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Logical Record Architecture For Health and Social Care: Artefacts Overview

Amendment History:

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Approvals:

This document must be approved by the following:

Name	Signature	Title / Responsibility	Date	Version
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1. Purpose of the Document

This document describes the artefacts associated with the Logical Record Architecture for Health and Social Care (LRA). Specifically, it describes the purpose and structure of the key artefacts that will be produced by the programme.

The document is divided into the following sections:

- LRA Artefacts Overview, providing a summary of the artefacts to be produced and used by the programme
- Detailed Description of the Artefacts, providing descriptions for:
 - LRA Knowledge Artefacts
 - LRA Interface Artefacts
 - LRA Technical Artefacts
- Appendices:
 - Product Descriptions
 - Other Interface Artefacts – describes non-concrete and other artefacts of contextual interest
 - Other Technical Artefacts – describes non-concrete and other artefacts of contextual interest
 - LRA Artefact Examples

2. LRA Artefacts Overview

The purpose of the LRA is to determine what data should be shared across multiple applications within the NHS and, where appropriate, Social Care, as well as how the data is to be managed, accessed and interpreted.

The distinction between knowledge and technical aspects of the LRA should be inconsequential from an end user perspective. One objective of the LRA is to have a seamless join between knowledge and technical artefacts. There are however important differences in the audience and users of the various aspect of the model and as a result the LRA has two distinct forms - the knowledge and technical artefacts - which are linked to produce a cohesive set of designs. The interface artefacts have been specified to provide this link.

The package structure of the LRA Artefacts is described in Figure 1 below.

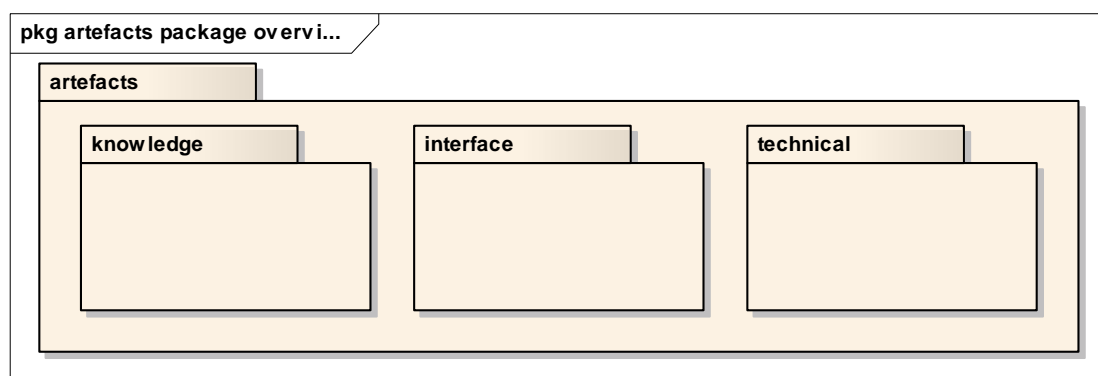


Figure 1: artefacts package overview

Figure 2 below outlines the key artefacts that have been identified to support this objective and generated as part of the project. This diagram highlights the flow of artefacts from requirements and key business concepts and processes through to resulting computable data models.

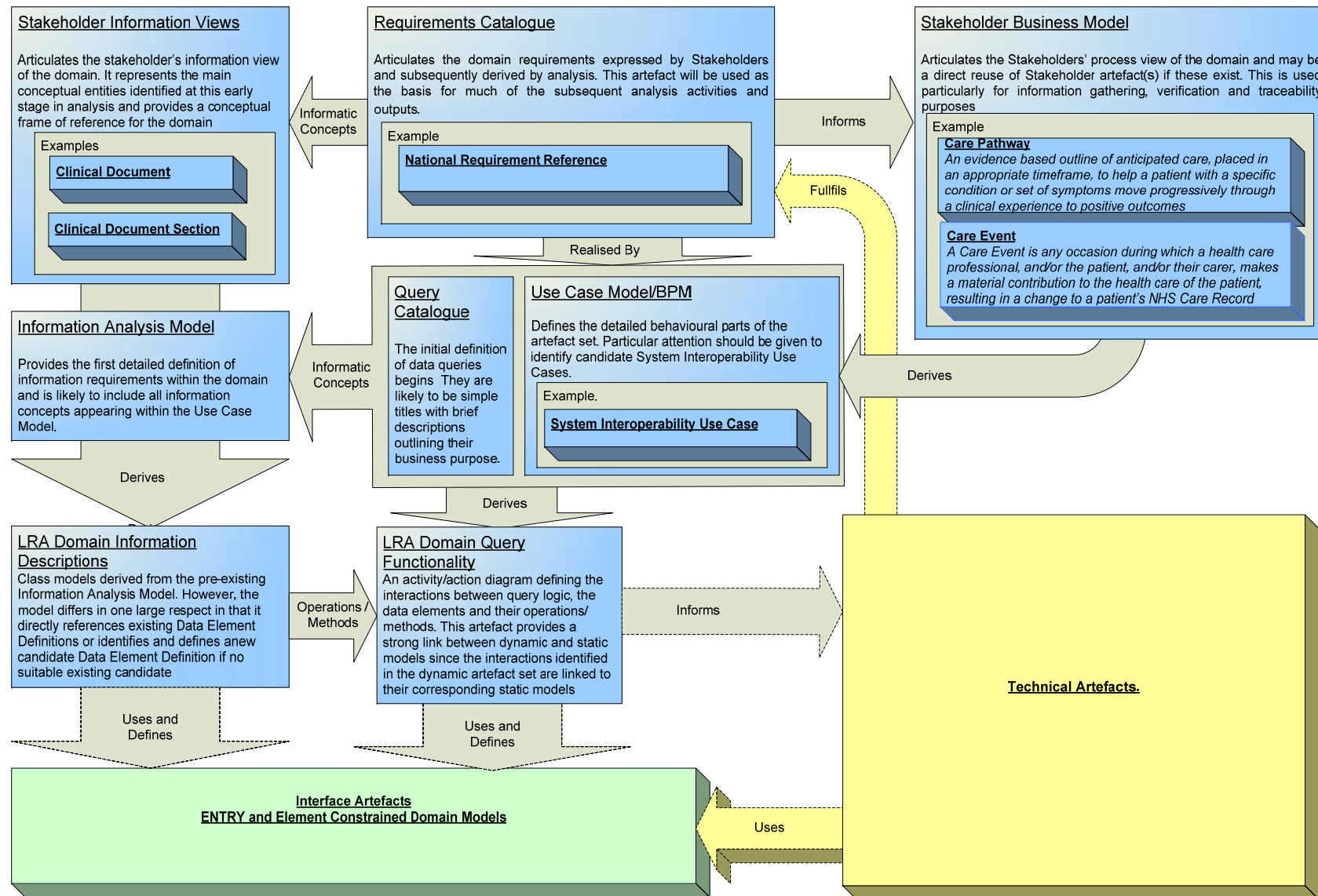


Figure 2: Key LRA Artefacts

The artefacts in the diagram have been categorised and colour coded as per the following descriptions:

- Blue indicates a type of 'knowledge artefact' – i.e. something that reflects an understanding of the national business requirements related to care records data interoperability
- Yellow indicates a type of 'technical artefact', to support semantic interoperability between independent information systems.
- Green indicates a type of 'interface artefact' - i.e. an artefact that links knowledge and technical artefacts.

3. LRA Knowledge Artefacts

This section describes each of the knowledge artefacts in more detail, which are represented in blue on the Artefacts Overview diagram.

3.1. Approach

The Analysis process consists of three broad phases:

- Domain Analysis and Scoping
- Logical Analysis
- LRA Analysis

Each of these phases has a corresponding set of artefacts that are produced during that phase of work. The following sections deal with each of these phases and outline the activities undertaken and the artefacts produced; the expected order of production is depicted in Figure 3

The methodology implemented by this approach utilises the Unified Modelling Language (UML) notation. Specifically, UML version 2.1.1 has been (partly) implemented by this document. The principal UML artefacts produced are:

- Use Case Diagrams
- Activity Diagrams
- Class Models

For Product Descriptions, see Appendix A. For Examples, see Appendix D.

