



## REFERENCE MODEL

### The *openEHR* Demographic Information Model

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## Amendment Record

Issue	Details	Raiser	Completed
RELEASE 1.0			
2.0	<b>CR-000189.</b> Add LOCATABLE. <i>parent</i> . New invariant in PARTY. <b>CR-000190.</b> Rename VERSION_REPOSITORY to VERSIONED_OBJECT. <b>CR-000194:</b> Correct anomalies with LOCATABLE. <i>uid</i> <b>CR-000161.</b> Support distributed versioning.	S Heard T Beale  H Frankel T Beale T Beale H Frankel	25 Jan 2006
RELEASE 0.96			
RELEASE 0.95			
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RELEASE 0.9			
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1.4.1	<b>CR-000003.</b> Removed ARCHETYPED and VERSIONABLE classes.	T Beale, Z Tun	18 Mar 2003
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1.3.1	<b>Review by H Frankel, MCA.</b> Corrections to diagrams and class texts. Improved PARTY_RELATIONSHIP semantics. Added Patient instance example. Made <i>time_validity</i> attributes optional.	T Beale	13 Feb 2003
1.3	Corrections to diagrams and class texts. Inheritance changed to ARCHETYPED for most key classes. Some instance examples added.	Z Tun, T Beale	08 Jan 2003
1.2	General modifications, addition of CAPABILITY class.	T Beale, D Lloyd	22 Oct 2002

Issue	Details	Raiser	Completed
1.1	Renamed CONTACT_DESCRIPTOR to CONTACT. Removed CONTACT. <i>role</i> . Renamed PARTY_ROLE to ROLE. Changed CONTACT. <i>address</i> to <i>addresses</i> . Renamed SPATIAL to STRUCTURE. Introduced PARTY and ACTOR classes.	T Beale	18 Sep 2002
1.0	Created from EHR RM.	T Beale	28 Aug 2002

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# 1 Introduction

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## 1.1 Purpose

This document describes the architecture of the *openEHR* Demographic Information Model. The semantics are drawn from previous work in GEHR, existing models in CEN 13606 and the HL7v3 RIM, and other work done in Australia.

The intended audience includes:

- Standards bodies producing health informatics standards;
- Software development groups using *openEHR*;
- Academic groups using *openEHR*;
- The open source healthcare community;
- Medical informaticians and clinicians interested in health information;
- Health data managers.

## 1.2 Related Documents

Prerequisite documents for reading this document include:

- The *openEHR* Modelling Guide
- The *openEHR* Support Information Model
- The *openEHR* Data Types Information Model
- The *openEHR* Common Information Model

Other documents describing related models, include:

- The *openEHR* EHR Information Model
- The *openEHR* Demographic Model

## 1.3 Status

This document is under development, and is published as a proposal for input to standards processes and implementation works.

This document is available at [http://svn.openehr.org/specification/TAGS/Release-1.0/publishing/architecture/rm/demographic\\_im.pdf](http://svn.openehr.org/specification/TAGS/Release-1.0/publishing/architecture/rm/demographic_im.pdf).

The latest version of this document can be found at [http://svn.openehr.org/specification/TRUNK/publishing/architecture/rm/demographic\\_im.pdf](http://svn.openehr.org/specification/TRUNK/publishing/architecture/rm/demographic_im.pdf).

## 1.4 Peer review

Areas where more analysis or explanation is required are indicated with “to be continued” paragraphs like the following:

**To Be Continued:**      more work required

Reviewers are encouraged to comment on and/or advise on these paragraphs as well as the main content. Please send requests for information to [info@openEHR.org](mailto:info@openEHR.org). Feedback should preferably be provided on the mailing list [openehr-technical@openehr.org](mailto:openehr-technical@openehr.org), or by private email.

## 1.5 Conformance

Conformance of a data or software artifact to an *openEHR* Reference Model specification is determined by a formal test of that artifact against the relevant *openEHR* Implementation Technology Specification(s) (ITSs), such as an IDL interface or an XML-schema. Since ITSs are formal, automated derivations from the Reference Model, ITS conformance indicates RM conformance.



## 2 Background

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This section describes the inputs to the modelling process which created the *openEHR* Reference Model.

### 2.1 Requirements

### 2.2 Design Principles

Corbamed,

PIDS

Archetypes



## 3 Demographic Package

### 3.1 Overview

The demographic model illustrated in FIGURE 1 is a generalised model of the facts one might expect to see in a demographic server. The purpose of the model is as a specification of a demographic service, either standalone, or a “wrapper” service for an existing system such as a patient master index (PMI). In the latter situation, it is used to add the required *openEHR* semantics, particularly versioning, to an existing service.

