Kettering General Hospital XML project
DRAFT Implementation Guidelines

Status

Drafted by David Markwell of the Clinical Information Consultancy for Kettering General Hospital and released to developed on 31/7/99.

This version of the guide is released for implementation in the project. It includes notes of some unresolved issues. These are highlighted in Teal to the right of the page with the header "ISSUE" applied to each. Four small suggested changes to the DTD are further highlighted in bold. These changes have not been made and will not be made without developer consent.

This guide has not been QA'd for typographical and grammatical errors a QA'd version will be released later in the project. If any such error cause problems with interpretation please contact the author for clarification and resolution.

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</div>

1 Introduction

1.1 Scope and references

These guidelines are based on the NHS simple referral and discharge report profiles. The objective of the guidelines is to ease implementation of those profiles in the XML messages defined for use in the Kettering project.

These guidelines refer to the document type definition (DTD) for the Referral message (ReferralMsg01.dtd) and Report message (ReportMsg01.dtd).

These DTDs have been distributed in three computationally equivalent forms.

 ❖ A full form including all references elements and comments

 ❖ A modular with elements shared between messages are defined in common files

 ❖ A lite form which has been stripped of all comments.

These forms are in different subfolders of the distribution archive. The folders containing the also include HTML versions automatically derived from the DTDs. The HTML versions are *not* usable as DTDs but are supplied to provide a clearer presentation and to ease of navigation within the DTD. When reading these guidelines you should refer to the *full* form HTML version. Appropriate hyperlinks are included in the electronic version of this document.

1.2 Stability of this specification

It is clearly desirable for any message specification to be stable or to migrate in a controlled way. No guarantee can be given that these guidelines or the associated DTDs will be applicable beyond the scope of the current project. There are three distinct strands that make some changes almost inevitable:

 ❖ The outcome of the Kettering project is quite likely to suggest some recommendations for changes to the message content or structure based on experience of use.

 ❖ The power of DTD is limited in terms of expressiveness, flexibility and usefulness for validation. It is likely that alternative approaches to the description of the content of XML messages will allow greater flexibility, expressivity and more powerful validation. Study of the current two part XML-Schema specification draft suggests that adopting this approach will lead to some changes which will lead to changes in the structure of messages. It seems premature to make these changes at this stage as these specifications are themselves under revision and are not fully supported by parsers.

 ❖ The adoption of an approach based on reusable and refinable building blocks facilitated by schemas is likely to alter and enhance some of the approaches currently used for attempting to specify XML messages that meet three goals:

 ▪ Meeting perceived local needs
 ▪ Conforming to clinical and technical standards
 ▪ Providing a consistent and simple way to implement different messages.

However, while changes will occur in future, the intention is not to make further changes within this project except where necessary to correct errors or remove ambiguities. Furthermore, on a more positive note the flexibility of XML should ease migration as changes occur. It is probably that a combination of a future XML-Schema with/without an appropriate XSL-Transform could enable future support for messages that conform to this draft specification.

2   Data types and formats

2.1   XML and Data Types

One of limitation of using XML with DTDs is the lack of "strong data typing". This means that all the data content is treated as a string of bytes (i.e. with the declaration #PCDATA) without stating what those bytes represent.

The XML-Schema proposals specify ways of specifying data types, which allow both simple and more complex validation rules to be applied.

For the purposes of this project this section of the guidelines specifies general rules that apply to commonly used data types and constructs within the message.

2.2   Character sets

XML is capable of supporting the full Unicode sets of characters using the UTF-8 or UTF-16 rules. The project will use the XML default encoding (UTF-8).

During the project only the ASCII subset of UTF-8 shall be used. Thus sending systems should not include characters with byte values greater than 127 (Hex 7F) and receiving systems need not cater for characters outside this range. This restriction does not preclude the use of escaped characters in the HTML content of the TextBlock element.

> NOTE: This restriction could be relaxed in future implementations is all systems can display full Unicode character set.

2.3   Dates and times

An element follows the date and time formatting rules below if the element:

a) Has the name "Date" or a name that ends with the four letters "Date"

   AND

b) Has a content model of #PCDATA

Dates and times shall always be formatted as follows with the number of digits as present representing the level of precision of the date.

This is in accord with the basic form of the time date representation described in ISO8601 (see http://www.iso.ch/markete/8601.pdf and excerpt in 9. ISO8601 Date Time Formats). The option to exclude the "T" separator between date and time has been adopted for use in the project.

	Format	Example	Description
Full date+time	CCYYMMDDhhmmss	19990728144620	14:46 and 20 seconds on 28th July 1999
Date+time without secs	CCYYMMDDhhmm	199907281446	14:46 on 28th July 1999 (a trailing pair of zeros would imply precision to the second)
Date+hour	CCYYMMDDhh	1999072814	About 2pm on 28th July 1999
Date only	CCYYMMDD	19990728	28th July 1999
Year+month	CCYYMM	199907	Sometime in July 1999
Year only	CCYY	1999	Sometime in 1999

> NOTE: The letter "T" is used as a literal demarcation of the boundary between the date and time. However, ISO8601 permits this to be omitted by agreement within a user community. This option is adopted for this project.

2.4 Numeric data

The current message does not include any elements that contain numeric values, which are subject to value or lexical constraints. This does not mean that none of the elements contain numeric values but that there are no elements where it is appropriate for them to be validated on the basis of there numeric content.

2.5 Coded information

2.5.1 Use of coding scheme identifiers

In the general models on which this message is based the elements that contain coded values are distinguished by inclusion of the International Coding Scheme Identifier (ICSI) as an attribute.

In these profiles the ICSI has been discarded for most coded elements in view of the decision to specify a specific coding scheme or more usually a closed list of values for use in the project.

2.5.2 Closed code lists

Elements with closed code list can only be clearly distinguished in the DTD (not in the *Lite* version). The comments that follow the element definition include the code list. This is presented as a sequence of lines preceded by a title including the words "permitted values" indicates that the preceding element has a limited list of permitted values. These must be chosen from the list that follows.

Each item in the list contains a quoted string value (the code value) followed by a string in square brackets (the code meaning) and optionally by other text (explanation or notes).

This convention is arbitrary but has been followed to facilitate machine interpretation when converting to a schema with a list of permitted literal values.

The code lists are derived either from:

       a) The NHS Profile, or failing that ...

       b) ENV13606-2 (the EHCR Term List Prestandard), or failing that ...

       c) Invention for the purposes of the project.

Example

    <-- Permitted values from ENV13606-2 applicable to these messages are:

     ...

     "4" [responsible to] Trainee relationship to senior clinician

     ...

    -->

      Interpretation: The code value "4" is used to represent the meaning "responsible to" and this is used for representing the relationship of a trainee to a senior clinician.

2.5.3 Reference to external code lists

An element may contain a code from an externally referenced code list or coding scheme. However in the current message this is not required for any of the items required by the NHS simple referral and report profiles.

2.5.4 Representation of coded values in the message

Representation of these elements is either by use of the code value alone or by combination of the code value and code meaning. This varies according to the context. There are two common constructs that can contain values from a code list or coding scheme.

   a) <!ELEMENT MyElement (#PCDATA)>

   b) <!ELEMENT MyElement (Code, CodeMeaning?)>

The last of these can also be represented using a parameter entity defined in the DTD so they may appear as follows:

   <!ELEMENT MyElement (%Coded;)>   (equivalent to b)

Suppose each of these was followed by a list that included the following

```
<-- Permitted values are:
 ...other values
 "L" [Left]
 ...other values
-->
```

The representations possible are as follows:

a) Code only

<!ELEMENT MyElement (#PCDATA)>

This is the simplest form. The code is represented as simple string data and the code meaning cannot be included.

   <MyElement>L</MyElement>

b) Coded with optional meaning

<!ELEMENT MyElement (Code, CodeMeaning?)>

This form allows the code value to be accompanied by a code meaning.

   <MyElement>

      <Code>L</Code>

      <CodeMeaning>Left</CodeMeaning>

   </MyElement>

The code meaning is optional but even if this is omitted the code value must be nested.

   <MyElement>

      <Code>L</Code>

   </MyElement>

2.6 Identifiers

2.6.1 Kinds of identifier

Identifiers can be divided into two distinct categories. These are "real-world" identifiers and the "instance" identifiers.

Real World Identifiers

A "real-world" identifier is an identifier used outside the context of an information system. Examples include the NHS number, GP number and the serial number on a piece of equipment. They are "real" in the sense that they are linked to something real (a patient or a GP, a piece of equipment). These identifiers may be recorded in an information system but, because they have validity in the real world, the constraints on their values and representation are defined independently of the information system.

The requirement to communicate a "real world" identifier typically arises from the business process itself. Thus the need to communicate an NHS number meets the need to match a referral to a known registered NHS patient.

When a "real world" identifier is conveyed in a message, the message must allow the valid forms to be conveyed. Thus the message must not apply constraints on length or character sets that are not compatible with the real world identifiers that are to be conveyed. Implementation of a message may optionally include apply known validation constraints specific to a particular identifier (e.g. length, character-set and check-sum). However, such rules cannot be invented in isolation from the reality of the identifiers actually used.