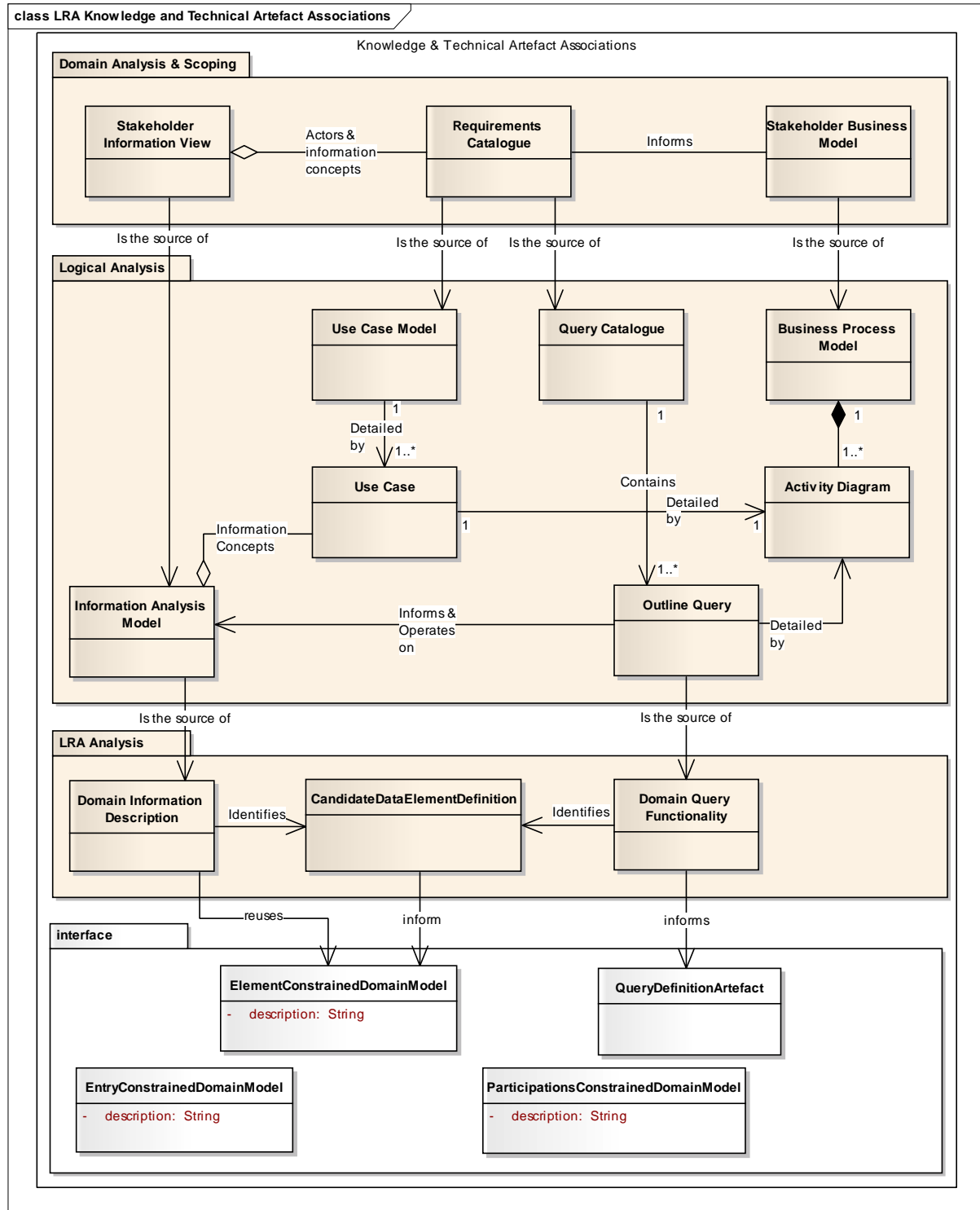


Figure 3: LRA Knowledge and Technical Artefact Associations

3.2. Domain Analysis and Scoping

Analysis for the domain begins with the identification and analysis of existing domain artefacts describing requirements, information and process concepts. New artefacts will be produced including (no order implied):

- Requirements Catalogue
- Stakeholder Information View
- Stakeholder Business Model

3.2.1. Requirements Catalogue

The Requirements catalogue articulates the domain requirements expressed by Stakeholders and subsequently derived by Analysts. This artefact will be used as the basis for much of the subsequent analysis activities and outputs. In order to focus the range of requirements that could potentially populate the Requirements Catalogue, National Requirement References have been identified as the primary requirement source for developing the LRA

National Requirement Reference

Business Definition

A statement copied from a national source document that provides guidance with respect to what may reasonably be expected to be in the content scope of care records data (i.e. the scope of potential national data standards).

Note: *Some National Requirement References may describe specific information objectives, e.g. from a secondary use analysis perspective.*

For the LRA, appropriate national source documents include (listed in order of priority):

1. *Legal requirements*
2. *Professional regulations*
3. *Professional guidelines or standards*
4. *National Output-Based Specifications for care record systems design*
5. *National secondary use requirements*

3.2.2. Stakeholder Information View

A Stakeholder Information View articulates the main conceptual entities identified at this early stage in analysis and provides a conceptual frame of reference for the domain. It is likely to be the result of initial brain-storming or information gathering activities, but may also be a direct re-use of stakeholder artefacts if these exist. Alternatively, existing business information such as data sets, clinical document structures, or headings within clinical document sections relevant to that domain (discharge reports, assessments, Patient held records for example) may be used as an initial starting point.

3.2.3. Stakeholder Business Model

A Stakeholders Business Model articulates the Stakeholders' process view of the domain and may be a direct reuse of Stakeholder artefact(s) if these exist. This is used mainly for information gathering, verification and traceability purposes. The stakeholder may use their own concepts and terms at this point and these will be mapped to more formal UML artefacts at later phases in the analysis. Within a clinical context, the Stakeholder Business Model is likely to include elements such as:

Care Pathway

Business definition

An evidence based outline of anticipated care, placed in an appropriate timeframe, to help a patient with a specific condition or set of symptoms move progressively through a clinical experience to positive outcomes

Business definition source: NHS CFH Pathways Forum

Care Event

Business definition

A Care Event is any occasion during which a health care professional, and/or the patient, and/or their carer, makes a material contribution to the health care of the patient, resulting in a change to a patient's NHS Care Record

3.3. Logical Analysis

The Logical Analysis builds on the artefacts produced in the previous phase to produce more detailed information and process concepts. During this phase the analysis should refer back to the artefacts produced during that previous phase to ensure the further analysis and previous artefacts are consistent and traceability is preserved. Note that this process may lead to the revision of artefacts from the previous phase. define

New artefacts will be produced including (no order implied):

- Information Analysis Model (IAM)
- Use Case Model (UCM: comprising of Use Cases, Activity Diagrams and the Use Case Catalogue)
- Business Process Model
- Query Catalogue: (containing outline queries, activity diagrams)

3.3.1. Information Analysis Model

The Information Analysis Model provides the first detailed definition of information requirements within the domain and is likely to include all information concepts appearing within the Use Case Model.

3.3.2. Use Case Model and Business Process Model

The Use Case Model and the Business Process Model define the detailed behavioural parts of the artefact set. Both of these artefacts are composed from Use

Case Activity Diagrams (i.e. these are reused between the UCM and BPM) and no ordering between these artefacts is mandated. For the purposes of LRA, particular attention should be given to identify candidate System Interoperability Use Cases.

System Interoperability Use Case

Business definition

A description of national or common practice requirements for data retrieval and re-use from the care record.

Example types of use cases include:

- *Pre-populating data from previous care records (sometimes from multiple source systems) to support faster current record authoring (e.g. re-using family history, identification, demographics, current medications data)*
- *Providing a view of aggregated similar data from previous care records (e.g. 'last 10 investigation results') for reference to support current care*
- *Transferring care records data from one independent information system to another, either within or between care pathways*
- *Responding to secondary use data queries by re-using (sometimes deriving new data from) data collected in the care record.*

3.3.3. Query Catalogue

The initial definition of data queries begins at this point in the analysis. They are likely to be simple titles with brief descriptions outlining their business purpose at this stage. In this form they will be stored within the Query Catalogue. A brief outline of their behaviour may also be added.

3.4. LRA Analysis

This phase of work represents the first significant consideration of LRA technical artefact requirements and is framed by the understanding gained in the previous analysis phase. The analysis carried out during Logical Analysis Phase determines if any technical artefacts (ENTRY or ELEMENT Definitions and Query Technical Artefacts for example) are required and provides guidance as to what these artefacts should be. As the need for LRA ENTRY or ELEMENT definitions, queries or data aggregation models are identified, pre-existing LRA technical artefacts should be evaluated to assess whether they meet the newly-identified business requirement. Should new technical artefacts be required, the LRA analysis phase is initiated. The result of this phase is a set of artefacts that draws on and are inputs to physical LRA technical artefacts.

The output from the LRA Analysis Phase produces the following Knowledge Artefacts:

- LRA Domain Information Descriptions
- LRA Domain Query Functionality
- Candidate Data ELEMENT or ENTRY Definitions

3.4.1. LRA Domain Information Descriptions

LRA Domain Information Descriptions are represented in the form of class models derived from the pre-existing Information Analysis Model. However, the model differs in one large respect in that it directly references existing ENTRY or ELEMENT Constrained Domain Models where they exist rather than the concepts detailed in the Information Analysis Model. Where there is an absence of a suitable corresponding ENTRY or ELEMENT a new candidate ENTRY or ELEMENT Definition should be created. If a number of LRA Domain Information Descriptions are to be defined and these are related, care should be taken to account for overlapping content. It may be preferable that this communication 'super-set' is analysed and modelled as a whole.

3.4.2. LRA Domain Query Functionality

The only dynamic artefact produced at this stage is the LRA Domain Query Functionality which is an activity/action diagram defining the interactions between query logic, the data elements and their operations/methods. This artefact provides a strong link between dynamic and static models since the interactions identified in the dynamic artefact set are linked to their corresponding static models

3.4.3. Candidate ENTRY or ELEMENT Definitions

These represent the new information requirement for the LRA. They are derived either from the gap established between the Information Analysis Model and the LRA Domain Information Description or alternatively the LRA Domain Query Functionality will highlight the absence of suitable of ELEMENT class attributes or operations required to process its logic

4. LRA Interface Artefacts

This section describes each of the interface artefacts in more detail.