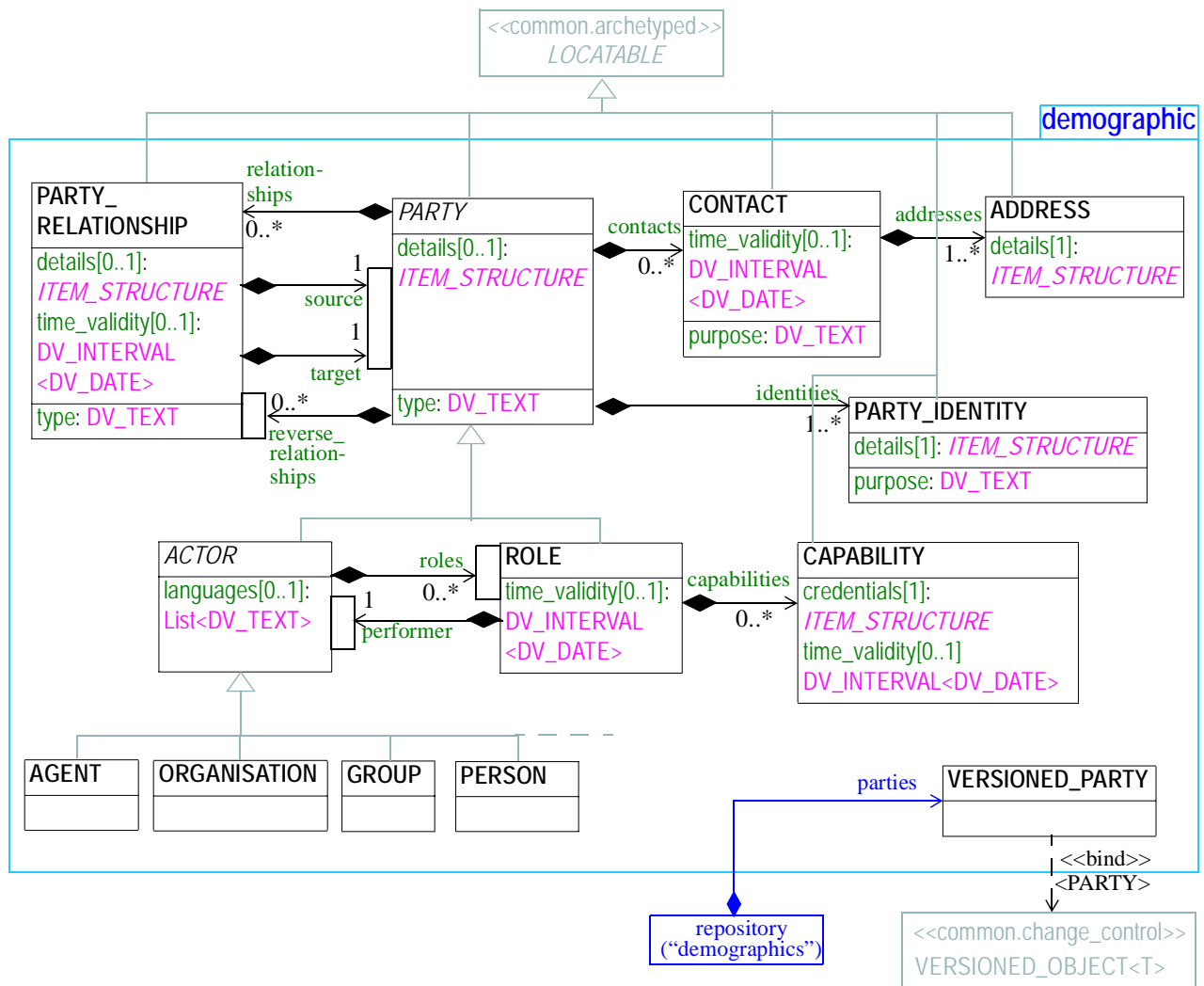


FIGURE 1 rm.demographic Package

The general design is based on the scheme of party and accountability described by Fowler [19], and is influenced by clinical adaptations including work done in Australia [11] and the HL7v3 RIM [15] (itself influenced by the Fowler models).

One of the main design criteria of the model is that it expresses attributes and relationships of demographic entities which exist *regardless* of particular clinical involvements or participations in particular events. Participations are meaningful only within the context of the health record or other relevant model where they record context-specific relationships between demographic entities and events in the real world.

Another criterion is that instances of the classes in the model must be serialisable into an EHR Extract in an unambiguous way. This requires that each `PARTY` be a self-contained hierarchy of data, in the same way as distinct `COMPOSITIONS` in the EHR model are distinct hierarchies in an Extract. In order to ensure this condition, `PARTY_RELATIONSHIPS` must be implemented correctly, so as to prevent endless traversal of all `PARTY` objects through their relationships, when serialising. See `Party Relationships` below for details.

