transport has been arranged for patient or patient associated person.

Example(s): Provider, requester, patient.

transport arrangement statusType: [S](#) [0..1]

Description: An indication of whether transport arrangement are known to have been made.

Example(s): Arranged, not arranged, unknown.

patient's requirements for transportType: [C/S](#) [1]

Description: The method of transport required if the patient has to attend the diagnostic service department for an investigation to be conducted.

Example(s): Walking on own, walking accompanied/assisted, wheelchair, stretcher.

escort requiredType: [V](#) [0..1]*Description:* An indication that the patient needs to be escorted to the diagnostic service department.*Note:* The nature of the escort requirements should be stated in the comments to requested patient transport.comment to transport requirementsType: [S](#) [0..1]**6.5.30 unstructured address****Type: sub class****Attributes**unstructured address lineType: [S](#) [0..*]*Note:* Used instead of [structured address](#) when communication parties do not support structured addresses**6.5.31 user defined data****Type: sub class****Description:** A data item that can be used to convey additional information not represented by any of the specified message components.**Attributes**user defined data typeType: [V](#) [1]user defined data identificationType: [S](#) [1]user defined data descriptionType: [S](#) [1]**6.6 Compound data-types****6.6.1 C****Type: sub class****Description:** Code with text description.**Attributes**ICSIType: [S](#) [1]*Description:* International Coding Scheme [identifier](#). This is usually part of a message that includes a coded value taken from the identified coding scheme.*Note:* ICSIs are issued in accordance with ISO 7826 to registered coding schemes. The ISO7826 provides ranges of values for unregistered local schemes.code valueType: [S](#) [1]*Description:* A string that contains a coded value. This is usually part of a sub-class in which contains an instance of [ICSI](#) which identifies the coding scheme from which the value is taken,code meaningType: [S](#) [1]

6.6.2 C/S**Type: sub class****Description:** Code (with text description) or uncoded text string.**Attributes**

- 5 **Choice of :** [1]
 coded element
 Type: [C](#)
 text description
 Type: [S](#)

10 6.6.3 C+S**Type: sub class****Description:** Code (with text description) and optional textual qualification**Attributes**

- 15 coded element
 Type: [C](#) [1]
 text qualifier to coded information
 Type: [S](#) [1]

6.6.4 LC/S**Type: sub class****Description:** List of codes (with text descriptions) or uncoded text strings.**Attributes**

- 20 coded or text element
 Type: [C/S](#) [1..*]

6.6.5 LC+S**25 Type: sub class****Description:** Lists of codes (with text descriptions) each with an optional textual qualification.**Attributes**

- coded element and text
 Type: [C+S](#) [1..*]

30 6.6.6 V**Type: sub class****Description:** Code without description**Attributes**

- 35 ICSI
 Type: [S](#) [1]
 Description: International Coding Scheme [identifier](#). This is usually part of a message that includes a coded value taken from the identified coding scheme.
 Note: ICSIs are issued in accordance with ISO 7826 to registered coding schemes. The ISO7826 provides ranges of values for unregistered local schemes.
- 40 code value
 Type: [S](#) [1]
 Description: A string that contains a coded value. This is usually part of a sub-class in which contains an instance of [ICSI](#) which identifies the coding scheme from which the value is taken,

6.7 Simple data-types

6.7.1 B

Type: Data Type

Description: Boolean

5 6.7.2 I

Type: Data Type

Description: Integer

6.7.3 R

10 **Type:** Data Type

Description: Real

6.7.4 S

Type: Data Type

Description: String

6.7.5 TOCD

15 **Type:** Data Type

Description: Time and calendar date

6.7.6 #TO BE ADDED

Type: Editorial Comment

Description: This data type is used to represent currently omitted data items.

7. General Message Descriptions

Drafting note: This section will be added once the domain model section is stable.

ANNEX A How to read the models (normative)

A.1 Model components

A.1.1 Introduction

The modelling technique and the definition of terms in the models follow the conventions described within the Unified Modelling Language (UML).

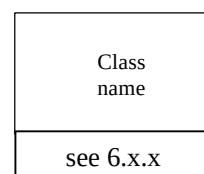
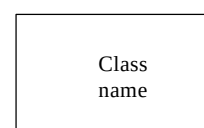
This annex contains a brief overview of the modelling conventions used in this document. However, it shall be understood modelling is used only within this **European Prestandard** for consistency and is used as a means of describing the domain. It is not the intention of this **European Prestandard**, or this Annex to present this modelling method, or its implementation, as a general method for modelling healthcare information for other purposes.