Note, this section only describes the concrete interface artefacts. Other abstract artefacts or those that are shown for information only are described in Appendix B. Only concrete interface artefacts will have a product description in Appendix A.

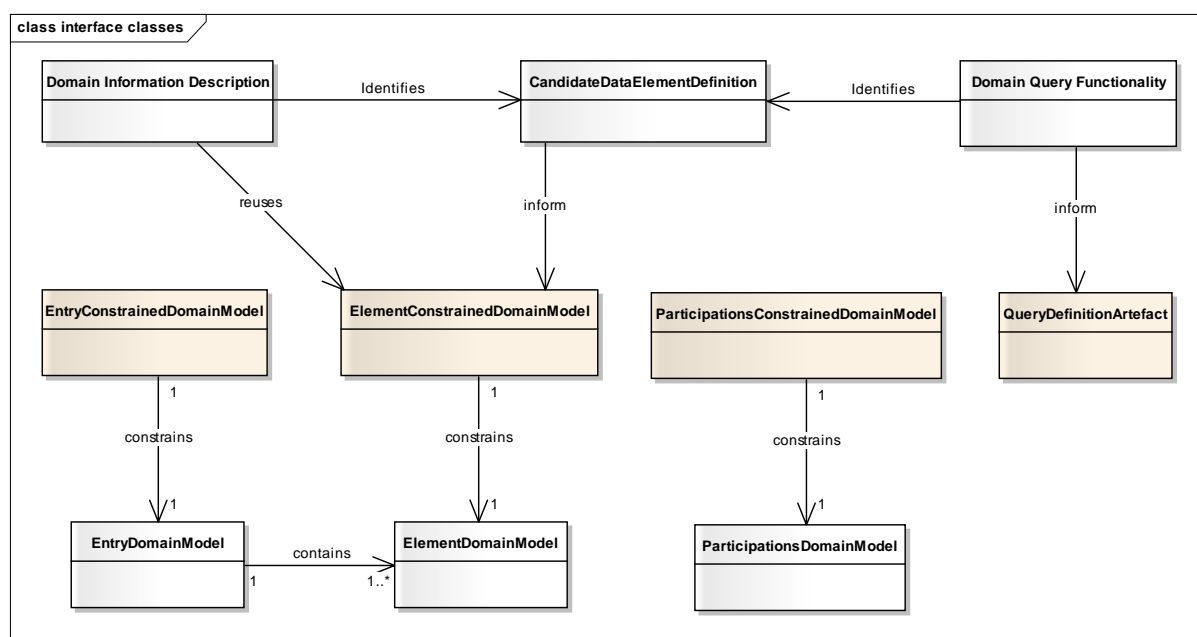


Figure 4: interface classes

4.1. Element Constrained Domain Model

An Element Constrained Domain Model is a refinement of an Element Domain Model to reflect the requirements specified in the knowledge space for a particular domain.

4.2. Entry Constrained Domain Model

An Entry Constrained Domain Model is a refinement of an Entry Domain Model to reflect the requirements specified in the knowledge space for a particular domain.

4.3. Participations Constrained Domain Model

A Participations Constrained Domain Model is a refinement of a Participations Domain Model to reflect the requirements specified in the knowledge space for a particular domain.

4.4. Query Definition Artefact

A Query Definition Artefact provides the format in which a query will be described to satisfy the requirements specified in the knowledge space for a particular domain.

This formal query definition provides an interface between the knowledge and technical layers.

A query is described using the following parameters:

- (i) Query Id – A unique identifier of the query.
- (ii) Query Name – A human-readable name assigned to the query, which conveys the general purpose of the query.
- (iii) Query Rationale – The reasoning or justification for performing the query. E.g. the query might be required to determine the future care plan of a patient, or an imminent national pandemic.
- (iv) Query Type – The type of a query is based on the following:
 - (a) Reference Model type: The query type is classified according to its reference model class i.e. Subject of Care, Population, or Demographic Selection query. NOTE: Patient-linked queries are currently out of scope for R3 due to lack of examples and their potential complexity.
 - (b) Function type: In addition to the reference model type a query is also classifiable on the basis of the type of function performed, i.e. Direct, Derived Operation, or Direct Inference query. One or more functions might be applied to a single query, if required.
- (v) Query Parameter – A single query can be decomposed into several types as mentioned in (iv) above. Each component of a query can comprise of its own parameter set consisting of a:
 - (a) Parameter name: A human-readable name assigned to the parameter.
 - (b) Parameter value type: A parameter value as an ISO21090 data type. This may include a SNOMED CT constraint expression where appropriate.
 - (c) Parameter description: A general description of the parameter.A query will always be passed a parameter as a 'name-value' pair making it uniquely identifiable.
- (vi) Query Range – The default range of any query is the entire EHR of all subjects of care. However, the range of a query might be restricted to include only EHRs of a specific subject of care (in the case of a direct patient query), or a group of subjects of care (in the case of a population query). The query range might become more restricted as query parameters and constraints are applied during execution of a query and/or its sub-queries.
- (vii) Query Expression – A query expression is the formal representation of a query which is distinct from its implementation. In R3, the query will be expressed as a pseudo code. A formally specified syntax for a logical (i.e. technology-independent and computable) query and inference expression language will be defined at a later stage. A query expression includes two main components:

(a) Input and predicate clause: A query needs to express its input clause (e.g. FOR using XQuery or FROM using SQL) and a list of predicates (e.g. WHERE using XQuery or SQL).

(b) Result specification: A query result is specified based on the query type in the query reference (or static) model [see LRAQuerySpecification document].

1. For DemographicSelection Query – Such queries return a query result set containing the shareable id of each subject of care with associated demographic information content that matches the supplied query criteria.

2. For SubjectofCareEHR Query – Such queries wrap the result in an instance of the LRA reference model i.e. a COMPOSITION. The path to an instance of the reference model is identified using the paths derived from the input and predicate clauses.

3. For Population Query – Such queries have two kinds of results that might be returned: (i) A set of shareable ids of each subject of care which fall within the population cohort satisfying the requirements of the query, or (ii) an aggregated resultset which might be a single collective value or a cluster of collective values of the population cohort satisfying the query.

A query might not return any results or might fail in which case an appropriate 'null flavour' must be communicated to the user or system.

(viii) Uses queries – A query might use other queries as sub-queries to generate a result.

(ix) Used by queries – A query might be used by other queries as a sub-query to help generate a result.

5. LRA Technical Artefacts

This section describes each of the technical artefacts in more detail.

Note, this section only describes the concrete technical artefacts. Other abstract artefacts or those that are shown for information only are described in Appendix C. Only concrete technical artefacts will have a product description in Appendix A.

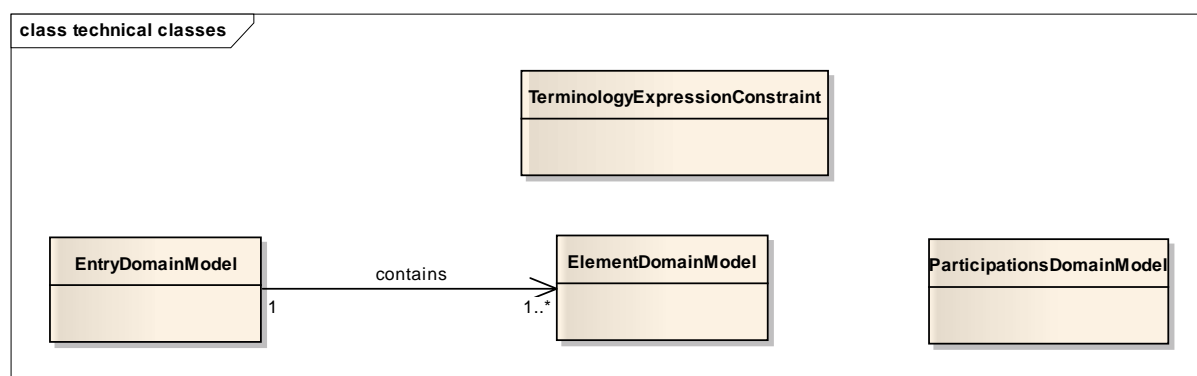


Figure 5: technical classes

5.1. Element Domain Model

Element Domain Models are comprised of exactly one ELEMENT from the Care Components Reference Model along with any applicable COMPONENT_RELATIONSHIP_ELEMENTS. An applicable COMPONENT_RELATIONSHIP_ELEMENT is one where a SUBJECT association exists between it and the ELEMENT in question.

Each ELEMENT represents a leaf node within the EHR hierarchy and has a single data value.

5.2. Entry Domain Model

Entry Domain Models are comprised of exactly one ENTRY from the Care Components Reference Model. Each ENTRY contains (as ELEMENTs) the information acquired and recorded for a single observation or observation-set (battery or time series), a single clinical statement such as a portion of the patient's history or an inference or assertion, or a single action that is intended or has actually been performed. Each Entry Domain Model contains one or more ELEMENT Domain Models.

5.3. Participations Domain Model

A Participation domain model is comprised of classes predominantly from the Participations Reference Model; there is also limited overlap and use of classes from the Care Components Reference Model.

Participations Domain Models describe the involvement of entities and roles within the health record. Examples of entities include person, device and organisation, whereas examples of roles include patient, care professional and hospital departments. These entities and roles may participate in the health record in various ways (e.g. as authors, performers, subject of the care record etc.).