### 3.1.1 Archotyping

The model is designed to be used with archetypes, hence the generic nature of all entities. Every class containing an attribute of the form *details:STRUCTURE* is a completely archetypable structure. As a result, archetypes can be defined for concepts such as particular kinds of `PERSON`, `ORGANISATION`; for actual `ROLES` such as “health care practitioner”, and for party identities and addresses.

### 3.1.2 Names and Addresses

Classes have been included for `PARTY_IDENTITY` and `ADDRESS`, even though they contain only a link to details, in the form of the generic `STRUCTURE` class. This is not strictly necessary - it could have been done simply using appropriately named attributes in the classes `PARTY` and `CONTACT` - but is done to provide a place to add specific semantics in future releases of the model. It is also expected to make software development easier, since it provides explicit classes to which behaviour and other implementation attributes can be added. Lastly, it allows the notions of `PARTY_IDENTITY` and `ADDRESS` to be explicitly used in archetype-authoring tools.

Instances of `PARTY_IDENTITY`, linked to `PARTY` by the attribute *identities* are intended to express the names of people, organisations, and other actors - that is names which are “owned” by the party, e.g. self-declared (in the case of institutions and companies) or by virtue of social relations (names given by parents, tribes etc). Identifiers of Parties given by other organisations, or the state are not represented in this way, and should be recorded in the `PARTY.details` structure instead (see below).

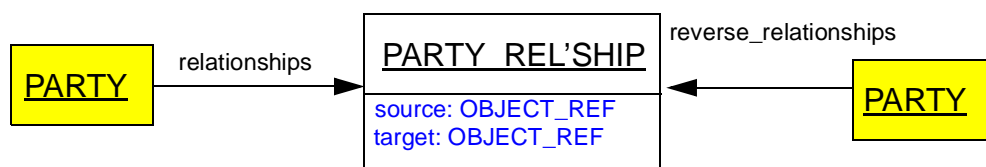
### 3.1.3 Unique Identification

Identifiers of Parties given by organisations or the state are treated as any other attribute of a Party, i.e. recorded as part of the data in the `PARTY.details` structure.

To Be Continued: id used by the demographic system itself - probably an OID inherited from `LOCATABLE`

### 3.1.4 Party Relationships

Relationships between parties in the real world may be expressed using `PARTY_RELATIONSHIP` objects, as illustrated in FIGURE 2.



**FIGURE 2** General Relationship Model

Relationships are considered *directional*, hence the use of the attribute names *source* and *target*, however, these names are otherwise neutral, and give no indication as to the meaning of the relationships, such as which party is responsible and which accountable (for comparison, see the demographic mod-

els of Fowler [19]). Accordingly, each party involved in a relationship includes it in its *relationships* list, if it is at the source end, or in the *reverse\_relationships* list, if at the target end.

The usual way to determine which ends of a relationship the two parties should go is usually by which party's actions caused the relationship to come into being. For example, a relationship representing the concept "patient", between a health consumer and a health care organisation would have the consumer as source and the organisation as target.

Relationships are also *shared objects* whose existence is dependent upon both source and target `PARTYs` being present. There is no official way to show this in UML, but it is approximated by using white diamonds from the `PARTY` to the `PARTY_RELATIONSHIP` class. The semantics are such that if either party is deleted, the relationship must also be deleted.

Serialising `PARTY_RELATIONSHIPS` requires that they function like `LINKs` in the EHR model, i.e. express symbolic references, not physical ones.

To Be Continued:

### 3.1.5 Versioning Semantics

The class `PARTY` and its descendants `ACTOR` and `ROLE` are all potentially versioned in a demographic system. A version of a `PARTY` takes in all the compositional parts, such as identities, contacts etc.

To Be Continued:      versioning semantics of relationships

## 3.2 Class Definitions

### 3.2.1 PARTY Class

CLASS	<i>PARTY (abstract)</i>	
<b>Purpose</b>	Ancestor of all party types, including real world entities and their roles. A party is any entity which can participate in an activity. The <i>name</i> attribute inherited from <code>LOCATABLE</code> is used to indicate the actual type of party (note that the actual names, i.e. identities of parties are indicated in the <i>identities</i> attribute, not the <i>name</i> attribute).	
<b>CEN</b>	healthcare agent	
<b>HL7</b>	Entity	
<b>Inherit</b>	<code>LOCATABLE</code>	
Attributes	Signature	Meaning
	<b>identities :</b> <code>Set&lt;PARTY_IDENTITY&gt;</code>	Identities used by the party to identify itself, such as legal name, stage names, aliases, nicknames and so on.
	<b>contacts :</b> <code>Set&lt;CONTACT&gt;</code>	Contacts for this party.
	<b>relationships :</b> <code>Set&lt;PARTY_RELATIONSHIP&gt;</code>	Relationships in which this role takes part as source.