Instance Identifiers

An "instance" identifier is an identifier of a particular instance of an information object such as a message or component within a message. These have no meaning outside the system and act only as handles to enable reference to those information objects. The constraints that apply to such identifiers may be determined by system design and they can be transposed or mapped into other forms that retains a unique linkage to the original object without loss of meaning. These guidelines specify constraints that seek to ensure effective communication. These constraints may affect system design but they do not directly specify how the "instance" identifiers should be generated or represented within a system. The main requirement is that these identifiers are unique, at least within a specified scope.

2.6.2 Real world identifiers in the message

The message includes four distinct types of "real-world" identifier.

Identifiers of patients

- NHS number
- Hospital Number
- (Practice number)

These are conveyed in the message a part of the PatientId element which contains one or more Id elements. Each Id element has an IdType (which is used to indicate whether this is an NHS, old NHS, Hospital or Practice number) and an IdValue (which contains the appropriate identifier).

> NOTE: The message model on which the profile is based also includes an IdScheme element but this is not used in the current message.

Identifiers or organisations or people involved in service provision (agents)

- GP identifier
- Practice identifier
- Provider identifier
- Locally issued identifiers

These are conveyed in the message as AgentId elements in the appropriate element represented that agent. Each AgentId element has an IdType (which is used to indicate the type of identifier and often implicitly the type of agent identified) and an IdValue (which contains the appropriate identifier).

Locally issued identifiers or members of staff or departments are only meaningful as part of an AgentInContext element, which includes a nationally identified organisation within which the locally issued identifier is meaningful.

Identifiers of documents or business transactions

- Referral number

A specific element is provided for the ReferralNumber. This is needed if the business process requires a distinct number or identifier with a predetermined structure (for example for purchasing and accounting purposes). The "instance" identifier of the message (MsgId) may be used if the only business requirement is to be able to refer to the relevant message within an information system.

Identifiers of "communicating systems"

- Message sender identifier
- Intended message recipient identifier

Specific elements are provided in the message for MsgSender and MsgRecipient. These are not identified in the same way as agents in the message. Instead they consist of a 19 digit EDI identifier made up as follows:

ISO6523 registration for the NHS				Ten digit NHS EDI identifier. Allocated to Trusts, Health Authorities, GP practices, etc. by NHSIA Telecommunications.										Five digit subdivision identifier issued by the identified organisation				
0	0	8	0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

The sender identifier is particularly important as it may provide the context for the uniqueness of "instance" identifiers in the message.

2.6.3 Instance identifiers

Message identifier

The MsgId element in the root node of the message shall uniquely identify this message within the scope of all healthcare messages issued by the sender (as identified by the identifier for MsgSender).

Note that this may differ from the real-world concept of a Referral number. Two or more messages may conceivably be sent to convey or replace a referral. Each of these would have a different MsgId but could share a common Referral number. Another distinction is that whereas the Referral numbers may be sequential for referrals the MsgId will change each time a message of any type is sent.

Message reference

References to earlier messages are supported by the MsgRef element. This is not itself an instance identifier but it illustrates the use and particular properties of instance identifiers. In the current project the only use of the MsgRef is to link a report message to the referral message with which it is associated. The MsgRef element contains two mandatory elements MsgIdRef and MsgSenderRef which together uniquely identify the referenced message. An additional optional element allows the issue date of the referenced message to be included. This is included to allow additional checking in the event that the sending application has failed to maintain a continuing unique set of message identifiers.

> NOTE: This is a change from the EHCR message in which the MsgRef included the originating healthcare agent. Since the scope of uniqueness of the MsgId is the newly added element for the MsgSender it is clear that this is a more appropriate identifier to use in the MsgRef element.

Component unique identifier

The Cuid element in each component element within the message shall uniquely identify an information object within the scope indicated by the IdScope attribute. Of the available scope options the initial recommendation is that with the project the "Message" scope should be used. This means that the Cuid uniquely identifies the component as a component within the message. A greater scope of uniqueness can if necessary be derived in combination with the MsgId element but there is no immediate requirement for this. However, if any only if, the sending system already has a unique internal reference to the information object from which the message component is derived then this should be used to provide a more usefully scoped Cuid.

The primary reason for include the Cuid is to establish the concept and future ability to uniquely refer to elements communicated in earlier messages. There is no immediate requirement to demonstrate this in the project but previous discussions of message functionality have identified the inability to specifically correct or amend communicated information.

Agent in Context Identifier

The Agent in Context identifier is an instance identifier that identifies a particular Person or Organisation (healthcare agent) acting within the context of their relationship with other healthcare agents. This is discussed in more detail in 2.7 Healthcare Agents in Context.

2.7 Healthcare Agents in Context

2.7.1 Healthcare Agents

Healthcare professionals and organisations are frequently referred to in messages. The current message only refers to two or three professionals and two or three organisations. However, in more extensive message containing parts of patient records many more professionals may be cited in light of their roles in providing different aspects of care. Furthermore, the same Person may be referred to in respect of many roles. It is therefore a good idea to apply a common and efficient mechanism for representing these references.

This problem was considered in CEN TC251 WGI together and the resolution ended up rather similar to the more arbitrary approach applied when implementing earlier healthcare messages in EDIFACT. The approach was extended to include devices and software, which may also need to be referred to on account of their ability to contribute information to a record (e.g. digital images, waveforms or decision support advice). The general term "healthcare agent" has been applied to any Person, Organisation, device or software that contributes to the care of the patient and needs to be referred to from an electronic patient record or message.

To avoid repetition, a directory approach is used allowing healthcare agents to be referred to using an AgentId. The relevant agent directory entries can be in the message but may be omitted if both sender and intended recipient have access to a shared directory.

In the case of the current project, the assumption is that healthcare agent information related to GPs, Practices and Providers is known to both communicating parties and these can be referenced by AgentId. However, department (or if relevant branch surgery information) is less likely to be shared and should be included in the message. Clinical specialists who receive referrals and issue reports may or may not have national recognised identifiers. If this information is not shared it must be included in the AgentInContext (see 2.7.2 and example).

2.7.2 Agents in context

The identification of a healthcare agent may not be sufficient. In practice, a healthcare agent usually undertakes a particular role in the context of their relationship with another agent. It is important to be able to include information about that relationship and the related healthcare agent as well as information about the healthcare agent fulfilling the role. For example, it should be possible to record information such as:
- ❖ A clinician undertook an activity while working in a particular organisation.
- ❖ A secretary wrote a note on behalf of a doctor.
- ❖ A request was sent by a clinician from a particular department in a hospital.

Therefore it may be necessary to able to link together a several healthcare agents with the relevant relationships between them and to indicate that this linked group fulfilled a specified role. We refer to this linked group as healthcare agent in context.

The roles of referring GP and referring practice are not distinct but rather relate from the context in which the GP is performing their role. Thus, it is preferable to avoid specifying additional but rather to represent the situation as a referral by a GP in the context of the practice.

Where there is clearly a separate role in an activity should an additional role be included (e.g. the roles of the surgeon and anaesthetist in an operative procedure should not be represented as a relationship between the two clinicians). In some cases the distinction is quite clear but in others there may be two ways of recording the same information.

Typically an agent will operate in a single context in relation to several items in the same message. Each agent in context is represented by a single identified instance of the AgentInContext in the AgentsDirectory element. Any references to that agent operating in that context use the appropriate instance identifier referring to the AgentsDirectory.

Example

```
<AgentInContext>
    <IdValue>12</IdValue>                           The Agent in Context Identifier used to refer to this
                                                     entry in the AgentsDirectory.

    <AgentId>
        <IdType>GP</IdType>                         IdType = GP = National GP code
        <IdValue>G111222</IdValue>
    </AgentId>
    <AgentRel>
    <AgentRelType>3</AgentRelType>                  AgentRelType = 3 = employee/staff
    <Organisation>
        <AgentId>
            <IdType>Internal</IdType>               IdType = Internal arbitrary identifier
            <IdValue>B2</IdValue>                   A local identifier for the Branch Surgery
        </AgentId>
        <OrgName>Hill Top Surgery</OrgName>         Name of the Branch Surgery
                                                     other information such as address may be added.
    </AgentId>
    </AgentRel>
    <AgentRel>
        <AgentRelType>5</AgentRelType>              AgentRelType = 3 = subdivision
        <AgentId>
            <IdType>PRA</IdType>                     IdType = PRA = National Practice Code
            <IdValue>P222333</IdValue>
        </AgentId>
    </AgentRel>
</AgentInContext>
```

❖ Notes

The above entry would exists in the AgentsDirectory

Any other element in the message that contains a role of an agent in context can include the AgentCtxIdRef=12. This refers to the GP nationally identified as "G111222" working in the "Hill Top Surgery" branch of the practice nationally identified as "P222333.

If the same GP does a locum in another surgery or works as a clinical assistant in the hospital and sees that same patient in that capacity, then another AgentInContext entry is used in a similar way while the GP national number is unchanged.

The full information about the Branch Surgery is included in-situ as part of the AgentInContext entry in the AgentsDirectory.

2.8 Post Code

The PostCode is represented as simple #PCDATA element. However, its formatting should conform with one of the following valid formats. The space between the elements should be included in all these formats.