A.1.2 Classes and Packages

- a) A **class** is the descriptor for a set of objects with similar structure, behaviour, and relationships. This document provides a graphical notation for the relationships between instances of the classes where this adds to the clarity of the description of the domain. All classes are described textually. Note: an instance of a class may be called ‘an object’.

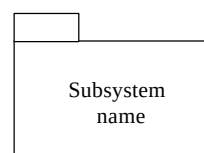
Notation: Within UML, a Class is shown as a solid-outline rectangle with 3 compartments separated by horizontal lines. The upper *name* compartment holds the class name; the middle compartment holds a list of *attributes*; the bottom list compartment holds a list of *operations*. In this document, where a class is included in a diagrammatic representation of the structure within a subsystem, only the *name* compartment is shown.

Within this European Prestandard, the most common representation of a class utilises two compartments, the *name* compartment and the *attribute* compartment, the latter indicating the sub-clause within the document where the attributes are described.



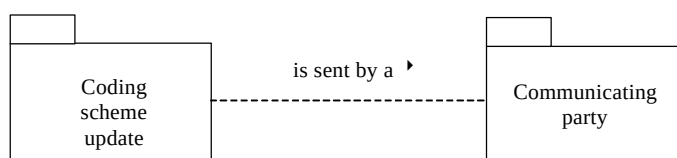
- b) A **package** is a grouping of model elements. Packages themselves may be nested within other packages. All kinds of UML model elements and diagrams can be organised into package.

Notation: A package is shown as a large rectangle with a small rectangle (a “tab”) attached on one corner. If the contents of the package are not shown, then the name is placed within the large rectangle.



A.1.3 Types of relationships

A.1.3.1 Relationship between packages

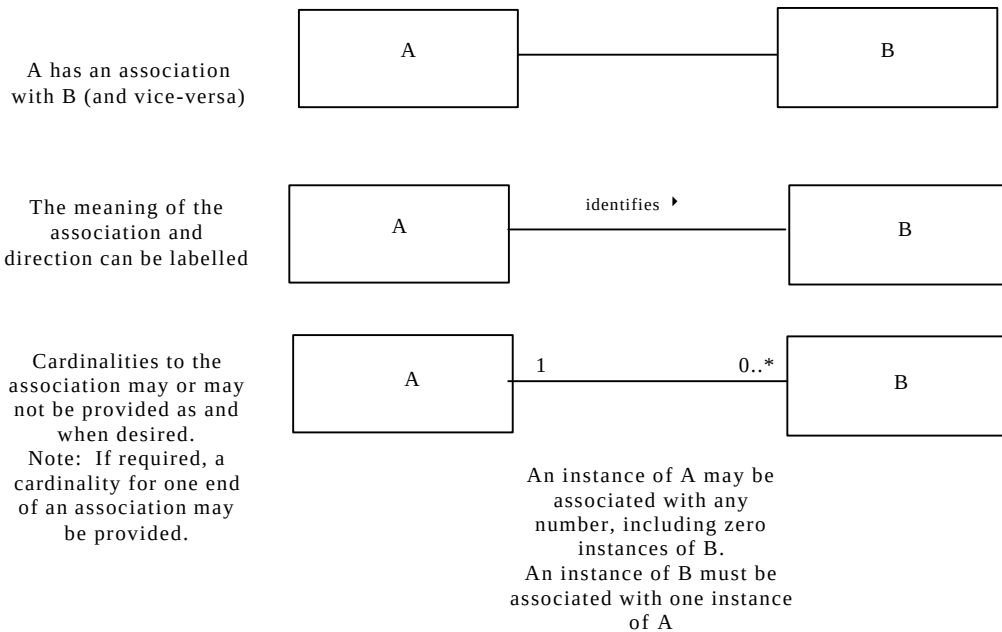


Association: Within this First Working Document associations between packages are illustrated using a dashed line. In addition, there is usually an indication of the nature or purpose and the direction of the relationship using a text string and arrow of direction.

A.3.2 Relationship between classes.