CLASS	PARTY ( <i>abstract</i> )	
	<b>reverse_relationships:</b> Set<LOCATABLE_REF>	Relationships in which this role takes part as target.
	<b>details:</b> ITEM_STRUCTURE	All other details for this party.
Functions	Signature	Meaning
	<b>type:</b> DV_TEXT	Type of party, such as “PERSON”, “ORGANISATION”, etc. Role name, e.g. “general practitioner”, “nurse”, “private citizen”. Taken from inherited <i>name</i> attribute.
<b>Invariants</b>	<p><b>Uid_exists:</b> uid /= Void  <b>Type_valid:</b> type = name  <b>Identities_valid:</b> identities /= Void <b>and then not</b> identities.empty  <b>Contacts_valid:</b> contacts /= Void <b>implies not</b> contacts.empty  <b>Relationships_validity:</b> relationships /= Void <b>implies (not</b> relationships.empty <b>and then</b> relationships.for_all({PARTY_RELATIONSHIP}.source = Current))  <b>Reverse_relationships_validity:</b> reverse_relationships /= Void <b>implies (not</b> reverse_relationships.empty <b>and then</b> reverse_relationships.for_all(repository(“demographics”).all_party_relationships.has_object(item) <b>and then</b> repository(“demographics”).all_party_relationships.object(item).target = Current))  <b>Is_archetype_root:</b> is_archetype_root  <b>No_parent:</b> parent = Void</p>	

### 3.2.2 PARTY\_IDENTITY Class

CLASS	PARTY_IDENTITY	
<b>Purpose</b>	An identity “owned” by a PARTY, such as a person name or company name, and which is used by the party to identify itself. Actual structure is archetyped.	
<b>CEN</b>	Person Name (data type).	
<b>HL7</b>	Person Name (PN) (data type).	
<b>Inherit</b>	LOCATABLE	
Attributes	Signature	Meaning
	<b>details:</b> ITEM_STRUCTURE	The value of the indenty. This will often taken the form of a parsable string or a small structure of strings.
Functions	Signature	Meaning
	<b>purpose:</b> DV_TEXT	Purpose of identity, e.g. “legal”, “stage-name”, “nickname”, “tribal name”, “trading name”. Taken from value of inherited <i>name</i> attribute.
	<b>as_string:</b> String	Identity in the form of a single string.
<b>Invariants</b>	<i>Purpose_valid:</i> purpose = name <i>Details_exists:</i> details /= Void	

*TBD\_1:* may define DV\_RWE\_ID type for use here e.g. as LIST\_S<DV\_RWE\_ID>

### 3.2.3 CONTACT Class

CLASS	CONTACT	
<b>Purpose</b>	Description of a means of contact of a party. Actual structure is archetyped.	
<b>Inherit</b>	LOCATABLE	
Attributes	Signature	Meaning
	<b>time_validity:</b> DV_INTERVAL <DV_DATE>	Valid time interval for this contact descriptor.
	<b>addresses:</b> List<ADDRESS>	A set of address alternatives for this purpose and time validity.
Functions	Signature	Meaning

CLASS	CONTACT	
	<b>purpose:</b> DV_TEXT	Purpose for which this contact is used, e.g. “mail”, “daytime phone”, etc. Taken from value of inherited <i>name</i> attribute.
<b>Invariants</b>	<i>Purpose_valid</i> : purpose = name <i>Addresses_exists</i> : addresses /= Void <b>and then not</b> addresses.empty	

### 3.2.4 ADDRESS Class

CLASS	ADDRESS	
<b>Purpose</b>	Address of contact, which may be electronic or geographic.	
<b>CEN</b>	Address (data type)	
<b>HL7</b>	Address (AD) (data type)	
<b>Inherit</b>	LOCATABLE	
<b>Attributes</b>	<b>Signature</b>	<b>Meaning</b>
<b>0..1</b>	<b>details:</b> ITEM_STRUCTURE	The details of the address, in the form of a STRUCTURE. This may take the form of a SINGLE_S, whose data item is a parsable string or a list or tree of many parts.
<b>Functions</b>	<b>Signature</b>	<b>Meaning</b>
	<b>type:</b> DV_TEXT	Type of address, e.g. “electronic”, “locality”. Taken from value of inherited <i>name</i> attribute.
	<b>as_string:</b> String	Address in the form of a single string.
<b>Invariants</b>	<i>Type_valid</i> : type = name <i>Details_exists</i> : details /= Void	