Within Participations Domain Models, classes from the Participations Reference Model serve to describe the details of any entities and roles. Classes from the Care Components Reference Model act as containers for choices of Participations Reference Model classes (e.g. a FUNCTIONAL_ROLE class may serve as a container for a choice of combinations of Participations Reference Model class; each combination representing the details of an information provider).

5.4. Terminology Expression Constraint

A Terminology Expression Constraint is a computable rule that can be applied to an instance of a terminology expression to test whether it complies with rules that may relate to its meaning and/or compositional structure.

An example of a terminology expression constraint used in the LRA is a SNOMED CT Expression Constraint.

6. Appendix A: Product Descriptions

6.1. Stakeholder Business Model

Product name	Stakeholder Business Model
Status	
Purpose	<p>To provide traceability between the analysis artefacts and the domain(s)</p> <p>To gain an initial understanding of the domain</p> <p>To clarify scope of the analysis required.</p> <p>To aid the identification of candidate use cases.</p> <p>To ensure stakeholder engagement.</p> <p>To analyse and agree outline business processes for the domain.</p> <p>To inform planning and development of downstream dynamic analysis artefacts.</p>
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team: to meet above purpose. <p>External:</p> <ul style="list-style-type: none"> • Users: verify the business processes and requirements. • Domain Experts: verify the business processes and requirements.
Description	An unconstrained model showing the high-level domain information such as processes/flows, participants and concepts
Format and Content	Unconstrained. Where this is created by the Analyst, it is expected that a UML Activity Diagram will be typical.
Construction Guidelines	See LRA Authoring Guide
Template(s)	No
Inputs and Predecessor Products	Relevant pre-existing work.
Peer Products	<ul style="list-style-type: none"> •
Successor Products	<ul style="list-style-type: none"> • Business Process Model • Use Case Model • Business Information Model.

Product name	Stakeholder Business Model	
	<ul style="list-style-type: none"> Query Catalogue 	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the Authoring Guide	Technical review – using review checklist
	Covers required scope	Domain expert review.
	Terminology of content must be recognisable to Domain Participants	Domain expert review.
Configuration Management	May inform any future project on domain area.	
Examples	No	

6.2. Stakeholder Information View

Product Name	Stakeholder Information View
Status	
Purpose	<p>To illustrate the main conceptual entities identified at this early stage in analysis and provides a conceptual frame of reference for the domain and the associations between them.</p> <p>To provide an appropriate frame of reference for subsequent analysis.</p> <p>Besides being the starting information product for work in the domain, it is a general purpose tool for any discussion of the information content of the domain.</p>
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> Project Team: to inform and advise on the project scope. Domain experts: to agree overall information concepts of business area. <p>External:</p> <ul style="list-style-type: none"> All: to provide an overview and introduction to the information concepts within the domain.

Product Name	Stakeholder Information View
Description	<p>The Stakeholder Information View is a basic overview of the information concepts and their relationships with the business area or domain, this can be represented diagrammatically or can also directly re-use existing stakeholder artefacts if they exist and specifically identifies:</p> <ul style="list-style-type: none"> • Identification of the business area(s) and system(s) with which the domain is concerned • Identification of classes (information concepts) that are shared with other domains • Identification of classes (information concepts) that are the source and destination of communications between business area(s) and between system(s) <p>It is not intended to be a definitive document, so will not capture the entire information requirement and their associated flows; however it is intended that the content should be understandable and recognisable to business users.</p> <p>The Stakeholder Information View is expected to be published, and at the point of publication it should be correct and consistent with the rest of the artefact set.</p>
Format and Content	<p>The Stakeholder Information View can be constructed as a UML Class diagram.</p> <p>The Model shows:</p> <ul style="list-style-type: none"> • Named classes – without attributes or operations, but with a brief description and an alias. • Named and directed associations – without cardinalities <p>The model may be annotated using notes but these will be of a general business nature rather than representing formal elements such as constraints.</p> <p>The Stakeholder Information View Class diagram will be produced using a suitable modelling tool, which it is assumed will support any annotation requirements.</p> <p>Alternatively, the SIV may also be a direct re-use of stakeholder artefacts if these exist in a format that helpful to assist stakeholder understanding. It may be useful to transform these into class diagram form at this stage or leave it until the Information Analysis Model to do this.</p>
Construction Guidelines	See Authoring Guide
Template(s)	<ul style="list-style-type: none"> • No

Product Name	Stakeholder Information View	
Inputs and Predecessor Products	<ul style="list-style-type: none"> Any previous Stakeholder Information View for this or related domains. 	
Peer Products	<ul style="list-style-type: none"> Requirements Catalogue Stakeholder Business Model. 	
Successor Products	<ul style="list-style-type: none"> Information Analysis Models. Use Case Model Query Catalogue 	
Quality Criteria	Quality Requirement	Quality Check
	Describes the domain	Project Manager and Domain expert sign off.
	Conforms to the Authoring Guide	Technical review – using review checklist
	Terminology of content must be recognisable to domain participants.	Domain expert review and sign-off
	All Actors represented on the Stakeholder Information View which are contained in the Actors Catalogue, must be referenced using the Relationship Matrix	Technical review – using review checklist
Configuration Management	<ul style="list-style-type: none"> Likely to be re-used as input to further work on this domain. 	
Examples	Domain Example:	Generic Example: No

6.3. Requirements Catalogue

Product name	Requirements Catalogue
Status	Mandatory
Purpose	<p>To provide a complete set of requirements which are:</p> <ul style="list-style-type: none"> stated using unambiguous language recognisable to business stakeholders usable within later project-cycle activities such as design, development, testing and implementation

Product name	Requirements Catalogue
	<ul style="list-style-type: none"> • the basis for demonstrating the fulfilment of requirements • Used to provide readers who are not familiar with modelling techniques with a point of entry to analysis/design artefacts. • Used to inform Analysis activities. • Used to inform Implementation activities and to provide a basis for traceability of requirements from source documentation through to Implementation
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team: to meet above purpose. • Test Team: to inform test cases. • Requirements Management Team: to trace schedule requirement fulfilment. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts: verify the suitability of the requirements (and by extension the project). • Suppliers: use as input into development work. • Users: use as input to User Acceptance Testing.
Description	<p>Definitive set of LRA project or domain requirements. An individual requirement is defined to be a single statement of need for what a product or service should be or do which identifies a necessary capability, characteristic, or quality of a system in order for it to have value and utility.</p>
Format and Content	<p>The Requirements Catalogue has 2 forms:</p> <ul style="list-style-type: none"> • The primary form is a graphic and textual set of requirements elements held in UML packages within a package hierarchy as part of the wider project hierarchy. Each package has diagrammatic representations which compose the graphic requirements elements, expose their textual content and show 'realising' UML elements. • The secondary form is an RTF document generated from the primary form and reincorporated into the model. NB. The secondary form is not edited directly; it is always generated from the primary form. <p>The Requirements Catalogue has 3 layers of content:</p> <ul style="list-style-type: none"> • The first layer, the "Expressed Requirements", contains a set of requirements as extracted from source requirement documents. • The second layer, the "Derived Requirements", is a

Product name	Requirements Catalogue	
	<p>transform of the first layer. A single Expressed Requirement may contain several atomic requirements which are recorded in this second layer as “Derived Requirements”.</p> <ul style="list-style-type: none"> The third layer, the “Informatic Concepts”, contains a listing of informatic concepts to be found in each of the Derived Requirements. An Informatic Concept is word or a phrase expressed in the stakeholders natural language that describes an area or subject that may be important from an informatics perspective. More formal analysis and elaboration in successor artefacts will determine the extent of its importance. A single derived requirement may contain one or more Informatics Concepts. Similarly a single common Informatic Concept may be distilled from many Derived Requirements. 	
Construction Guidelines	<ul style="list-style-type: none"> See LRA Authoring Guide 	
Template(s)	<ul style="list-style-type: none"> No. 	
Inputs and Predecessor Products	<ul style="list-style-type: none"> Project Documentation Any previous requirements documentation for this or related domains. 	
Peer Products	<ul style="list-style-type: none"> Stakeholder Business Model Stakeholder Information View 	
Successor Products	<ul style="list-style-type: none"> BPM Query Catalogue Use Case Model IAM 	
Quality Criteria	Quality Requirement	Quality Check
		Domain expert review and sign-off
	Conforms to the Authoring Guide	Technical review – using review checklist
	Domain Specific information concepts to be represented within the Stakeholder Information View	Technical review – using review checklist
	Appropriately structured – in a	Technical review – using

Product name	Requirements Catalogue	
	root 'Requirements Catalogue', with a repeating package structure and valid diagrams.	review checklist
	Any deprecated requirements must be held within a package named 'Deprecated Requirements' which should be placed in the 'Requirements Catalogue' package; with any deprecated requirements also removed from current diagrams	Technical review – using review checklist
	Requirements named & aliased with automatically generated identifiers	Technical review – using review checklist
	Each package contains a description in its 'notes'	Technical review – using review checklist
	Requirements Palette is grouped into 'Expressed' and 'Derived' requirements	Technical review – using review checklist
	Every (non-deprecated) requirement appears on at least one requirement diagram	Technical review – using review checklist
	The only association types allowed between requirements are aggregations, 'follows-on from' (stereotyped) and 'depends on' (stereotyped).	Technical review – using review checklist
	The only association types allowed between requirements and other elements are realisations and 'derived from' (stereotyped)	Technical review – using review checklist
	In scope, 'current' phase expressed requirements must be 'realised' by at least 1 element within the model	Technical review – using review checklist
	In scope, 'current' phase derived requirement must be 'derived from' at least 1 element within the model	Technical review – using review checklist