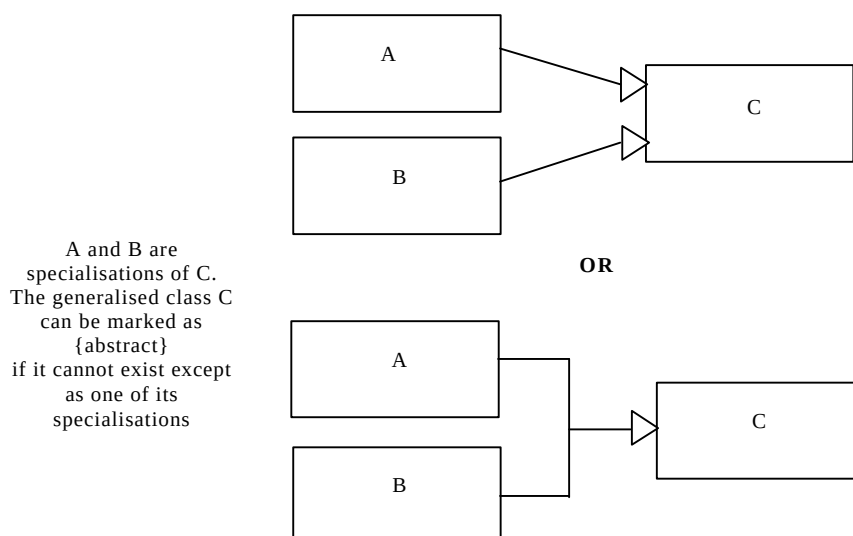
Class Association: Within this First Working Document associations between instances of classes are illustrated using a solid line. In addition, the cardinalities associated with the association are usually attached and may, as with the associations between packages above, attach a textual description of the meaning associated with the link.

5

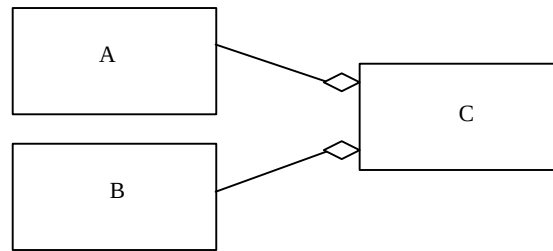


Generalisation/Specialisation: This type of relationships represent "is a" or "is a kind of" structures and are modelled using a connection containing a triangle at the generalisation end of the association.. Specialisation classes inherit all attributes, relationships and services from their generalisation class(es).

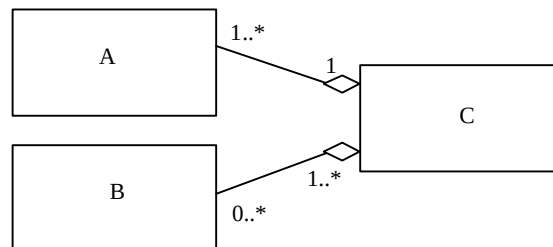
10



Aggregation: This type of relationships represents "is a part of" structures and are modelled using a connection containing a small hollow diamond at the class that is the aggregate.



This indicates that A and B are 'Part of' C. However, the instances of A and B may exist apart from C (e.g. in some other relationship or in another instance of the same type of association). For example, a healthcare professional may exist without a healthcare organisation but can also be a part of one. If the healthcare organisation ceases to exist, the healthcare professional will still exist.



In the same way as associations, above, the links may have associated cardinalities (can be many-to-many), and may have labels.

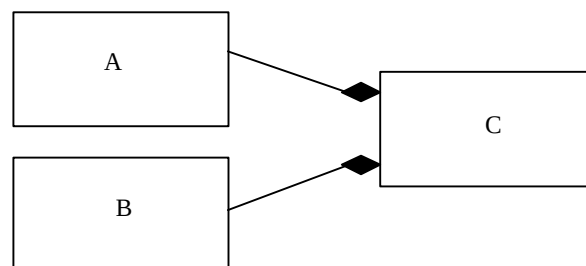
In this example:

An instance of C is associated with one to many instances of A and zero to many instances of B.

An instance of B is a part of one to many instances of C

An instance of A is always associated with a particular single instance of C

Composition: This is a type of aggregation with strong ownership and coincident lifetime of part with the whole. This type of relationship is modelled using a connection containing a small filled diamond at the class that is the aggregate.