"AN NAA"
"ANN NAA"
"AAN NAA"
"AANN NAA"
"ANA NAA"
"AANA NAA"

Example:

<PostCode>RG30 2SN</PostCode>

2.9 HTML

The TextItem used to convey the details of the referral and report letters should be represented in HTML. There is an option to use plain text if the sender cannot generate HTML or the recipient cannot process it.

> NOTE: Participants in the project have already agreed to use HTML. Thus the assumption is that HTML will be used for this purpose in all messages.

To indicate the inclusion of HTML the TextMarkupIndicator should contain the reference to the HTML encoding ("-//IETF//DTD HTML//EN").

> **NOTE: For the purpose of this project the string "-//IETF//DTD HTML//EN" should be used but this may be varied in future to specify XHTML or to amend the syntax of the indicator.**

The TextBlock element should contain the HTML marked up text. There are two possible ways to include HTML in XML without causing the parser to fail and these are considered and illustrated below.

❖ The simplest option is to use a CDATA section as this excludes the HTML component from parsing.

❖ A more robust longer-term option is to use XHTML and then to declare the content of the TextBlock as conforming to this notation. Ordinary HTML allows implicit ending of elements without closing tags and for this reason fails in an XML parser. XHTML is a "well-formed" version of HTML, which means it requires balancing tags and thus parses as well-formed in an XML environment.

When the CDATA demarcation was removed from the first of the two examples on the next page the containing document failed to parse in IE5. However correcting a reported error by changing "meta" into an "empty" element (by adding a trailing "/") allowed it to parse.

Since we cannot be certain that all the HTML generators used in the project will generate "well-formed" XHTML it is better to insist on the CDATA option at this stage.

NOTE: No attempt should be made to process information in the HTML text element other than for display purposes.

> **NOTE: For the purpose of this project HTML text shall be included in a CDATA section.**

Example 1 HTML as generated by MS-FrontPage 3.0 in a CDATA section

```
<TextBlock><![CDATA[
    <html>
    <head>
    <title>New Page 1</title>
    <meta name="GENERATOR" content="Microsoft FrontPage 3.0">
    </head>
    <body>
    <h2>Re: Mr. B. Rightbone</h2>
    <h2>Note</h2>
    <p>Your patient had a <strong><font color="#8000FF">Right Total Hip
    Replacement </font></strong>performed
    by Mr Art Iculate.</p>
    <p>He has been discharged from the ward today (12/7/99).</p>
    <p>The wound is not completely healed and needs a district nurse
    review in the next few days. Mobility adequate but suggest you arrange
    home physio to facilitate further
    improvement.</p>
    <h2>Please arrange</h2>
    <ul>
    <li><strong><font color="#FF0000">District Nurse to review wound 3
    days.</font></strong></li>
    <li><strong><font          color="#FF0000">Physiotherapy        ?
    domicilliary.</font></strong></li>
    </ul>
    </body>
    </html>
]]></TextBlock>
```
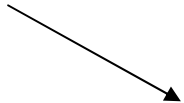
Example 2 Well formed HTML created by a single correction to the above

```
<TextBlock>
    <html>
    <head>
    <title>New Page 1</title>
    <meta name="GENERATOR" content="Microsoft FrontPage 3.0"/>
    </head>
    <body>
    <h2>Re: Mr. B. Rightbone</h2>
    <h2>Note</h2>
    <p>Your patient had a <strong><font color="#8000FF">Right Total Hip
    Replacement </font></strong>performed
    by Mr Art Iculate.</p>
    <p>He has been discharged from the ward today (12/7/99).</p>
    <p>The wound is not completely healed and needs a district nurse
    review in the next few days. Mobility adequate but suggest you arrange
    home physio to facilitate further
    improvement.</p>
    <h2>Please arrange</h2>
    <ul>
      <li><strong><font color="#FF0000">District Nurse to review wound 3
    days.</font></strong></li>
      <li><strong><font          color="#FF0000">Physiotherapy        ?
    domicilliary.</font></strong></li>
    </ul>
    </body>
    </html>
</TextBlock>
```

2.10 Plain text string data

All elements that are specified as containing #PCDATA which are not identified elsewhere in the preceding section are of indeterminate length. However, any such element which is present in the message it shall not be either empty nor shall it contain a zero length string.

3   Common Elements

This chapter is concerned with elements common to both messages.
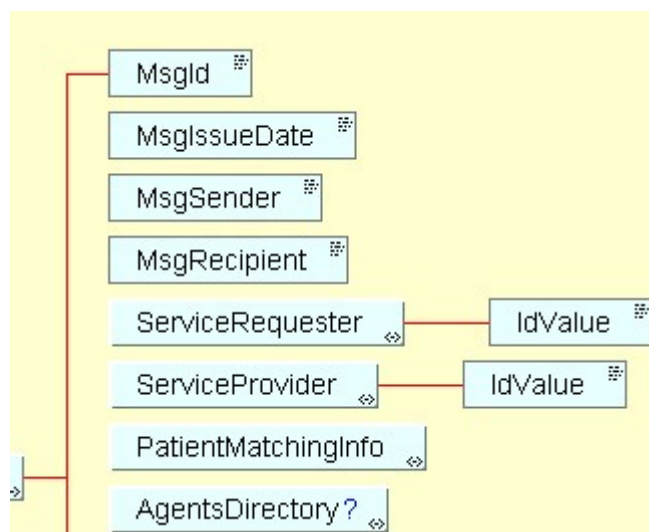
3.1 Information about the message

The Project position on "message headers" is described in a paper drafted by Andrew Hinchley. This section is concerned with implementation of the decisions outlined in that paper in the message.

Both messages contain a set of common elements that are concerned

3.1.1 Message identification

MsgId shall be an identifier generated by the sending application that is globally unique across all instances of healthcare messages originating from that system.

Any combination of MsgSender and MsgId shall be globally unique.

No assumption of meaning or sequencing is implied by this identifier.

3.1.2 Date of issue

MsgIssueDate shall contain the date and time of issue of the message.

The date of issue is the date at which the sending application completes its last step of generating and processing the XML message instance. After this date and time has been entered no further changes shall be permitted to the message.

3.1.3 Sender identifier

MsgSender shall contain the unique 19 digit EDI identifier allocated to the organisational subdivision from which the message is sent. See Identifiers of "communicating systems" in Section 2.6.2.

3.1.4 Intended recipient identifier

MsgRecipient shall contain the unique 19 digit EDI identifier allocated to the organisational subdivision to which the message is sent. See Identifiers of "communicating systems" in Section 2.6.2.

3.1.5 Service requester

ServiceRequester shall contain an IdValue. This IdValue need not be meaningful outside the message but shall match the IdValue of an AgentInContext in the AgentsDirectory of the message.

The referenced AgentInContext entry shall identify the GP responsible for the referral and shall further identify the practice from which they are making the referral (see 2.7.2). The practice shall be represented as an agent relationship (AgentRel) with a relationship type (AgentRelType) "3" [employee of] (this is a general purpose value covering partners and associates as well as employees).

3.1.6 Service provider

ServiceProvider shall contain an IdValue. This IdValue need not be meaningful outside the message but shall match the IdValue of an AgentInContext in the AgentsDirectory of the message.

The referenced AgentInContext entry shall identify the specialist providing (or requested to provide) the service. It shall further identify the Trust in which they provide the service and the department or specialty (see 2.7.2). The Trust shall be represented as an agent relationship (AgentRel) with a relationship type (AgentRelType) "3" [employee of] (this is a general purpose value covering partners and associates as well as employees). The Department or specialty shall be represented as an agent relationship (AgentRel) with a relationship type (AgentRelType) "5" [subdivision of].

3.1.7 Message acknowledgement request

The MsgRcptAckRequest attribute indicates the circumstances in which the sender requires an acknowledgement.

In this project it has been agreed that acknowledgements are required for all messages. Therefore the MsgRcptAckRequest attribute has the fixed value "Always" defined in the DTD. This attribute should not be included in any instance of the messages.

3.1.8 Message urgency

The MsgUrgency attribute indicates the urgency with which the sender requests the recipient to review and process the message.

In this project it has been agreed that only two values shall be used. These are "Normal" and "High".

The receiving system should highlight, prioritise in a list or otherwise draw the attention of the recipient to messages with the value MsgUrgency="High".

3.1.9 Message status

The MsgStatus attribute indicates whether a message is being used for real or as a test.

In this project two values shall be used. These are "Live" or "Test". The attribute is optional and has a default value "Live".

The receiving system should ensure that messages with the value MsgStatus="Test" are not acted on as though they were real requests or reports. The content of test messages should not be added to a real patient record. The fact that a message is a test should be apparent to the user when the message is viewed or included in a list of messages.