Product name	Requirements Catalogue	
	Terminology of content must be recognisable to domain participants.	Domain expert review and sign-off
	The content of individual requirements must be cohesive, complete, unique, consistent, correct, feasible, unambiguous and verifiable.	Technical review – using review checklist
	Requirements content (i.e. notes) should be displayed in requirements diagrams	Technical review – using review checklist
	Requirement Metadata 'Status' must identify whether the requirement is in scope. In the absence of specific project/domain terminology this must be set to one of 'Proposed', 'Approved' and 'Deprecated'	Technical review – using review checklist
	Requirement Metadata 'Type' must be set to either 'Functional' or 'Non-Functional'	Technical review – using review checklist
	Requirement Metadata 'Phase' must identify the phase associated with the requirement. In the absence of specific project/domain terminology this must be set to '1.0'	Technical review – using review checklist
	Every requirement element should have a tagged value of type 'Originator' and 'Sponsor' (a further tag type of 'Contributors' is optional – see next item below). This content of this value must include the name/role of the source and a description/date.	Technical review – using review checklist
	Every requirement element which has been changed should have a tagged value of type 'Contributors'. This content of this value must include the name/role of the source and a	Technical review – using review checklist

Product name	Requirements Catalogue	
	description/date.	
	Every requirement element must have a tagged value of type 'Priority'. This content of this value must be one of 'MUST', 'SHOULD' and 'MAY'.	Technical review – using review checklist
	The requirement priority in the elements properties dialogue should be set to 'Medium' the correct priority is shown in the 'Priority' tagged value.	Technical review – using review checklist
	Deprecated requirements must have their names prefixed as 'Deprecated' and the reason for its deprecation and details of any other requirements that replace it or to which its parameters have been subsumed must be added to its description (Notes)	Technical review – using review checklist
	Where a CSV output of the requirements for a model is generated this should be re-imported and held as a document/artefact element on the navigation page of the model	Technical review – using review checklist
	An RTF version of the Requirements Catalogue is incorporated into the model	Technical review – using review checklist
Configuration Management	<ul style="list-style-type: none"> • Unlikely to be reusable outside the domain. • Will be used as a basis for identification of Use Case Models and Use Cases. 	
Examples	Domain Example: No	Generic Example:

6.4. National Requirement Reference Product Description

Product name	National Requirement Reference
Status	Mandatory
Purpose	To cite within the LRA a statement from an appropriate source

	document that either provides the basis for a reasonable expectation as to national care records data content (e.g. based on care practice standards) or describes a specific secondary data use information objective.
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team: to meet above purpose. • Test Team: to inform test success criteria and data scope • Requirements Management Team: to trace schedule requirement fulfilment. <p>External:</p> <ul style="list-style-type: none"> • To justify national care records content scope assumptions made in LRA development. • To expose specific information objectives from a secondary use perspective. • Suppliers: Use as part of the business requirements for data design. • Carers: To identify and link care record content assumptions to other artefacts within the LRA • Secondary Data Users: To identify and link care records data re-use objectives to other artefacts within the LRA
Description	<p>An individual National Requirement Reference is defined to be a single statement of expectation that describes either the scope of data content in a typical care record or a secondary use analysis question.</p> <p>For the LRA, appropriate source documents are listed below, in order of priority:</p> <ol style="list-style-type: none"> 1. Legal requirements 2. Professional regulations 3. Professional guidelines <ul style="list-style-type: none"> • For example, as published by NICE, SCIE, Royal Colleges, and professional associations 4. NHS National Programme Output-Based Specification requirements for Local Service Providers 5. Population analysis data requirements <ul style="list-style-type: none"> • For example, as documented by the Commission for Social Care Inspection, the Healthcare Commission (to become the Care

	<p>Quality Commission), government departments, Foundation Trusts, or MONITOR</p> <p>National Requirement References are minimally composed of a unique identifier, a description and an approval status.</p> <p>A further classification of National Requirement References is also relevant, as follows:</p> <ul style="list-style-type: none"> • Information Objectives: Sourced from national care records system design requirements or national secondary data use documents; they express questions or queries on records data or describe data interoperability requirements between information systems. • Record Content Scope: Sourced from legal, care professional, or national care records system design requirements documents, they express national expectations describing or implying what data should typically be found within a care record. <p>Package</p> <p>A package is a container of elements such as National Requirement References – essentially a cross domain National Requirement Reference Catalogue. An organising principle is imposed upon National Requirement References by their grouping into different packages. The package will have a descriptive name, a National Requirement Reference diagram and contain related types of National Requirement References.</p>
Format and Content	See Requirements Catalogue Product Description
Construction Guidelines	See Requirements Catalogue Product Description
Template(s)	<ul style="list-style-type: none"> • No.
Inputs and Predecessor Products	<ul style="list-style-type: none"> • Appropriate national source documents (as described in Description above)
Peer Products	<ul style="list-style-type: none"> • None
Successor Products	<ul style="list-style-type: none"> • Stakeholder Information View • Stakeholder Business Model • Use Case Model • Query Catalogue

Quality Criteria	Quality Requirement	Quality Check
	The National Requirement References must be sourced to appropriate national documents	Domain expert review and sign-off
	Conforms to the Authoring Guide	Technical review – using review checklist
	Appropriately structured – in a root ‘National Requirement Reference Catalogue’, with a repeating package structure and valid diagrams	Technical review – using review checklist
	National Requirement References named & aliased with automatically generated identifiers	Technical review – using review checklist
	Each package contains a description in its ‘notes’	Technical review – using review checklist
	National Requirement Reference Palette is grouped into ‘Information Objective’ and ‘Record Content Scope’ National Requirement References	Technical review – using review checklist
	Every (non-deprecated) National Requirement Reference appears on at least one National Requirement Reference diagram	Technical review – using review checklist
	The only association types allowed between National Requirement References are aggregations, ‘follows-on from’ (stereotyped) and ‘depends on’ (stereotyped).	Technical review – using review checklist
	The only association types allowed between National Requirement References and other elements are realisations and ‘derived from’ (stereotyped)	Technical review – using review checklist
	The content of individual National Requirement References must be cohesive, complete, unique, consistent, correct, feasible, unambiguous and verifiable.	Technical review – using review checklist
	National Requirement Reference content (i.e. notes) should be displayed in National Requirement Reference diagrams	Technical review – using review checklist

	Every National Requirement Reference element should have a tagged value of type 'Originator'. This content of this value must include the name/role of the source and a description/date.	Technical review – using review checklist
	Every National Requirement Reference element which has been changed should have a tagged value of type 'Contributors'. This content of this value must include the name/role of the source and a description/date.	Technical review – using review checklist
Configuration Management	Unlikely to be reusable outside the domain. Will be used as a basis for identification for System Interoperability Use Cases and Data Processing Rules	
Examples	Domain Example:	Generic Example:

6.5. Information Analysis Model

Product name	Information Analysis Model
Status	Mandatory
Purpose	<p>To provide an information model for the area of interest. It provides the domain information context for subsequent analysis and/or development.</p> <p>To allow the exploration of the domain information requirements against known constraining data architectures</p>
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team: to determine the business data needs within the area of interest • Test Team: to inform test cases. • Technical Architects: to inform technical design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts: verify the business data. • Suppliers: use as input into development work.
Description	A data model showing the classes, associations, cardinalities and attributes for a particular area of interest.
Format and Content	<p>The Information Analysis Model is a UML Class diagram.</p> <p>The Model shows:</p> <ul style="list-style-type: none"> • Named classes <ul style="list-style-type: none"> ○ Class description

Product name	Information Analysis Model	
	<ul style="list-style-type: none"> ○ Attributes <ul style="list-style-type: none"> ◆ Datatypes where determined ◆ Cardinality ◆ Constraints ◆ Usually a brief description ● Associations <ul style="list-style-type: none"> ◆ Must have Cardinality ◆ Direction should normally be shown ◆ May have Name (where appropriate) ◆ Must not have Constraints. 	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	No	
Inputs and Predecessor Products	Stakeholder Information View.	
Peer Products	Use Case Model(s). Use Case Activity Diagrams.	
Successor Products	Communication Information Model.	
Quality Criteria	Quality Requirement	Quality Check
	Conforms to the Authoring Guide	Technical review – using review checklist
	Encompasses full area of interest	Domain Expert Review
	Data concepts from the Use Case Model Set must be represented as classes or attributes.	Technical Review
	Appropriate use of template classes.	Technical review – using review checklist
		Technical review
	All attributes must have specified data-types, which must conform to the standard list of data-types	Technical review – using review checklist
Configuration Management	<ul style="list-style-type: none"> ● Likely to be re-used as input to further work on this domain 	
Examples		Generic Example: No