### 3.2.5 ACTOR Class

CLASS	ACTOR ( <i>abstract</i> )	
<b>Purpose</b>	Ancestor of all real-world types, including people and organisations. An actor is any real-world entity capable of taking on a role.	
<b>CEN</b>	healthcare party	
<b>HL7</b>	Entity	



CLASS	ACTOR ( <i>abstract</i> )	
Inherit	PARTY	
Attributes	Signature	Meaning
	<b>roles:</b> Set<HIER_OBJECT_ID>	Identifiers of the Version container for each Role played by this party.
	<b>languages:</b> List<DV_TEXT>	Languages which can be used to communicate with this actor, in preferred order of use (if known, else order irrelevant).
Functions	Signature	Meaning
	<b>has_legal_identity:</b> Boolean	True if one there is an identity with purpose "legal identity"
Invariants	<i>Roles_valid:</i> roles /= Void <i>implies not</i> roles.empty <i>Languages_valid:</i> languages /= Void <i>implies not</i> languages.is_empty <i>Legal_identity_exists:</i> has_legal_identity	

### 3.2.6 PERSON Class

CLASS	PERSON	
Purpose	Generic description of persons. Provides a dedicated type to which Person archetypes can be targeted.	
CEN	healthcare person	
GEHR	G1_PERSON	
HL7	Person	
Inherit	ACTOR	
Attributes	Signature	Meaning
Invariants		

### 3.2.7 ORGANISATION Class

CLASS	ORGANISATION	
Purpose	Generic description of organisations. An organisation is a legally constituted body whose existence (in general) outlives the existence of parties considered to be part of it.	

CLASS	ORGANISATION	
CEN	healthcare organisation	
GEHR	G1_HCF	
HL7	ORGANIZATION	
Inherit	ACTOR	
Attributes	Signature	Meaning
Invariants		

### 3.2.8 GROUP Class

CLASS	GROUP	
Purpose	A group is a real world group of parties which is created by another party, usually an organisation, for some specific purpose. A typical clinical example is that of the specialist care team, e.g. “cardiology team”. The members of the group usually work together.	
Inherit	ACTOR	
Attributes	Signature	Meaning
Invariants		

### 3.2.9 AGENT Class

CLASS	AGENT	
Purpose	Generic concept of any kind of agent, including devices, software systems, but not humans or organisations.	
CEN	healthcare software, healthcare device	
HL7	DEVICE	
Inherit	ACTOR	
Attributes	Signature	Meaning

CLASS	AGENT
Invariants	

### 3.2.10 ROLE Class

CLASS	ROLE	
Purpose	Generic description of a role performed by an actor. The role corresponds to a competency of the party. Roles are used to define the responsibilities undertaken by a party for a purpose. Roles should have credentials qualifying the performer to perform the role.	
Use	Roles correspond to concepts like “general practitioner”, “nurse” and so on.	
CEN	healthcare agent in context	
HL7	ROLE	
Inherit	PARTY	
Attributes	Signature	Meaning
	<b>capabilities:</b> List <CAPABILITY>	The capabilities of this role.
	<b>time_validity:</b> DV_INTERVAL <DV_DATE>	Valid time interval for this role.
	<b>performer:</b> HIER_OBJECT_ID	Id of Version container of Actor playing the role.
Invariants	<i>Capabilities_valid:</i> capabilities /= Void <i>implies not</i> capabilities.empty <i>Performer_exists:</i> performer /= Void	

### 3.2.11 CAPABILITY Class

CLASS	CAPABILITY	
Purpose	Capability of a role, such as “ehr modifier”, “health care provider”. Capability should be backed up by credentials.	
Use		
Inherit	LOCATABLE	
Attributes	Signature	Meaning

CLASS	CAPABILITY	
	<b>credentials:</b> ITEM_STRUCTURE	The qualifications of the performer of the role for this capability. This might include professional qualifications and official identifications such as provider numbers etc.
	<b>time_validity:</b> DV_INTERVAL <DV_DATE>	Valid time interval for the credentials of this capability.
<b>Invariants</b>	<i>Credentials_exists</i> : credentials /= Void	