3.2 Matching the message to a patient
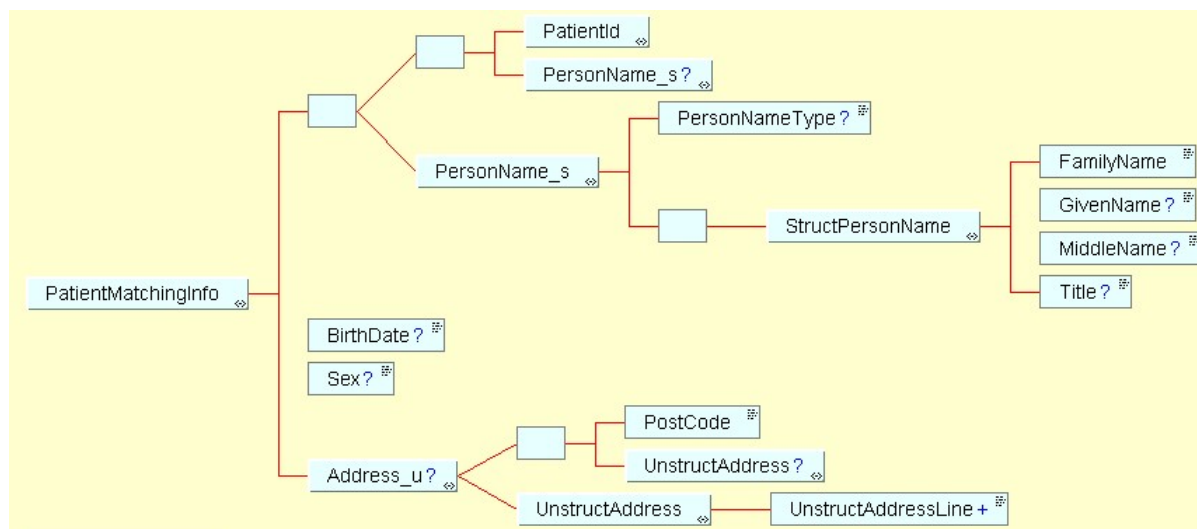
3.2.1 Matching rules

The rules for automatic and manually assisted matching of patients to messages defined by the Clinical EDI Functions for GP Systems version 0.5 shall be implemented by recipient systems. Therefore the provision of information in the PatientMatchingInfo element of the message shall as a minimum be sufficient to support the matching process.

3.2.2 Patient identifiers

The PatientId element shall contain one or more Id elements each containing an IdType and an IdValue. In this project **no more than three** instances of the Id element shall be included. If the NHS number is known this should be included. Other identifiers are optional.

The permissible values for IdType are:

"Nhs"	NHS number
"NhsOld"	Old NHS number
"Requester"	Number allocated to patient by the Requester (e.g. GP system number)
"Provider"	Number allocated to patient by the Provider (e.g. hospital number)

3.2.3 Patient name

The patient name shall be included if the NHS number is not present and may be included in addition to the NHS number. If the name present shall follow the structured form specified for the element PersonName_s. This varies the general purpose Person Name by requiring the name to be represented as a StructPersonName.

The StructPersonName consists of a FamilyName with optional GivenName, MiddleName and Title. The GivenName is required if to meet patient matching rules.

The PersonNameType is optional and need only be provided if a name other than the patient's registered name is used.

3.2.4 Optional additional matching characteristics

The BirthDate, Sex and an unstructured address (Address_u) may be provided as additional characteristics to support patient matching.

3.3 Information about healthcare agents
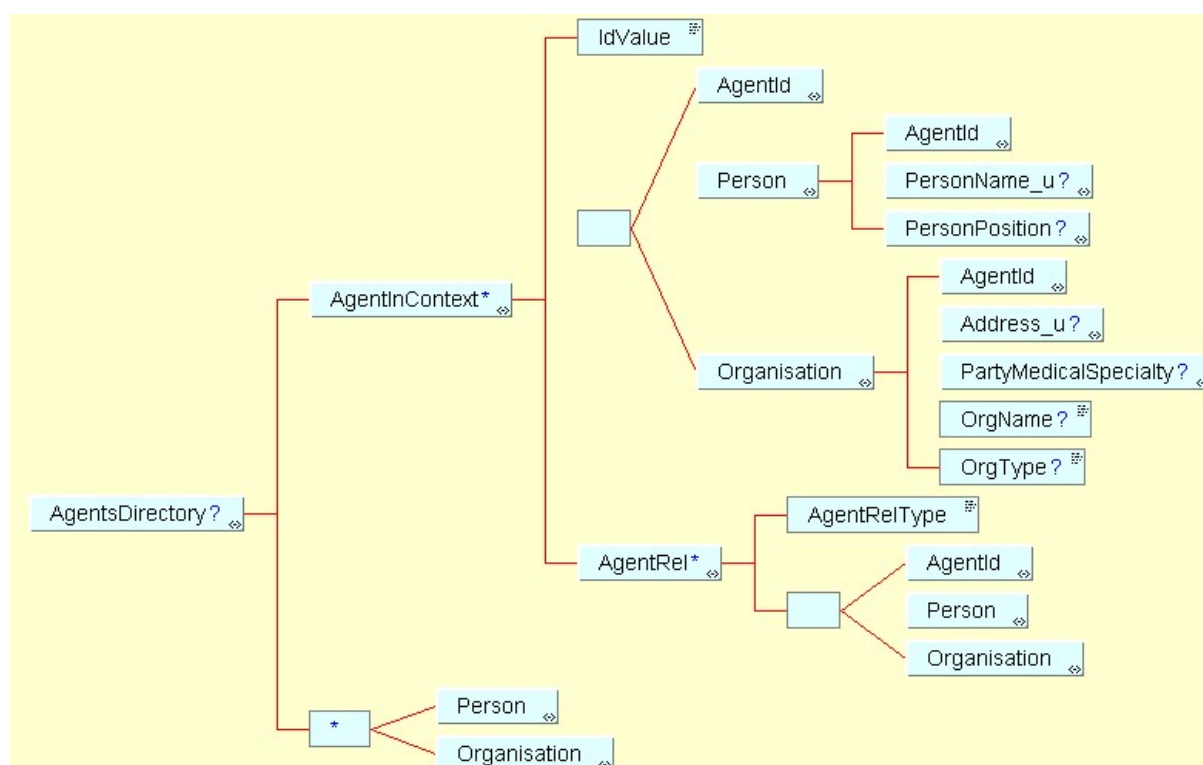
The AgentsDirectory is an optional element but for the purposes of this project it is required since there is no externally defined directory for agents in context (see 2.7.2). For the same reason the AgentsDirectory will always contain at least two instances of AgentInContext (referenced by the ServiceProvider and ServiceRequester elements).

Each AgentInContext is uniquely identified by an IdValue which is used to refer to it from other elements within the message. This IdValue is not required to have any meaning outside the context of the message.

Each AgentInContext contains a healthcare agent represented either by an AgentId or by a more detailed element containing details about the Person or Organisation. The AgentId is sufficient if a National identifier is used to identify the person or organisation and the communicating systems share information about that agent. However, if there is no National identifier or no shared information, the more detailed representation is required.

An AgentInContext may include related healthcare agents that give relevant context to the first healthcare agent. Each of these is represented as an AgentRel containing an AgentRelType, specifying the relationship, and either an AgentId, identify the agent, or details about the person represented as a Person or Organisation.

> NOTE Within this project both the primary agent in of an AgentInContext and the agent with an AgentRel shall be represented as instances of Person or Organisation unless the AgentId is a Nationally recognised identifier which the sender and recipient have agreed is adequate for communication. For example, if a name is required for communication (rather than just an identifier) the Person or Organisation element shall be included.
>
> The message also supports the option for the AgentId to refer to a separate AgentsDirectory entry containing the Person or Organisation information. However, this indirect approach should not be applied in this project.

The AgentsDirectory may also contain instances of Person or Organisation separate from the contextual information provided within an AgentInContext. This is of value to provide information about agents referred to in more than one context where shared information is not accessible or where National identifiers are not used.

The AgentId is a mandatory component of Person or Organisation and is thus used in any reference to a healthcare agent. The AgentId contains an IdValue and an IdType indicating the source of that identifier. In cases where there is no National identifier or where the National identifier is unknown an internal identifier (unique in the message but possibly meaningless outside it) shall be used as the IdValue and the IdType shall be "Internal".

> **NOTE: Within this project, if details of a person or organisation are required, these are provided explicitly as part of the AgentInContext, rather than using separate AgentsDirectory entries for Person or Organisation. Therefore there is requirement for any Person or Organisation elements to exist as direct descendants of AgentsDirectory.**

The specialty of an Organisation may be specified by using an optional PartyMedicalSpecialty element. This should be applied to a department within a hospital but should not be applied to a hospital, practice or branch surgery.