6.6. Use Case

Product name	Use Case
Status	
Purpose	<p>To describe in detail an area of business functionality.</p> <p>To identify communications between business areas.</p> <p>To inform the logical design and elaboration of subsequent artefacts in the development lifecycle.</p> <p>To provide analysis fulfilment of schedule requirements.</p>
Audience and Use	<p>Internal:</p> <p>Project Team: to meet above purpose.</p> <p>Test Team: to inform test cases.</p> <p>Technical Architects: May take the Use Cases as the input for their realisation work.</p> <p>Requirements Management Team: to trace schedule requirement fulfilment.</p> <p>External:</p> <p>Domain Experts: verify Use Cases.</p> <p>Users: verify Use Cases for accuracy, completeness and consistency from a user's perspective and to give their approval of those Use Cases.</p> <p>Suppliers: use as input into development work.</p>
Description	<p>A Use Case describes the interactions between a user and a system. The system may be a Business System or an Automated System.</p> <p>A Use Case is a statement of the functional and process needs of the business user.</p>
Format and Content	<p>A Use Case should include the following:</p> <p>Use Case Name & Identifier.</p> <p>Description: This should introduce the Use Case to the reader, placing it in context with the rest of the system and/ or domain and describing it and its purpose at a very high level. Any information necessary to understand subsequent sections of Use Case should be detailed in this section.</p> <p>Actors: All actors referenced within a Use Case should be identified.</p> <p>Trigger: A description of the event(s) that initiates the Use Case should be provided.</p> <p>Pre-conditions: All conditions that must be satisfied if the Use</p>

Product name	Use Case	
	<p>Case is to be initiated.</p> <p>Post Conditions: Post conditions may be considered in two forms; Success and Guaranteed. The Success conditions show the state of the system after the process has run as expected. The Guaranteed condition shows the state we can expect the system to be in after an unsuccessful condition.</p> <p>Use Case Activity Diagram: Describes the process steps of both the main and alternative paths.</p> <p>Business Rules to be observed within the Use Case.</p> <p>References to Clinical Safety issues relating to the Use Case in part or whole: See clinical safety risk register.</p> <p>Basic path: This describes the process steps that would be expected to happen in the majority of cases if the process was run. This will be described by the Use Case Activity Diagram.</p> <p>Alternate path(s): These are alternative process steps that can occur within the Use Case, showing the possible deviations from the basic path. This will be described by the Use Case Activity Diagram.</p>	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	No	
Inputs and Predecessor Products	<p>Use Case Model.</p> <p>If available: Any existing domain analysis artefacts.</p>	
Peer Products	<p>Information Analysis Model.</p> <p>Use Case Activity Diagram.</p>	
Successor Products	Activity Diagram	
Quality Criteria	Quality Requirement	Quality Check
	Conforms to the Authoring Guide	Technical review – using review checklist
	Use Cases are physically located within the Use Case Catalogue	Technical review – using review checklist
	All actors (including specialisations) identified in the Use Case must be represented within the Use Case Model and stored in the Actors Catalogue	Technical review – using review checklist
	The triggers identified in the Use Case must be consistent with the	Technical review –

Product name	Use Case	
	initial activity in the Use Case Activity Diagram and any incoming flows identified on the BPM.	using review checklist
	Pre and post-conditions identified in the Use Case must not conflict with process as stated in the BPM.	Technical review – using review checklist
	The post-conditions of the Use Case cover all end points of the corresponding Use Case Activity Diagram.	Technical review – using review checklist
	Domain specific information concepts must be represented within the corresponding IAM.	Technical review – using review checklist
	All Use Cases should ‘realise’ at least one requirement in the model.	Technical review – using review checklist
	The Use Case description must match the scope of the contained Use Case Activity Diagram.	Technical review – using review checklist
	Each Use Case must have an equivalent activity on the BPM, which must be referenced using the Relationship Matrix.	Technical review – using review checklist
Configuration Management	Unlikely to be reusable outside the domain. Likely to be refined/elaborated as work progresses	
Examples	Domain Example: No	Generic Example:

6.7. System Interoperability Use Case Product Description

Product name	System Interoperability Use Case
Status	Required
Purpose	<p>The System Interoperability Use Case describes national or common practice requirements for care records data retrieval and re-use.</p> <p>Example types of use cases include:</p> <ul style="list-style-type: none"> Pre-populating data from previous care records (sometimes from multiple source systems) to support faster current record authoring (e.g. re-using family history, identification, demographics, current medications data)

	<ul style="list-style-type: none"> • Providing a view of aggregated similar data from previous care records (e.g. 'last 10 investigation results') for reference to support current care • Transferring care records data from one independent information system to another, either within or between care pathways • Responding to secondary use data queries. 	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team: to provide test scenarios for data designs. • Test Team: to inform test cases and defined success criteria • Technical Architects: to inform the scope of implementation use and the development of interoperability implementation specifications <p>External:</p> <ul style="list-style-type: none"> • Domain Experts: verify the business processes and requirements. • Suppliers: use as input into systems design • Users: to inform implementation and process change and/or to re-use in systems requirements specifications 	
Description	Use cases describe a process in terms of the sequence of its activities and flow of control between the activities. Decisions, actors and other information can also be represented in the diagrams.	
Format and Content	A UML Activity Diagram	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	See Use Case	
Inputs and Predecessor Products	See Use Case	
Peer Products	See Use Case	
Successor Products	See Use Case	
Quality Criteria	Quality Requirement	Quality Check
	See Use Case	

Configuration Management	See Use Case	
Examples	See Use Case	

6.8. Use Case Model

Product name	Use Case Model
Status	Required (Mandatory for communication analysis domains)
Purpose	<p>A single Use Case Model provides an organised view of the behaviours for a subset of the domain. The collection of Use Case Models provides an organised view of the behaviours for the whole domain.</p> <p>To inform the logical design and elaboration of subsequent artefacts in the development lifecycle.</p> <p>To provide readers with a point of entry to analysis/design artefacts.</p>
Audience and Use	<p>Internal:</p> <p>Project Team: to meet above purpose.</p> <p>Test Team: to inform test cases.</p> <p>Technical Architects: May take the Use Case Model as the input for their realisation work.</p> <p>External:</p> <p>Domain Experts: verify Use Cases identified in Use Case Model are within scope.</p> <p>Users: verify Use Cases identified in Use Case Model for accuracy, completeness and consistency from a user's perspective and to give their approval of those use cases.</p> <p>Suppliers: use as input into development work.</p>
Description	<p>The Use Case Model consists of a use case diagram with Use Cases and Actors.</p> <p>A Use Case Model will derive from the Requirements Catalogue and provides the start point for functional analysis. There may be multiple Use Case Models describing different parts of the subject domain</p>
Format and Content	<p>The Use Case Model will be produced using a suitable UML modelling tool and will be composed of a number of parts:</p> <p>A Use Case diagram comprising:</p>

Product name	Use Case Model	
	<p>Actors.</p> <p>Use Cases (identified using a suitable identifier and name).</p> <p>Associations showing the interactions between Use Cases and Actors or Actors and Actors or Use Cases and other Use Cases.</p> <p>A System Boundary.</p>	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	No	
Inputs and Predecessor Products	<p>Requirements Catalogue</p> <p>Stakeholder Business Model</p>	
Peer Products	<p>Information Analysis Model.</p> <p>Business Process Model.</p>	
Successor Products	<p>Use Cases.</p> <p>Supplier technical products.</p>	
Quality Criteria	Quality Requirement	Quality Check
	Conforms to the Authoring Guide	Technical review – using review checklist
	Any invoked Use Case shown in the Use Case Activity Diagram must be shown as extends/includes on the Use Case Model.	Technical review – using review checklist
	All actors (including specialisations) identified in the Use Cases must be represented within the Use Case Model	Technical review – using review checklist
	All represented Use Cases must be stored within the Use Case Catalogue	Technical review – using review checklist
	All represented Actors must be stored within the Actors Catalogue	Technical review – using review checklist
	Use Cases represented within the Use Case Model will have a hyperlink to the related corresponding Use Case Activity Diagram	Technical review – using review checklist

Product name	Use Case Model	
Configuration Management	Unlikely to be reusable Likely to be refined/elaborated as work progresses	
Examples	Domain Example:	Generic Example: No

6.9. Use Case Activity Diagram

Product name	Use Case Activity Diagram	
Status	Required	
Purpose	To analyse and document the steps within the Use Case. To provide the detailed representation of individual activities within the BPM. To inform logical design. To identify communication requirements within the Use Case.	
Audience and Use	Internal: Project Team: to meet above purpose. Test Team: to inform test cases. Technical Architects: to inform technical design. External: Domain Experts: verify the business processes and requirements. Suppliers: use as input into development work. Users: to inform implementation and process change.	
Description	An activity diagram is used to describe a process in terms of the sequence of its activities and flow of control between the activities. Decisions, actors and other information can also be represented in the diagrams. The Use Case Activity Diagram is bounded by its Use Case.	
Format and Content	A UML Activity Diagram	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	No	
Inputs and Predecessor Products	Business Process Model. Use Case Catalogue.	
Peer Products	Use Case Model. Information Analysis Model.	