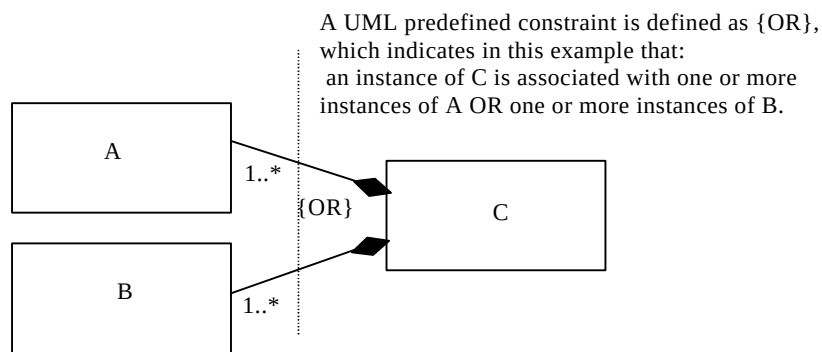
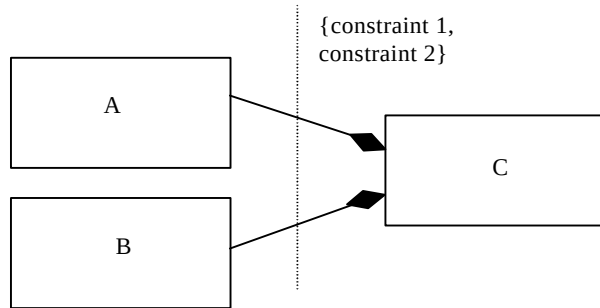


A composition aggregation owns its parts. The parts 'live' inside the whole: they will be destroyed together with its whole. The cardinality therefore allows a part to be associated with one whole, but the whole may own many instances of a particular part. The link may be labelled at the part end.

A.1.3.3 Other notation elements

Constraints: A constraint may be attached to any type of association including aggregation and composition. The constraint is indicated by a dashed line across the affected associations. The type of constraints are shown below:

5



ANNEX B. Summary of work in related areas reviews as input to this document

7.1 European Standardisation Activities

7.1.1 Completed Standards/Prestandards

7.1.1.1 Clinical message development

The following message standards have been developed within CEN TC251.

- ❖ Laboratory Service Requests and Report Messages (ENV1613)
- ❖ Diagnostic Service Requests and Report Messages (ENV12539)
- ❖ Referral and Discharge Messages (also known as the Specialist Service Request and Report Messages) (ENV12538)
- ❖ Healthcare Administrative Information Messages (ENV12612)

These messages contain many elements that form part of a EHR. Consequently they will inform the development of EHR messages.

The Standard messages are specified in a syntax independent form. The general message descriptions have subsequently all been mapped into implementable syntaxes. In particular, EDIFACT implementation of all these messages have been specified. Some messages have also been mapped into ASN1.BER and XML. However, most current implementations of these messages are in EDIFACT and these include Norway, Sweden, Denmark, Netherlands and the UK (where they form the basis of [NHS Standard Messages](#)).

7.1.1.2 Clinical message development methods

All CEN Standard messages were developed using a syntax independent method. The method was also developed within CEN TC251 and later published as a formal CEN Report (CR 12587).

The HL7 group uses a similar modelling method in the development of [HL7 version 3](#).

The modelling technique is now being updated to use a subset of the UML modelling method. The intention of this change is to produce smaller, clearer standards that can be more easily mapped into an implementation syntax. These changes do not alter the general approach, which stresses the analysis of scenarios and information requirements, rather than particular syntactic representations.

More information on UML at www.rational.com/uml/adobe.html

7.1.1.3 Coding schemes used in messages

All CEN Standard messages support a variety of coding schemes using Healthcare Coding-scheme Designators (HCD), as specified by the European Standard on Registration of Healthcare Coding Scheme (ENV1068). The European Standard ENV1068 has now been superseded by an International Standard (ISO/IEC 7826). From the perspective of the Standard Message registered International Coding Scheme Identifiers (ICSI) provided by ISO7826 can be used in place of the HCDs without changing the structure of the messages.

7.1.1.4 Healthcare record architecture

A high-level overall health record architecture has also been agreed as a European Standard (ENV12265). This defines a patient health record as consisting of many individual units referred to as "record items". It also defines different ways in which these items can be combined into "record item complexes". A few of the more important common attributes of "record items" are considered but for the most part this Standard stopped short of defining details of the content of these elements. This was a prerequisite for achieving consensus within a finite period of time. However, a more detailed [EHR Extended Architecture](#) will be required in the future and this work is now beginning.