**The permissible values for PartyMedicalSpecialty derived from the NHS profile are:**

"100"	General Surgery
"101"	Urology
"110"	Trauma & Orthopaedics
"120"	ENT
"130"	Ophthalmology
"140"	Oral Surgery
"141"	Restorative Dentistry
"142"	Paediatric Dentistry
"143"	Orthodontics
"150"	Neurosurgery
"160"	Plastic Surgery
"170"	Cardiothoracic Surgery
"171"	Paediatric Surgery
"180"	Accident & Emergency
"190"	Anaesthetics
"300"	General Medicine
"301"	Gastroenterology
"302"	Endocrinology
"303"	Haematology (Clinical)
"304"	Clinical Physiology
"305"	Clinical Pharmacology
"310"	Audiological Medicine
"311"	Clinical Genetics
"312"	Clinical Cytogenetics and Molecular Genetics
"313"	Clinical Immunology and Allergy
"314"	Rehabilitation

(continues)

Permissible values for PartyMedicalSpecialty (continued)

"315"	Palliative Medicine
"320"	Cardiology
"330"	Dermatology
"340"	Thoracic Medicine
"350"	Infectious Diseases
"360"	Genito-urinary Medicine
"361"	Nephrology
"370"	Medical Oncology
"371"	Nuclear Medicine
"400"	Neurology
"401"	Clinical Neuro-physiology
"410"	Rheumatology
"420"	Paediatrics
"421"	Paediatric Neurology
"430"	Geriatric Medicine
"450"	Dental Medicine Specialties
"460"	Medical Ophthalmology
"500"	Obstetrics & Gynaecology
"510"	Antenatal clinic
"520"	Postnatal clinic
"600"	General Practice
"610"	GP Maternity Function
"620"	GP other than Maternity
"700"	Mental Handicap
"710"	Mental Illness
"711"	Child & Adolescent Psychiatry
"712"	Forensic Psychiatry
"713"	Psychotherapy
"715"	Old age Psychiatry
"800"	Radiotherapy
"810"	Radiology
"820"	General Pathology
"821"	Blood Transfusion
"822"	Chemical Pathology
"823"	Haematology
"824"	Histopathology
"830"	Immunopathology
"831"	Medical Microbiology
"832"	Neuropathology
"900"	Community Medicine
"901"	Occupational Medicine
"990"	Joint Consultant Clinics

4 Patient administrative information
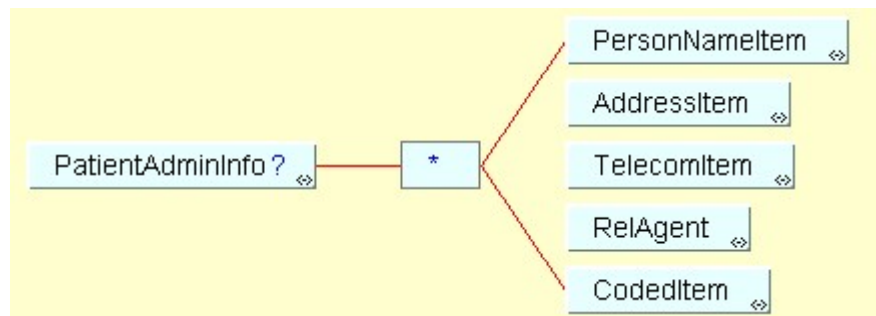
4.1 Introduction

Non-clinical information about the patient that is required other than for matching purposes is conveyed in the PatientAdminInfo element of either of the messages. This element may contain any number of items containing different types of administrative or demographic information. However, in the project the actual instances of items within this group should be limited to those essential to convey information not otherwise represented in the message.

4.2 Component unique identifiers and status indicators

The EHCR Prestandard (ENV13606) specifies two general types of record component *record items* that contain specific types of information and *record complexes* that gather together *record items* into logical collections. The PatientAdminInfo element is a rather specialised type of *record complex* and the elements within it are types of *record item.* The significance of this is that one of the critical characteristics of a *record item* is that it can be explicitly identified and subsequently referenced. This explains the presence of the Cuid within the individual items. The rules for the use of a Cuid allow it to be unique within a localised, generalised or global scope. The Cuid has an IdScope attribute that indicated this scope of uniqueness on the identifier.

Within this project the Cuid need only be unique in the scope of a single message. If the sending system can provide one of the broader scopes of uniqueness it may do so. However, there is no requirement in this project for the receiving system to process the Cuid nor to store it other than in an archival copy of the message.

Record items also include a status indicator to discriminate between information that is currently valid and superseded information that is included in relation to a revision of an item. This is represented by the RcStatus attribute.

Within this project only current valid information is communicated. Therefore the RcStatus attribute has the fixed value "Current" defined in the DTD. This attribute need not be included in individual instances of messages.

4.3 Person Name
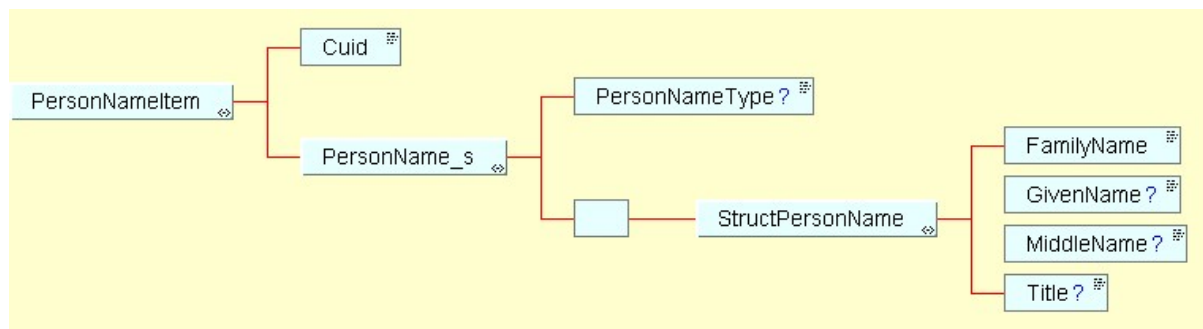
The PersonNameItem element is used to convey names of the patient.

In the project it is recommended that the PersonNameItem is only used for carrying alternative names. The registered name is provided in PatientMatchingInfo.

In future confidentiality constraints may lead to a change in this advice. For example, it may be that the name should only be conveyed in a first communication between parties where the recipient does not hold a record of the patient and is unable to access a common register.

4.4 Address
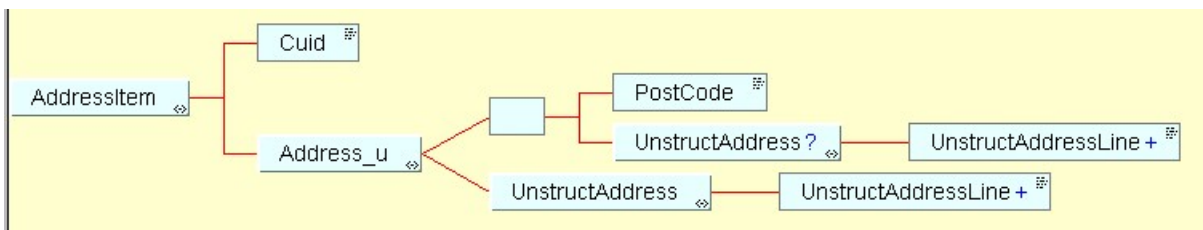
The AddressItem element is used to convey the address of the patient if this is not provided in the PatientMatchingInfo. It can also be used to provide alternative addresses such as a home address in the case of a temporary registered patient.

The Address_u element is used in this project in place of the more general Address element to indicate that all addresses are unstructured. Thus each Address consists of a PostCode and/or an UnstructAddress containing a number of instances of UnstructAddressLine. In addition each address may be qualified by an AddrType attribute specifying the nature of the address. The value of the AddrType attribute has been modified to align with the NHS profile. However, this reduced list lacks some of the important expressivity of the list provided in ENV13606-4 and may be further revised in future.

In this project:

❖ a **maximum of two** instances of AddressItem shall be included.

❖ a **maximum of five** instances of UnstructAddressLine shall be included.

❖ the default value for AddrType is "Current"

4.5 Telecommunication numbers
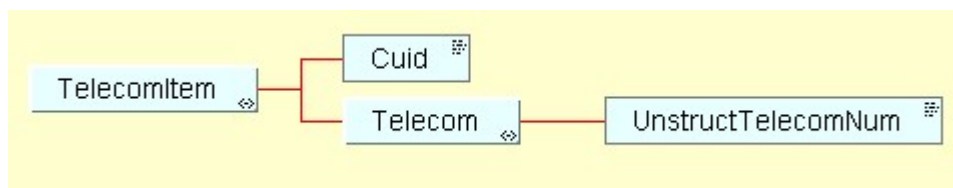
The TelecomItem element is used to convey the telephone and other telecommunication numbers of the patient.

In this project each number is provided in an unstructured form within the Telecom element.

The type of telecommunication shall be indicated by the TelecomType attribute with the value "Voice" used as a default.

An AddrType attribute is optional and should be omitted unless the number is known to refer to an address other than the current home address of the patient.

4.6 Related agents

The RelAgent element is included in PatientAdminInfo as a shortcut for indicating the relationship between the patient and a registered GP, the usual GP that sees the patient or a specialist or other healthcare professional responsible for the care of a patient. The EHCR Prestandard (ENV13606) represents these relationships through other *record items* in the manner specified above for CodedItem.

Within this project the RelAgent in the PatientAdminInfo should be used where it is necessary to identify a relationship between the patient and a GP other than as the requester or provider of the service to which the message relates.