Product name	Use Case Activity Diagram	
Successor Products	LRA Domain Query Functionality	
Quality Criteria	Quality Requirement	Quality Check
	Conforms to the Authoring Guide	Technical review – using review checklist
	Fit with business and purpose	Domain expert review and sign-off by an identified approver/approvers
	The name of the parent activity within the BPM is the Name of the Use Case Activity Diagram.	Technical review – using review checklist
	UCADs can only have sub-activities if they provide a description for ‘extends’ or ‘includes’ Use Case/s that already exist within the related Use Case diagram.	Technical review – using review checklist
	The name of a single activity within the Use Case Activity Diagram must not replicate the name of the Use Case.	Technical review – using review checklist
	Actors from the Use Case Model are represented as swim lanes in the Use Case Activity Diagram.	Technical review – using review checklist
	All actors within the Use Case Activity Diagram must be represented within the Use Case Model	Technical review – using review checklist
	The initial activity in the Use Case Activity Diagram is consistent with the trigger identified in the Use Case and any incoming flows identified on the BPM.	Technical review – using review checklist
	All final activities should have matching post-conditions within the Use Case.	Technical review – using review checklist
	All ‘normal’ activities (i.e. excludes initial & final activities) must have one incoming flow and one outgoing flow.	Technical review – using review checklist
	Any extended/included Use Cases shown in the Use Case Model must be shown as invoked activities on the Use	Technical review – using review checklist

Product name	Use Case Activity Diagram	
	Case Activity Diagram.	
	Any notes against activities do not amend the logic.	Technical review – using review checklist
	Each activity should describe a single, testable piece of process step and is normally of the form 'A User / System does something'.	Technical review – using review checklist
	Communication object flows must be associated with 'interrupt events' catering for 'duplication' and 'timeout' events; the events and the object flow must be encapsulated within an interruptible region.	Technical review – using review checklist
	Individual activities within a Use Case Activity Diagram should not be re-used in any other Use Case Activity Diagrams.	Technical review – using review checklist
	All final activities on the invoked Use Case Activity Diagram must be represented within the invoking Use Case Activity Diagram – this requires a decision to test the outcome of the invoked Use Case.	Technical review – using review checklist
Configuration Management	Unlikely to be reusable Likely to be refined/elaborated as work progresses Downstream, post-analysis, versions of this product can be developed to reflect the resulting technical design;	
Examples	Domain Example:	Generic Example:

6.10. Use Case Catalogue

Product name	Use Case Catalogue
Status	Mandatory where use cases are developed
Purpose	<ul style="list-style-type: none"> Organise and contain the Use Cases into packages.
Audience and Use	Internal: <ul style="list-style-type: none"> Project Team: to meet above purpose. Domain Experts: to agree the list of Use Cases to be developed.

Product name	Use Case Catalogue	
	External: <ul style="list-style-type: none"> • All: to understand the grouping of Use Cases 	
Description	Use Case Catalogue has no graphical representation and is simply a directory in the model hierarchy. The Use Case Catalogue is part of the Use Case Model and can have its own substructure of packages which are used to provide an organising principle for the contained Use Cases which are reused across the rest of the model.	
Format and Content	The Use Case Catalogue is a directory structure containing other directories (such as the Actor Catalogue) and Use Cases	
Construction Guidelines	<ul style="list-style-type: none"> • See LRA Authoring Guide 	
Template(s)	<ul style="list-style-type: none"> • No 	
Inputs and Predecessor Products	<ul style="list-style-type: none"> • Requirements Catalogue 	
Peer Products	<ul style="list-style-type: none"> • Use Cases 	
Successor Products	<ul style="list-style-type: none"> • Use Case Models. • Business Process Model. 	
Quality Criteria	Quality Requirement	Quality Check
	Conforms to the Authoring Guide	Technical review – using review checklist
	All Use Cases within the artefact set must be stored within the Use Case Catalogue.	Technical review – using review checklist
	All Actors within the artefact set must be stored within the Actors Catalogue.	Technical review – using review checklist
	All Use Cases within the artefact set must appear within the Use Case Model	Technical review – using review checklist
	All Actors within the artefact set must appear within the Use Case Model	Technical review – using review checklist
	Where a class represents an Actors from the Actor Catalogue, this must be referenced using the Relationship Matrix (NB it is expected that this applies in	Technical review – using review checklist

Product name	Use Case Catalogue	
	particular to BIM classes.	
	Identified Use Cases and Actors cover full scope	Domain expert review
Configuration Management	Unlikely to be reusable outside the domain.	
Examples	Domain Example: No	Generic Example:

6.11. Business Process Model

Product name	Business Process Model
Status	Required
Purpose	<p>To analyse and agree outline business processes of interest for the domain. N.B. it should be noted that the scope of the business processes is restricted to the use case model set</p> <p>To inform logical design.</p> <p>To inform planning and development of downstream dynamic analysis artefacts.</p> <p>To show how the Use Cases support business processes.</p> <p>To show the process relationships between the Use Cases.</p>
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team: to meet above purpose. • Test Team: to inform test cases. • Technical Architects: to inform technical design. <p>External:</p> <ul style="list-style-type: none"> • All: Starting point for process view of the domain. • Domain Experts: verify the business processes and requirements. • Suppliers: use as input into development work.
Description	<p>The Business Process Model shows one, many or all possible configurations of the Use Cases within the domain.</p> <p>The activities within the Business Process Models are the Use Cases from within the Use Case Catalogue, connected by process logic. Where such logic between Use Cases exists, this should also be represented within the Use Case Model Set (as pre/post conditions and triggers). However the BPM may not represent the definitive statement of process within the (part of the) domain, unless non-Use Case activities are included within the BPM scope.</p>

Product name	Business Process Model	
	<p>Where there are multiple discrete business processes within an area of interest, and where the relationships between those business processes vary depending on scenario, this is referred to as a discontinuous flow. In such cases, example configurations will be constructed:</p> <ul style="list-style-type: none"> • Each configuration will be depicted using a UML activity diagram. • The set of example configurations can be accessed from a single diagram. This diagram does not show any relationships between the configurations. • Users of the diagram may access any of the example configurations. <p>Example configurations are not required where the area of interest is described by a single business process.</p>	
Format and Content	UML Activity Diagrams	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	No	
Inputs and Predecessor Products	<ul style="list-style-type: none"> • Stakeholder Business Model (if available). • Use Case Catalogue. 	
Peer Products	<ul style="list-style-type: none"> • Use Case Model • Information Analysis Model 	
Successor Products	<ul style="list-style-type: none"> • Use Case Activity Diagrams. • Use Cases. 	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the Authoring Guide	Technical review – using review checklist
	Activities must be represented as Use Cases on the Use Case Catalogue or denoted as being for information only.	Technical review – using review checklist
	Use Cases shown on the BPM must be associated with actors on the corresponding Use Case Model.	Technical review – using review checklist
	All final activities on a Use Case	Technical review – using

Product name	Business Process Model	
	Activity Diagram must be represented as outgoing flows from the parent activity on the BPM -this requires a decision to test the outcome of the Use Case.	review checklist
	All 'normal' activities (i.e. exclude initial & final activities) must have one incoming flow and one outgoing flow.	Technical review – using review checklist
	Terminology of content must be recognisable to domain participants.	Domain expert review and sign-off
	Where an activity represents a Use Case this must be cross referenced using the relationship matrix functionality	Technical review – using review checklist
	Pre and post-conditions identified in the Use Case must not conflict with process as stated in the BPM.	Technical review – using review checklist
Configuration Management	<ul style="list-style-type: none"> Unlikely to be reusable outside the domain. Likely to be refined/elaborated as work progresses. 	
Examples		

6.12. Query Catalogue

Product name	Query Catalogue
Status	Required
Purpose	Organise and contain the Outline Queries into packages.
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> Project Team: to meet above purpose. Domain Experts: to agree the list of Queries to be developed. <p>External:</p> <p>All:</p> <p>to understand the grouping of Queries</p>

Description	Query Catalogue has no graphical representation and is simply a directory in the model hierarchy. The Query Catalogue is part of the query development process and can have its own substructure of packages which are used to provide an organising principle for the contained queries which are reused across the rest of the model.	
Format and Content	The Query Catalogue is a directory structure containing other directories	
Construction Guidelines	See LRA Authoring Guide	
Template(s)	none	
Inputs and Predecessor Products	TBC	
Peer Products	TBC	
Successor Products	TBC	
Quality Criteria	Quality Requirement	Quality Check
	TBC	
Configuration Management	TBC	
Examples	TBC	

6.13. LRA Domain Information Description

Product name	LRA Domain Information Description
Status	Required
Purpose	<ul style="list-style-type: none"> • Specifies the business information content of a single domain. • States the information relationships within a single domain. • Provides static content for use within the Domain Query Functionality.
Audience and Use	<ul style="list-style-type: none"> • Internal: <ul style="list-style-type: none"> ○ <i>Project Team</i>: to meet above purpose ○ <i>Domain Experts</i>: to check correct understanding of information requirements and logical domain; as well as