7.1.1.5 Health records and patient data cards

Another relevant European Standard deals with common clinical data structures for machine-readable cards (ENV12018). This is expressed in ASN1 rather than following the message development approach. However, it takes a broadly similar approach to clinical information by treating it as a collection of common codes, dated elements. See also [EU/G7 Healthcard Interoperability](#).

7.1.2 Current European Standards Activities

7.1.2.1 Healthcare Record Architecture and Messages

At the beginning of 1998 a new set of project teams have been commissioned to extend the Standard health record architecture and to develop messages for EHR communication. Four separate teams are working closely together to do this work. Most of this work is scheduled for formal completion in early or mid 1999. Interim results will be available for widespread consultation in summer/autumn 1998.

7.1.2.1.1 Electronic Healthcare Record - Extended Architecture (Work Item 1.8ea)

The Extended Architecture (EA) team is addressing a variety of issues related to extending the [Standard EHR architecture](#). This work also involves developing a more detailed domain model of the healthcare record and providing a framework for the other three related teams. An important focus of this work is the representation of contexts that modify the meaning of clinical record entries. Stephen Kay from Manchester University leads the EA team.

More information from [Stephen Kay – Email: sky@cs.man.ac.uk](mailto:sky@cs.man.ac.uk)

7.1.2.1.2 Electronic Healthcare Record – Domain Terms (Work Item 1.8dt)

The Domain Terms (DT) team is developing common lists of terms and meta-terms that enable the description of parts of the electronic health record in a common way. While taking an ontological approach, the DT team is committed to finding pragmatic solutions to short term problems such as the description of context and different views or record headings. Angelo Rossi-Mori from Rome leads the DT team.

More information from [Angelo Rossi-Mori – Email: angelo@color.irmkant.rm.cnr.it](mailto:angelo@color.irmkant.rm.cnr.it)

7.1.2.1.3 Electronic Healthcare Record – Distribution Rules (Work Item 1.8dr)

The Distribution Rules (DR) team is addressing the need for Standard ways of expressing and managing rules for access to and distribution of electronic clinical information. The DR team is not responsible for determining what these rules should be in any particular instance as this is an issue of policy, law and professional ethics. Instead, it is concentrating on the requirements to support current and projected rules in a way that can be conveyed when information is communicated between systems. Dr Robin Hopkins from Exmouth leads the DR team.

More information from [Robin Hopkins – Email: Haldonhousesurgery@btinternet.com](mailto:Haldonhousesurgery@btinternet.com)

7.1.2.2 Other Relevant Standards currently under development

Project teams are also actively working on the following European Standards which has a more or less direct impact on issues related to the EHR and its communication.

- ❖ Prescription Messages (Work Item 3.15)
- ❖ Blood Transfusion Messages (Work Item 3.16)
- ❖ System of Concepts to support Continuity of Care (Work Item 2.16)
- ❖ Security for Healthcare Communication (Work Item 6.10)
- ❖ Medical Multimedia and related Interoperability Format (Work Item 4.10)

7.2 Relevant research and development activities

A number of R&D activities and concerted actions funded by the European Commission have direct relevance to the development of EHR communications. The following list is not exhaustive but points to those that are most directly relevant.

7.2.1 Synapses

Synapses is a three year project within the fourth Health Telematics R&TD Framework of the European Commission. It aims to support the improvement of patient care by enabling healthcare professionals access patient records more readily at their computer workstations. The project methodology draws together and builds on the extensive work and results in the field of Telematics, IT and Telecommunications, and CEN TC/251 (in particular ENV12265). Synapses servers will be built and prototyped in a variety of test sites across Europe, in order to test the applicability of a generic server specification to a range of different legacy healthcare record systems. The Synapses Consortium are committed to placing the Specification and the Guidelines in the public domain and have already provided PT29 with valuable interim documents.

The objectives of the Synapses Project include:

1. To specify a generic and open means for combining healthcare records or dossiers consistently, simply, comprehensibly and securely, to enable the sharing of data between different information systems in different places.
2. To produce aids and guidelines that can be used in the migration from legacy healthcare systems, as an evolution strategy for a region or Member State, or as an exploitation plan for a healthcare site or commercial company.