The value of RelAgentRole should be one of the following:

"PRG"	Patient's registered GP
"FL"	GP with which FULLY registered for GMS
"TM"	GP with which TEMPORARY registered for GMS
"PT"	GP providing PRIVATE care
"OB"	GP with which registered for Obstetric Care
"CN"	GP with which registered for Contraceptive Care
"UR"	GP with whom patient is not registered
"UK"	GP with which patient has unknown registration status

4.7 Coded items
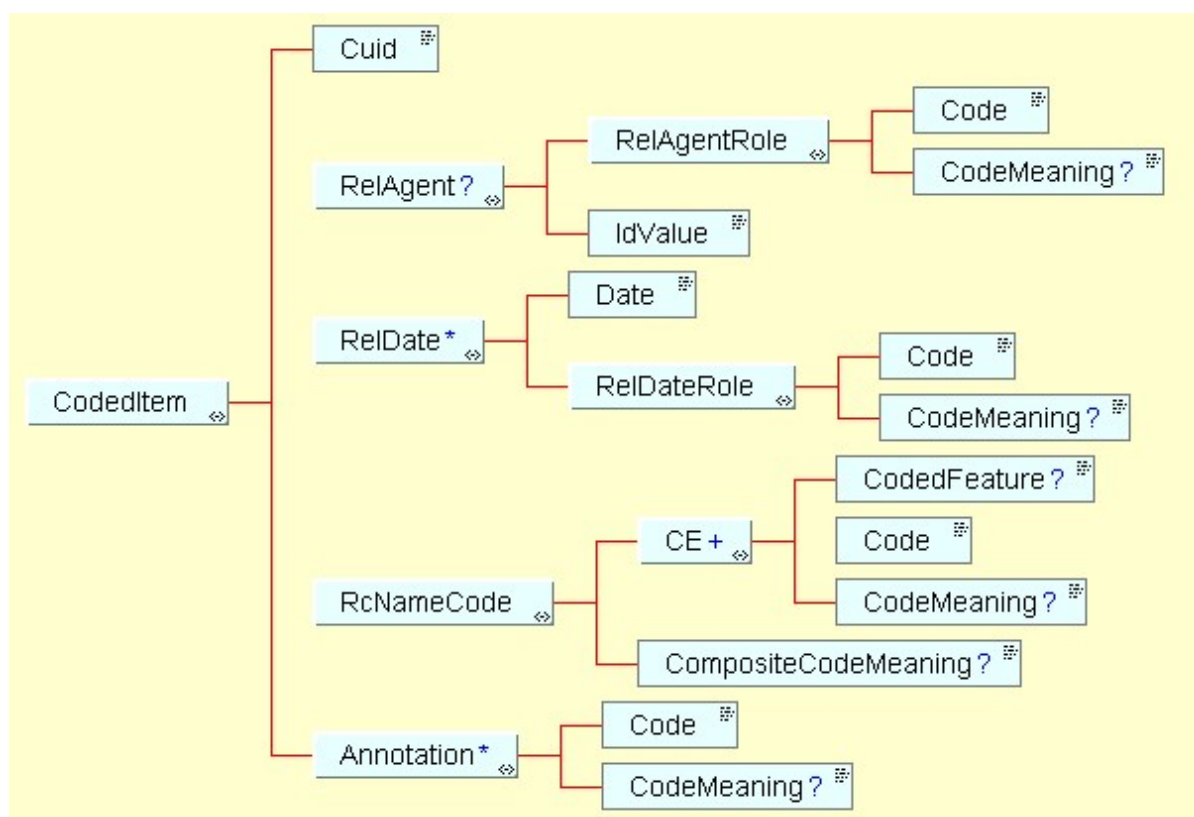
The CodedItem is a general purpose item that can be used to convey various information in a coded form. It is simplified from the full *structured coded item* specified in ENV13606 in that it does not include information about the origin, categorisation or mapping of the coded information.

There is no requirement in the current NHS profile for inclusion of coded information in this item since all the required coded information has been provided for with specific named elements. Therefore it need not be used in this project. It remains in the DTD for experimental use for conveying coded information for **non-clinical** purposes.

If used the following guidelines apply:

RelAgent may be used to indicate the role (RelAgentRole) of a particular agent in relation to the coded information.

Instances of RelDate with appropriate RelDateRole values may be used to indicate a date and time (or start and end of a period) related to the coded information.

The coded information is contained in RcNameCode which contains a Code from an identified coding scheme with an optional indication of the property (CodedFeature) to which the Code applied.

For example, the patient's marital state might be conveyed in this way:

❖ CodedFeature: MaritalStatus Code: M CodeMeaning: Married.

Multiple Codes to be conveyed to produce a single composite meaning but it is not envisaged that this capability will be utilised in this project.

The Annotation element is included in the DTD for consistency with the message model from which this element was derived. It is used to indicate any safety critical modifier that apply to a clinical code and it need not be used for the **non-clinical** purposes envisaged in this project.

5   Referral Message
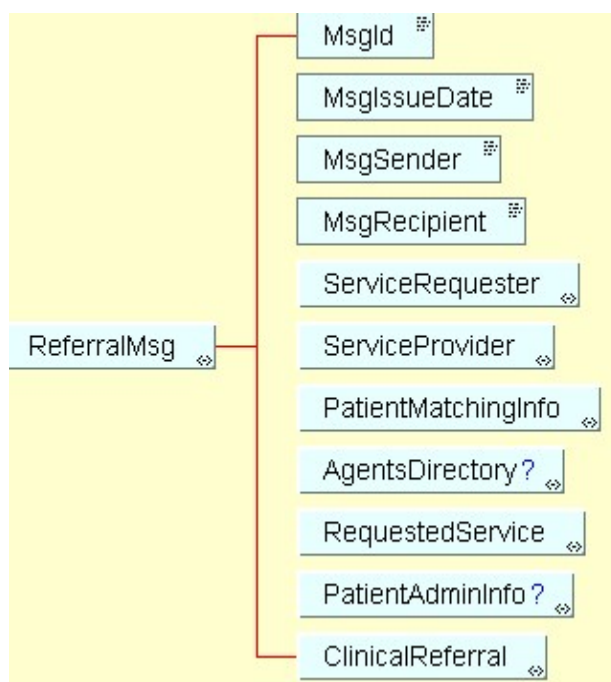
The overall outline of the ReferralMsg is shown above. Most of these elements have been dealt with in the earlier general sections of the Guide. The exceptions are covered in the following two subsections.

5.1   Referral message structured information items
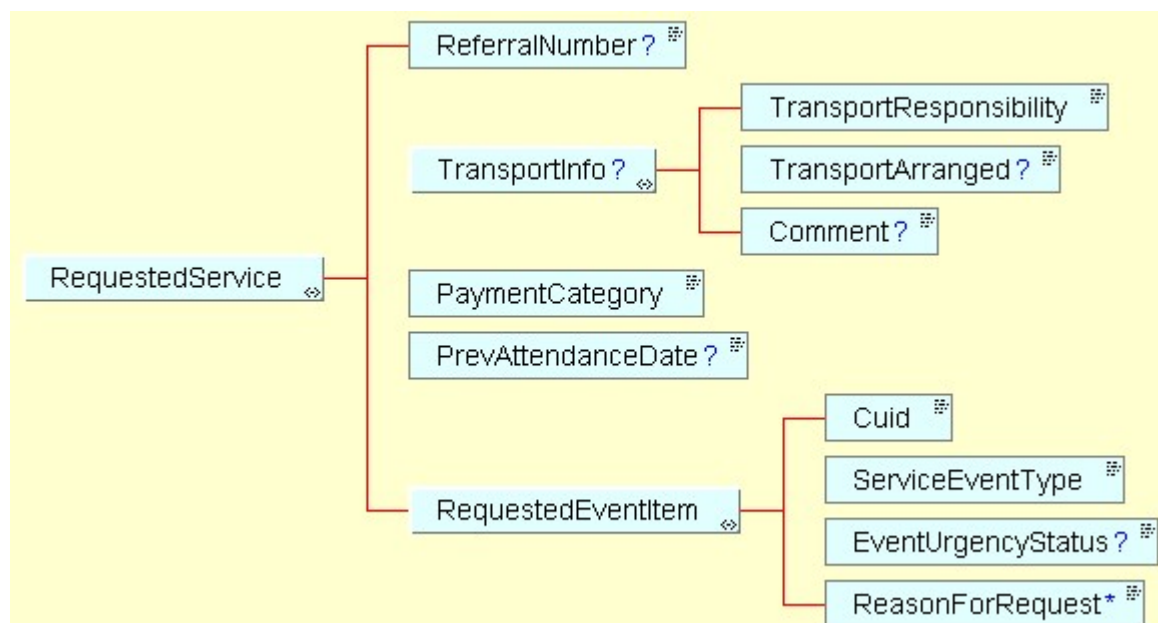
The RequestedService contains all the non-clinical information specifically associated with the request for a service.

The ReferralNumber is optional and if used uniquely identifies a referral. This may differ from the message identifier in that it may be real-world identifier (see 2.6.2) applied according to a scheme determined by the requester, the requester in agreement with the provider or potentially by an NHS directive.

TransportInfo should be included if the requester is aware of particular constraints in respect of the patient's transport to receive the requested service.

If TransportInfo is included:

TransportResponsibility is used to indicate who is responsible for arranging to meet these specific requirements.