To Be Continued: to be considered - accreditation, credentialling

### 3.2.12 PARTY\_RELATIONSHIP Class

CLASS	PARTY_RELATIONSHIP	
<b>Purpose</b>	Generic description of a relationship between parties.	
<b>HL7</b>	RELATIONSHIP_LINK	
<b>Inherit</b>	LOCATABLE	
Attributes	Signature	Meaning
	<b>details:</b> ITEM_STRUCTURE	The detailed description of the relationship
	<b>time_validity:</b> DV_INTERVAL <DV_DATE>	Valid time interval for this relationship.
	<b>source:</b> OBJECT_REF	Source of relationship.
	<b>target:</b> OBJECT_REF	Target of relationship.
Functions	Signature	Meaning
	<b>type:</b> DV_TEXT	Type of relationship, such as “employment”, “authority”, “health provision”
<b>Invariants</b>	<i>Uid_exists</i> : uid /= Void <i>Type_validity</i> : type = name <i>Source_valid</i> : source /= Void <b>and then</b> source.relationships.has(Current) <i>Target_valid</i> : target /= Void <b>and then not</b> target.reverse_relationships.has(Current)	

## 3.3 Instance Examples

In the following instance examples, the values of the attributes *uid*, *source*, *target*, and *reverse\_relationships* are not meant to be taken as literally valid OBJECT\_IDS - for the purposes of clarity, simple integers have been used.

### 3.3.1 Parties

#### 3.3.1.1 Person

FIGURE 3 illustrates a possible set of instances for a PERSON, with home and work contact information. There are separate archetypes for the PERSON, each ADDRESS, and each PARTY\_IDENTITY. In the following figure, “meaning” is the meaning from the value of the *archetype\_node\_id* attribute, functionally derived from the archetype local ontology.