More information from <mailto:jane.grimson@cs.tcd.ie>

7.2.2 GEHR and HCR Sup-A

The Good European Health Record was an EU funded R&D project that has proposed a detailed structure for health records. The initial [EHR Architecture Standard \(ENV 12265\)](#) was closely based on the early work of GEHR. The Health Care Record - Supporting Action (HCR-Sup A) is a further research and development project that involves some of the original GEHR partners. It is anticipated that this work will provide important input to the [Extended Architecture](#) and [EHR Message Standards](#).

More information at www.chime.ucl.ac.uk/HealthI/GEHR

7.2.3 EU/G7 Healthcard Interoperability / DiabCard and CardLink

The EU and G7 activities on healthcard interoperability involved EU partners in the R&D projects DiabCard (concerned with use of computer-readable cards to support diabetic care) and CardLink (concerned with use of computer-readable cards as emergency health records). The end results included an agreement with Japanese and US contributors on a basic structure for interoperability of summarised clinical information items suitable for meeting emergency needs. [See also ENV12018](#).

More information at www.clinical-info.co.uk/euhci.htm

7.2.4 Panacea

The EU funded Panacea project involved development of prototype systems based on the European Standard for identification, administrative and clinical data on computer readable cards ([ENV12018](#)). This project also tested prototypes for multimedia record communication.

More information from [Robin Hopkins – Email: Haldonhousesurgery@btinternet.com](mailto:Robin.Hopkins@btinternet.com)

7.3 US Standardisation activities

In the US there are several separate strands to standardisation activities. The two that are most relevant to Europe at present are HL7 and ACR/NEMA DICOM. Two other important areas of development are concerned with the use of object-oriented techniques for communication of healthcare information. These are the work of CORBA-Med and the work of the Microsoft User Group on healthcare COM based objects.

7.3.1 HL7

HL7 is a group that involves many leading US vendors of healthcare information systems. It has developed some of the most widely used messages for communication between healthcare systems. Its current messages (version 2) cover order-reporting and administration. The domains covered are rather similar to those covered by European messages. However, HL7 has a larger number of distinct messages whereas the European Standard messages tend to be rather more generic as a result of a common underlying model. Some systems have used of HL7 messages for EHR communication but this application tends to make use of user-definable "Z" segments rather than the standard part of HL7 messages. HL7 are moving towards a completely new set of Version 3 messages based on a modelling technique very similar to the one developed in CEN TC251.

The HL7 version 3 Reference Information Model includes sub-models that deal with Patient Care and Medical Records.

More information at www.mcis.duke.edu/standards/HL7/pubs/version3/Version3.htm

7.3.2 HL7 / Kona

Within the HL7 community there has also been a task force looking at the use of SGML and XML as a basis for future messages. This "Kona" initiative has proposed a layered approach. The least granular form ("ProseDoc") is a document with no formally structured data. The next layer ("clinical content") provides a rudimentary standard structure for items of clinical information. The most granular common form ("Electronic Health Record") contains more complex relationships between items. A higher level ("Enterprise") provides scope for additional structures specific to a particular group of communicating parties to meet specific needs.

More information at www.mcis.duke.edu/standards/HL7/committees/sgml/kona.htm

7.3.3 ACR/NEMA DICOM

DICOM is a Standard developed by ACR/NEMA for image communication. Originally this Standard was designed to provide for communication between digital X-ray machines. However, it has been extended to other types of images. Because textual reports often accompany these images the standard provides for "structured reporting". The structured reporting elements are potentially usable for other clinical reports that do not involve images.

More information from www.xray.hmc.psu.edu/dicom/dicom_home.html

7.3.4 CORBA and COM

CORBA and COM are effectively two competing approaches that allow controlled access to remote objects. A consortium of companies developed CORBA to enable their systems to provide an interoperable interface for accessing programming objects. It specifies a common architecture that allows object-oriented application to request objects from remote servers. The CORBA group has attracted considerable interest from the healthcare sector and this led to the formation of CORBA-Med.

More information at www.bhssf.org/corbamed/white_p.htm

Microsoft developed COM as an extension of OLE. Whereas OLE provides a common interface (API) to objects on a local system COM extends access over a remote networked system. A healthcare interest group within the Microsoft User Group is working on healthcare applications of COM technology.

More information at www.microsoft.com/com/