TransportArranged is optionally included to indicate that the requester has already made appropriate arrangements (this may be applicable for open access services or where the appointment slot is pre-booked).

A Comment may be included to indicate any special transport needs.

The permitted values for TransportResponsibility are

"Patient"	Patient to arrange own transport
"Provider"	Provider to arrange transport for patient
"Requester"	Requester to arrange transport for patient (e.g. the practice)
"Other"	Other (unspecified) person to arrange transport for patient

The permitted for TransportArranged are

"True"	Responsible party has made appropriate transport arrangements
"False"	Responsible party has not yet made appropriate transport arrangements
"Unknown"	Status of transport arrangement not known

PaymentCategory is a mandatory element indicating whether the patient is an NHS patient or a private patient. The permitted values are:

"PPI"	NHS patient (PPI=Payment Public Insurance as in NHS profile)
"PPR"	Private patient
"PCT"	Category II patient
"PAM"	Amenity patient

PrevAttendanceDate is an optional element indicating the date on which the patient last attended the service provider. This information should be provided if available in the referring system to assist in location of existing patient records.

The RequestedEventItem indicates the type of service event requested (ServiceEventType), the referrers view of the urgency with which that service is required (EventUrgencyStatus) and the reason form making the request (ReasonForRequest).

Permitted valued for ServiceEventType in a request message are:

"OP"	Out-patient]
"DV"	Domiciliary visit
"DA"	Direct access
"AE"	Accident and Emergency
"HA"	Hospital admission
"UN"	Unspecified

Permitted values for EventUrgencyStatus are:

| "U" | Urgent |
| "R" | Routine |

Permitted values for ReasonForRequest are:

"DI"	Diagnosis
"MA"	Management advice
"TR"	Treatment
"PO"	Procedure/operation
"PR"	Patient reassurance
"DR"	Doctor reassurance
"SO"	Second opinion
"UN"	Unspecified

NOTE: Possible future change to add RelDate back an optional element in RequestedEventItem to enable date of a pre-bookded appointment in a referral. **No change for this project.**

5.2 Clinical referral narrative
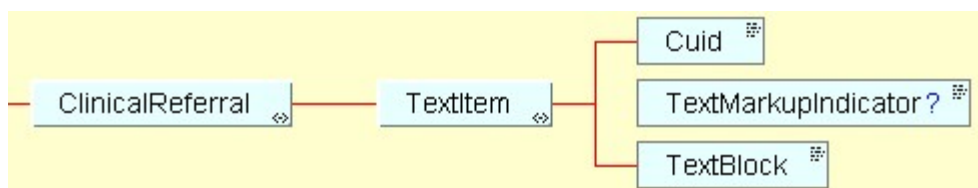
The ClinicalReferral contains the content of the referral letter as marked up text. It consists of a single instance of the general-purpose TextItem, which itself contains a single TextBlock with a TextMarkupIndicator (indicating the type of markup used). Implementation notes on the technical representation of marked text within the message are included elsewhere in this guide (see 2.9).

The content and form of the clinical referral text is not specified in detail. However, it should conform to the conventions generally applied to paper referral letters.

The text shall include information specific to the referral typed either by the referring clinician or by a secretary based on dictation by the referring clinician.

The text may include some information derived from the patient record by a selective manual or semi-automated extraction from the patient record (e.g. "cut and paste" or use of system selection and reporting tools). This may be used to fill specific sections regarding medication, allergies and key elements of past medical and surgical history. However, the resulting text should not be the entire patient record and the specific information germane to the referral should precede and be clearly separate from any more general information.

The version of the TextItem being used in the project is heavily simplified and excludes information about origin and attestation. Responsibility for the content and accuracy of the text (including automatically extracted information) rests with the referring clinician. Therefore, the system should ensure that the referring clinician can review the entire text prior to sending.
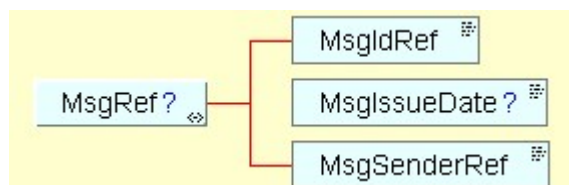
6 Report Message

6.1 Outline
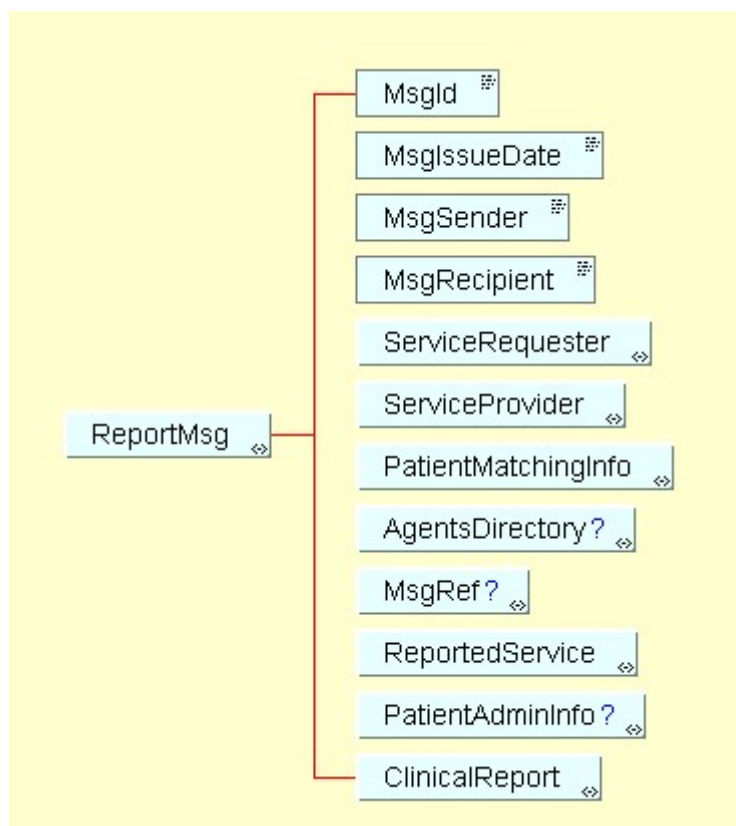
The overall outline of the ReportMsg is shown above. Most of these elements have been dealt with in the earlier general sections of the Guide. The exceptions are covered in the following three subsections.

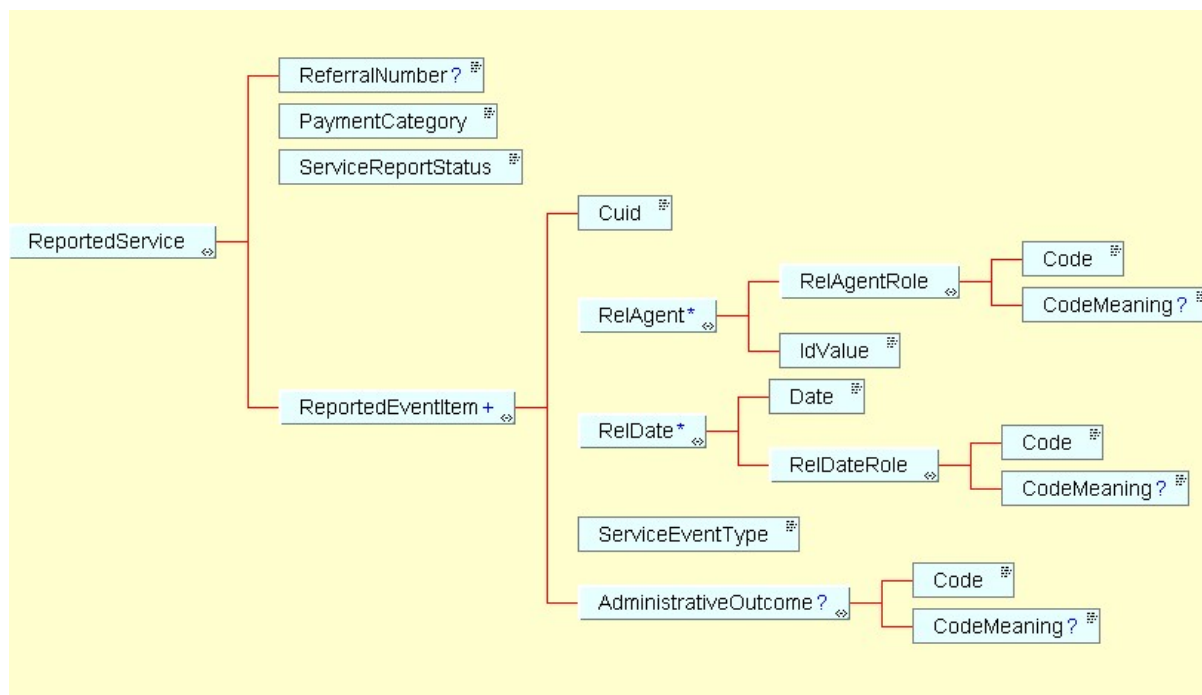## 6.2 Reference to the originating referral message

The MsgRef element is used to provide a link to the referral message to which this service relates. The MsgRef is optional but should be provided when the report results from a referral which was conveyed using an instance of the referral message (ReferralMsg).