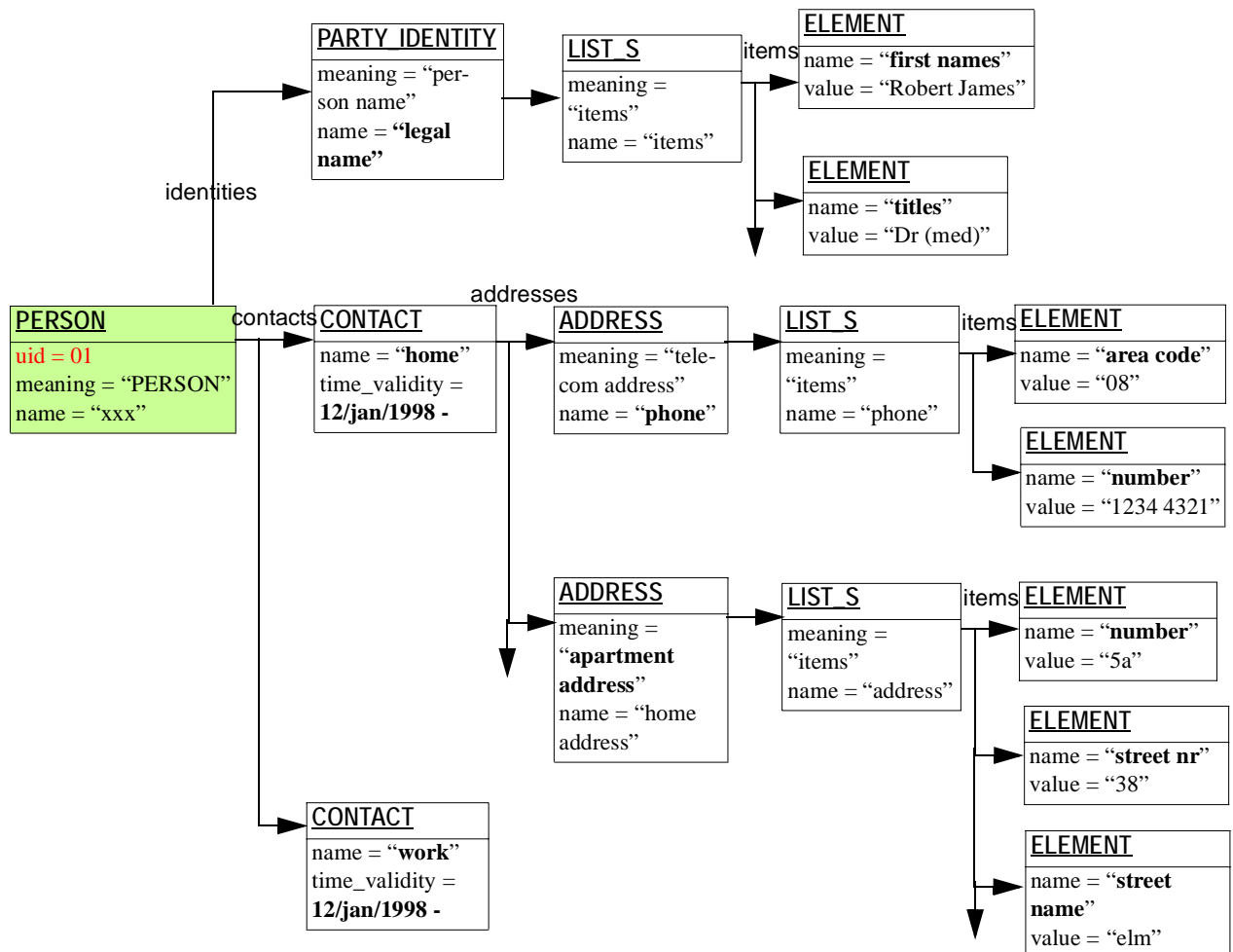


FIGURE 3 Person Demographic Information

#### 3.3.1.2 Clinician

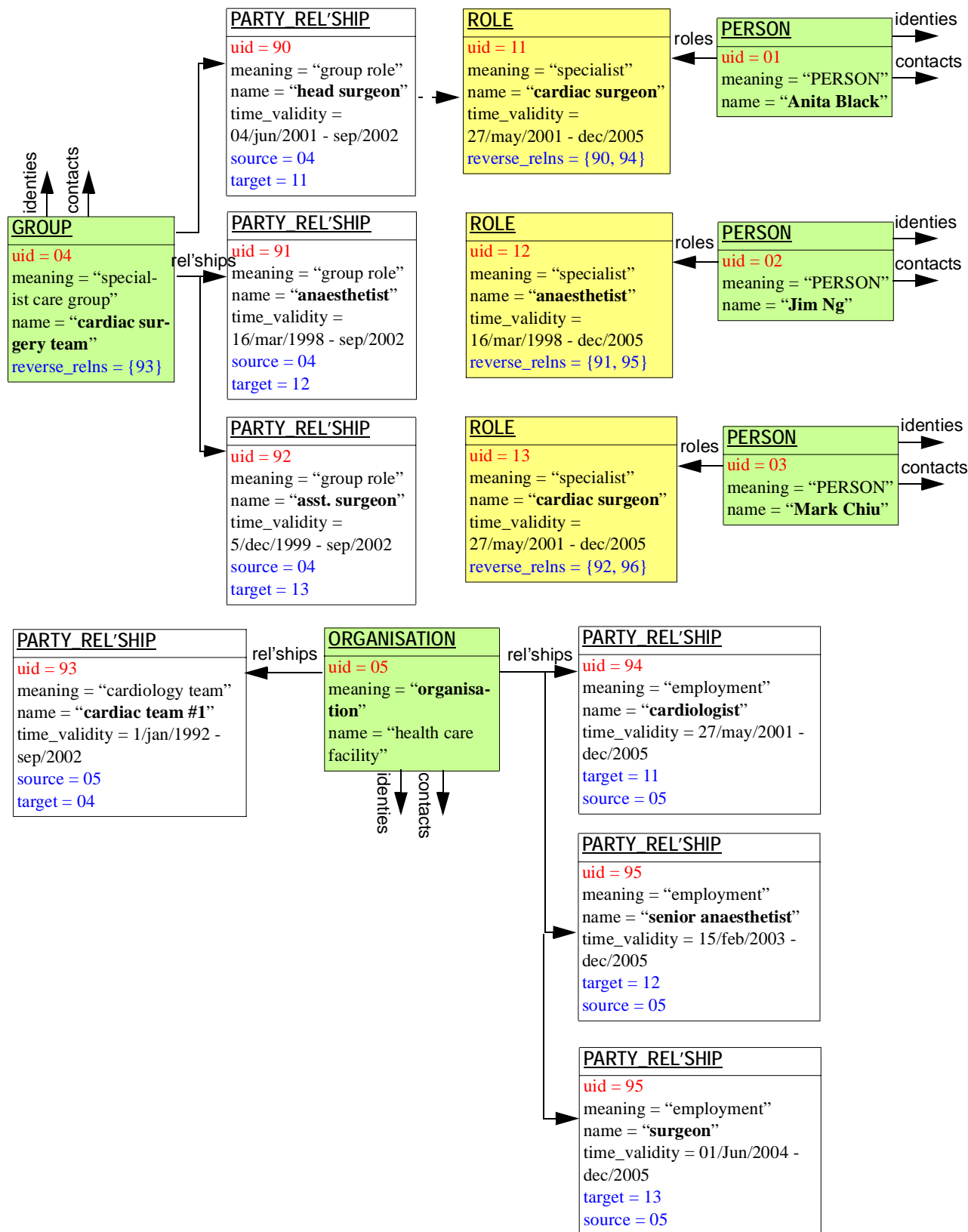
#### Credentials

#### 3.3.1.3 Health Care Facility

#### 3.3.1.4 Group

FIGURE 4 illustrates the demographic information for a cardiac surgery team in a hospital. The group includes a head surgeon, anaesthetist, assistant surgeon, and presumably others (not shown). Each of

these members of the team have an employment relationship with the hospital (shown only for one surgeon, in the interests of clarity).