The MsgRef element contains two mandatory elements MsgIdRef and MsgSenderRef which together uniquely identify the referenced message.

The optional MsgIssueDate should contain the issue date of the referenced message where this is available. However, MsgIssueDate is treated as a check on the reference rather than a fundamental part of the reference to the original message.

6.3 Report Message structured items

The ReportedService contains all the non-clinical information specifically associated with the report of a service.

The ReferralNumber is optionally included to indicate the original referral. This may differ from a reference to the message identifier. The ReferralNumber may be real-world identifier (see 2.6.2) applied according to a scheme determined by the requester, the requester in agreement with the provider or potentially by an NHS directive.

PaymentCategory is a mandatory element indicating whether the patient is an NHS patient or a private patient. The permitted values are:

"PPI"	NHS patient (PPI=Payment Public Insurance as in NHS profile)
"PPR"	Private patient
"PCT"	Category II patient
"PAM"	Amenity patient

ServiceReportStatus is a mandatory element indicating whether this in an interim or conclusive report. In the case of an interim report the recipient will expect a subsequent conclusive report. The statement that a report is conclusive does not preclude a subsequent report providing further or corrected information.

"IN"	Interim
"CO"	Conclusive

The ReportedEventItem indicates the type of service event reported (ServiceEventType) the date or dates of that service (RelDate), healthcare agents (RelAgent) involved in the provision of the service (other than the main service provider) the outcome of that service (AdministrativeOutcome).

There may be more than one ReportedEventItem in a message. This may be used to enable inclusion of information about planned events such as the next scheduled appointment or admission in addition to a report of the current event.

Related dates (RelDate) should be used to indicate the date of an attendance, appointment, admission or discharge. If any related dates are included these shall include a RelDateRole with one of the following permitted values:

"81"	began or commenced on (e.g. attendance, admission)
"82"	ended or completed on (e.g. discharge, transfer or death)
"83"	scheduled to start on (e.g. appointment or planned admission)
"84"	scheduled to end on (e.g. planned discharge date)
"85"	schedule is planned on
"89"	other date

Related agents should be used as a minimum to indicate the person authorising discharge. Other uses are optional and discouraged within the current project. If related agents (RelAgent) are included these shall include a RelAgentRole with one of the following permitted values:

| "00"	unspecified
"11"	carried out (e.g. the surgeon undertaking a procedure)
"12"	assisted with
"13"	provided a service
"21"	responsible for a period of care (e.g. the consultant - if the reporting service provider is a junior doctor)
"22"	facilitator of shared care
"23"	other responsibility for care
"32"	source of a request or referral
"34"	authorised an activity (e.g. authoriser of discharge)

Permitted values for ServiceEventType in a report message are:

"IP"	In-patient
"DC"	Day case
"DH"	Day hospital attendance
"WR"	Ward attendance
"FF"	First follow-up (out-patient)
"SF"	Subsequent follow-up (out-patient)
"FV"	First visit (out-patient)
"SV"	Subsequent visit (out-patient)
"MV"	Multiple visits (out-patient)
"DI"	Diagnostic test
"VO"	Visit only (domicilary)
"VP"	Visit with procedure (domicilary)
"NC"	No patient contact
"RC"	Receipt of clinical information supplied by the specialist service requester
"TR"	Tertiary referral
"UN"	Unspecified

Permitted values for AdministrativeOutcome in a report message are:

"DC"	Patient discharged on clinical advice or with clinical consent
"DS"	Patient discharged him/herself or was discharged by a relative or advocate
"DH"	Patient discharged by mental health review tribunal, Home Secretary or court
"PD"	Patient died
"SB"	Stillbirth
"CPA"	Cancelled by patient in advance
"CPS"	Cancelled by patient at short notice
"CPV"	Cancelled by provider
"CRQ"	Cancelled by requester
"PPA"	Postponed by patient in advance
"PPS"	Postponed by patient at short notice
"PPV"	Postponed by provider
"DNA"	Patient did not attend
"PLAN"	Planned event
"UN"	Unspecified

6.4 Clinical report narrative
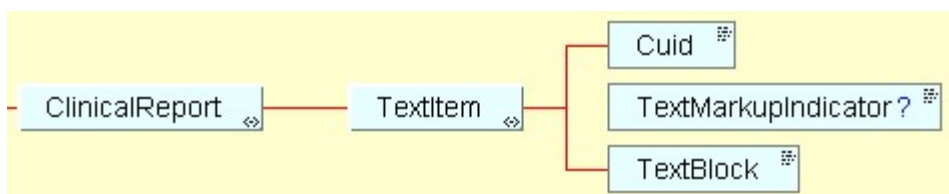
The ClinicalReport contains the clinical content of the discharge note, summary or letter as marked up text. It consists of a single instance of the general-purpose TextItem, which itself contains a single TextBlock with a TextMarkupIndicator (indicating the type of markup used). Implementation notes on the technical representation of marked text within the message are included elsewhere in this guide (see 2.9).

The content and form of the ClinicalReport text is not specified in detail. However, it should conform to the conventions generally applied to an equivalent paper discharge note, summary or letter.

The text may include information specific to the report typed either by the clinician responsible for providing the service provider or by a secretary based on dictation by the clinician.

The text may include some information derived from the patient record by a selective manual or semi-automated extraction from the patient record (e.g. "cut and paste" or use of system selection and reporting tools). This may be used to fill specific sections regarding diagnoses, procedures, medication, allergies and other key information. However, the resulting text should not be the entire patient record and the specific information germane to the report should precede and be clearly separate from any more general information.

The version of the TextItem being used in the project is heavily simplified and excludes information about origin and attestation. Responsibility for the content and accuracy of the text (including automatically extracted information) rests with the service provider. Therefore, the system should ensure that the clinician responsible for the report can review the entire text prior to sending.

7 Receipt Acknowledgement Message
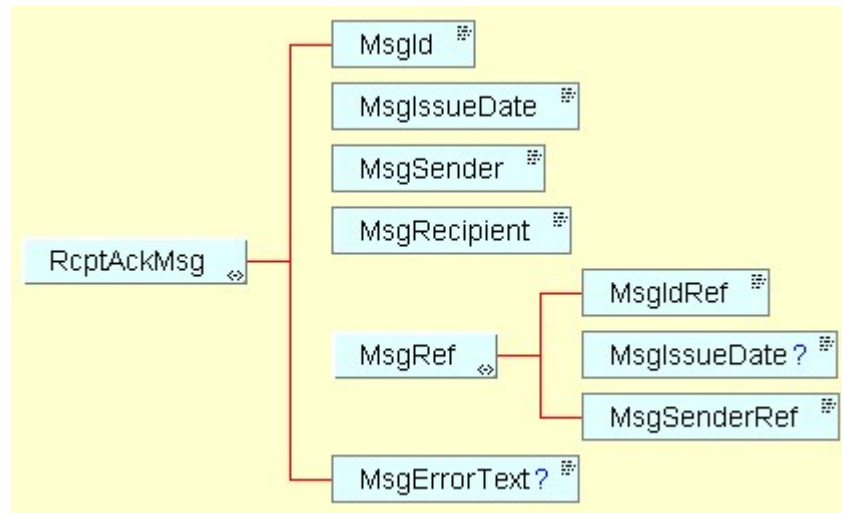
The Receipt Acknowledgement message (RcptAckMsg) contains elements common to all other messages excepting that it has an AckStatus attribute and a MsgErrorText element.

The AckStatus is either:

- ❖ "Accepted"
  - ▪ The message has been successfully parsed and made available to the user of the receiving application as an entry in the "In Tray".
  - ▪ The MsgErrorText may be omitted.
- ❖ "Rejected"
  - ▪ The message has not been successfully parsed or generated an error on parsing. An error message and possible the message itself may be in the receiving application "In Tray".
  - ▪ The MsgErrorText shall be present and shall contain a textual description of the nature of the error.

8 Hyperlink index to Elements

9   ISO8601 Date Time Formats (relevant excerpts)

5.4.1   Complete representation

The components of an instant of time shall be written in the following sequence:

a)   For calendar dates:

year - month - day - time designator - hour - minute - second

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The character [T] shall be used as time designator to indicate the start of the representation of date time of day in combined date and time of day expressions. The hyphen [-] and the colon [:] shall be used, in accordance with 4.4, as separators within the date and time of the day expressions respectively, when required. When any of the date or time components are omitted, the time designator shall always precede the remaining time of day components.

NOTE — By mutual agreement of the partners in information interchange, the character [T] may be omitted in applications where there is no risk of confusing a combined date and time of the day representation with others defined in this International Standard.

The following are examples of complete and reduced representation (in basic and extended format) of combinations of date and time of the day representations:

a)   Calendar date and local time of the day

Basic format: CCYYMMDDThhmmss
                CCYYMMDDThhmm
                CCYYMMDDThh

Examples: 19850412T101530
            19850412T1015
            19850412T10

Extended format: CCYY-MM-DDThh:mm:ss
                   CCYY-MM-DDThh:mm
                   CCYY-MM-DDThh

Examples: 1985-04-12T10:30
            1985-04-12T10:15
            1985-04-12T10