**FIGURE 4** Group Demographics

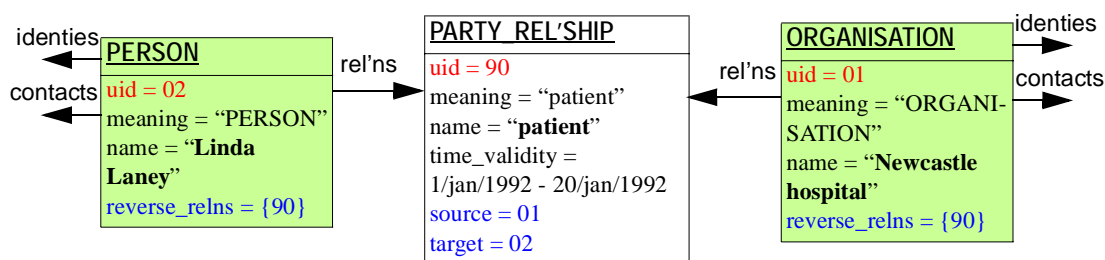
### 3.3.2 Relationships

#### 3.3.2.1 Familial Relationship

#### 3.3.2.2 Employment Relationship

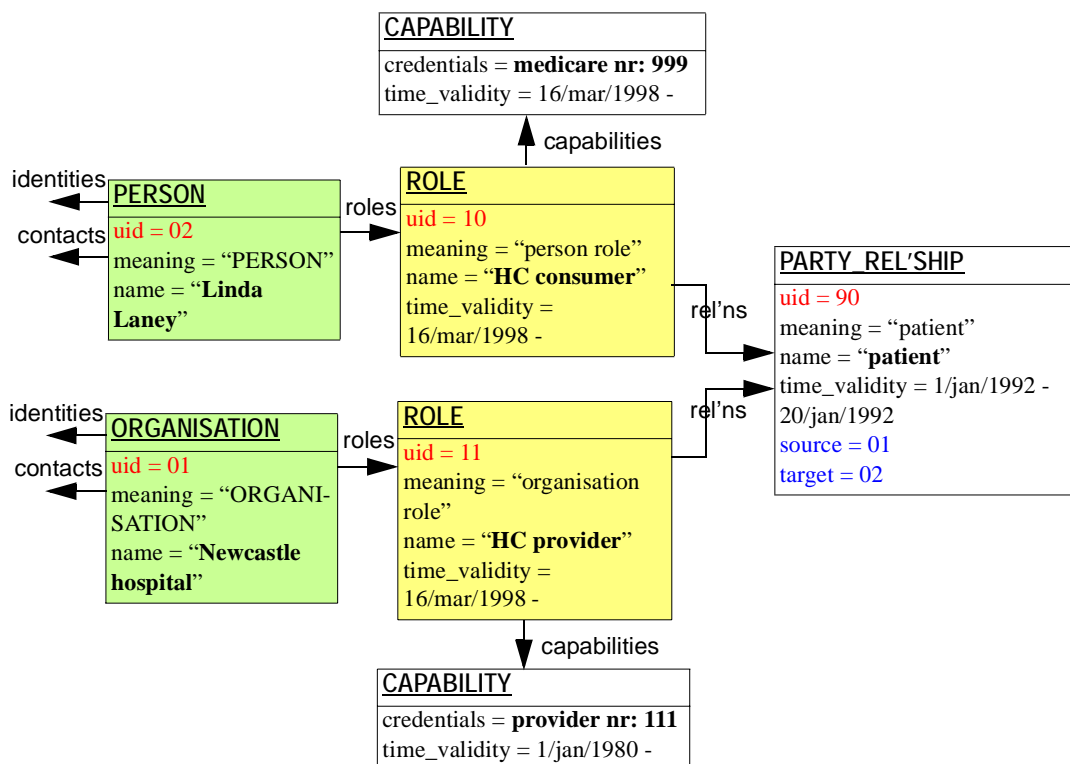
#### 3.3.2.3 Patient

FIGURE 5 shows a simple way of representing the patient relationship between a person and a health care organisation.



**FIGURE 5** Simple Patient Relationship

FIGURE 6 shows the same logical relationship, but with both Parties acting through Roles, representing their status as healthcare consumer and healthcare provider respectively. Each of these Roles has associated credentials which document its official nature within the healthcare system.



**FIGURE 6** Patient Relationship with Roles and Credentials





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**END OF DOCUMENT**