	<p>checking the correct understanding of the relevant communication artefacts.</p> <ul style="list-style-type: none"> • External: <ul style="list-style-type: none"> ◦ <i>Suppliers</i>: use as input into development work; as well as supporting the understanding of the CDs
Description	<p>The LRA Domain Information Description Package contains all the communication classes and elements within a model which are shown on the LRA Domain Information Description Diagrams and with which the LRA Domain Information Descriptions are structured and populated. The development process is iterative and inter-dependent with all LRA Domain Information Description classes being derived from the IAM.</p>
Format and Content	<ul style="list-style-type: none"> • A UML Class Diagram showing a subset of elements owned by the LRA Domain Information Description Package <ul style="list-style-type: none"> ◦ The LRA Domain Information Description is the information model for each individual domain produced • Content: <ul style="list-style-type: none"> ◦ Named classes / class packages from the domain package with: <ul style="list-style-type: none"> ◆ Associations ◆ Attributes ◆ Datatypes ◆ Operations ◦ Class and class package contents may be shown or hidden on diagrams ◦ Any annotations against the model must not modify or infer data content or structure. <p>Any annotations against the model must not modify or infer data content or structure.</p>
Construction Guidelines	<ul style="list-style-type: none"> • See LRA Authoring Guide
EA Construction	<ul style="list-style-type: none"> • See LRA Authoring Guide
Template(s)	<ul style="list-style-type: none"> • No
Inputs and Predecessor Products	<ul style="list-style-type: none"> • Information Analysis Model. • Use Case Model Set.
Peer Products	<ul style="list-style-type: none"> • TBC
Successor	<ul style="list-style-type: none"> • Candidate ENTRY and ELEMEMENT Definitions

Products		
Quality Criteria	TBC	
Configuration Management	TBC	
Examples	Domain Example: TBC	Generic Example: TBC

6.14. LRA Domain Query Functionality

See Use Case Activity Diagram

6.15. Element Constrained Domain Model

Product name	Element Constrained Domain Model.	
Status	Mandatory.	
Purpose	<p>To represent the shared knowledge and technical semantics of Candidate Data Element Definitions and Element Domain Models.</p> <p>To be informed by Candidate Data Element Definitions.</p> <p>To provide a mechanism of reuse for Domain Information Descriptions.</p> <p>To refine Element Domain Models.</p>	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that both knowledge and technical semantics are represented correctly. • Suppliers – use as input into development work. 	
Description	An Element Constrained Domain Model is a refinement of an Element Domain Model to reflect the requirements specified in the knowledge space for a particular domain.	
Format and Content	UML Class diagram including attributes and associations with suitable structural and semantic constraints applied.	
Construction Guidelines	See LRA Authoring Guide.	
Template(s)	No.	
Inputs and Predecessor Products	<p>Candidate Data Element Definition.</p> <p>Element Domain Model.</p>	
Peer Products	Domain Information Description(s).	
Successor Products	Entry Constrained Domain Model(s).	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.

Product name	Element Constrained Domain Model.	
	Is fully representative of the knowledge and technical semantics of the predecessor products.	Knowledge review. Technical review. Domain expert review.
Configuration Management	No, as specific to a particular domain.	
Examples	Yes.	

6.16. Entry Constrained Domain Model

Product name	Entry Constrained Domain Model.	
Status	Mandatory.	
Purpose	<p>To serve as a container for Element Constrained Domain Models.</p> <p>To provide a mechanism of linkage to Participations Domain Models.</p> <p>To refine Entry Domain Models.</p>	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that the requirements of the domain are fulfilled by the model. • Suppliers – use as input into development work. 	
Description	An Entry Constrained Domain Model is a refinement of an Entry Domain Model to reflect the requirements specified in the knowledge space for a particular domain.	
Format and Content	UML Class diagram including attributes and associations with suitable structural and semantic constraints applied.	
Construction Guidelines	See LRA Authoring Guide.	
Template(s)	No.	
Inputs and Predecessor Products	<p>Entry Domain Models.</p> <p>Element Constrained Domain Models.</p>	
Peer Products	Participations Domain Models.	
Successor Products	None.	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.
	Is fully representative of the knowledge and technical semantics	Knowledge review. Technical review.

Product name	Entry Constrained Domain Model.	
	of the predecessor products.	Domain expert review.
Configuration Management	No, as specific to a particular domain.	
Examples	Yes.	

6.17. Participations Constrained Domain Model

Product name	Participations Constrained Domain Model.	
Status	Mandatory.	
Purpose	<p>To represent the shared knowledge and technical semantics of Candidate Data Element Definitions and Participations Domain Models.</p> <p>To be informed by Candidate Data Element Definitions.</p> <p>To refine Participations Domain Models.</p>	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that both knowledge and technical semantics are represented correctly. • Suppliers – use as input into development work. 	
Description	A Participations Constrained Domain Model is a refinement of a Participations Domain Model to reflect the requirements specified in the knowledge space for a particular domain.	
Format and Content	UML Class diagram including attributes and associations with suitable structural and semantic constraints applied.	
Construction Guidelines	See LRA Authoring Guide.	
Template(s)	No.	
Inputs and Predecessor Products	<p>Candidate Data Element Definition.</p> <p>Participations Domain Model.</p>	
Peer Products	Domain Information Description(s).	
Successor Products	Entry Constrained Domain Model(s).	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.
	Is fully representative of the knowledge and technical semantics of the	Knowledge review.

Product name	Participations Constrained Domain Model.	
	predecessor products.	Technical review. Domain expert review.
Configuration Management	No, as specific to a particular domain.	
Examples	Yes.	

6.18. Query Definition Artefact

Product name	Query Definition Artefact	
Status	Mandatory.	
Purpose	<p>To represent the shared knowledge and technical semantics of Domain Query Functionalities and Computable Query Expressions.</p> <p>To be informed by Domain Query Functionalities.</p> <p>To result in a Computable Query Expression.</p>	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that the requirements of the domain are fulfilled by the model. • Suppliers – use as input into development work. 	
Description	A Query Definition Artefact provides the format in which a query will be described to reflect the requirements specified in the knowledge space for a particular domain. This formal query definition provides an interface between the knowledge and technical layers.	
Format and Content	TBC.	
Construction Guidelines	See LRA Authoring Guide.	
Template(s)	No.	
Inputs and Predecessor Products	Domain Query Functionality	
Peer Products	None.	
Successor Products	None.	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.

Product name	Query Definition Artefact	
	Is fully representative of the knowledge and technical semantics of the predecessor products.	Knowledge review. Technical review. Domain expert review.
Configuration Management	No, as specific to a particular domain.	
Examples	Yes.	

6.19. Element Domain Model

Product name	Element Domain Model.
Status	Mandatory
Purpose	<p>To define and facilitate understanding of the information objectives of an Element Domain Model.</p> <p>To act as a model for refinement for Element Constrained Domain Models.</p>
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that the requirements of the domain are fulfilled by the model. • Suppliers – use as input into development work.
Description	<p>Element Domain Models are comprised of exactly one ELEMENT from the Care Components Reference Model along with any applicable COMPONENT_RELATIONSHIP_ELEMENTS. An applicable COMPONENT_RELATIONSHIP_ELEMENT is one where a SUBJECT association exists between it and the ELEMENT in question.</p> <p>Each ELEMENT represents a leaf node within the EHR hierarchy and has a single data value.</p>
Format and Content	UML Class diagram including attributes and associations with suitable structural and semantic constraints applied.
Construction Guidelines	See LRA Authoring Guide.
Template(s)	No.
Inputs and Predecessor Products	Candidate Data Element Definition(s).
Peer Products	<p>Domain Information Description(s).</p> <p>Structural Constraint(s).</p> <p>Semantic Constraint(s).</p>

Product name	Element Domain Model.	
Successor Products	Entry Domain Model(s).	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.
	Encompasses and fulfils all requirements for that Element Domain Model.	Knowledge/Technical review against LRA Candidate Data Element Definition(s).
	Information is semantically correct in representation.	Domain expert review. Terminology expert review.
Configuration Management	Required, as may be used across domains.	
Examples	Yes.	

6.20. Entry Domain Model

Product name	Entry Domain Model.	
Status	Mandatory	
Purpose	<p>To define and facilitate understanding of the information objectives of an Entry Domain Model.</p> <p>To act as a model for refinement for Entry Constrained Domain Models.</p>	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that the requirements of the domain are fulfilled by the model. • Suppliers – use as input into development work. 	
Description	<p>Entry Domain Models are comprised of exactly one ENTRY from the Care Components Reference Model. Each ENTRY contains (as ELEMENTs) the information acquired and recorded for a single observation or observation-set (battery or time series), a single clinical statement such as a portion of the patient's history or an inference or assertion, or a single action that is intended or has actually been performed. Each Entry Domain Model contains one or more ELEMENT Domain Models.</p>	
Format and Content	UML Class diagram including attributes and associations with suitable structural and semantic constraints applied.	
Construction Guidelines	See LRA Authoring Guide.	
Template(s)	No.	
Inputs and Predecessor Products	Element Domain Model(s).	
Peer Products	<p>Structural Constraint(s).</p> <p>Semantic Constraint(s).</p>	
Successor Products	Entry Constrained Domain Model(s).	
Quality Criteria	Quality Requirement	Quality check

Product name	Entry Domain Model.	
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.
	Encompasses and fulfils all requirements for that Entry Domain Model.	Technical review.
	Information is semantically correct in representation.	Domain expert review. Terminology expert review.
Configuration Management	Required, as may be used across domains.	
Examples	Yes.	

6.21. Participations Domain Model

Product name	Participations Domain Model
Status	Mandatory
Purpose	To define and facilitate understanding of the information objectives of a Participations Domain Model.
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that the requirements of the domain are fulfilled by the model. • Suppliers – use as input into development work.
Description	<p>A Participation domain model is comprised of classes predominantly from the Participations Reference Model; there is also limited overlap and use of classes from the Care Components Reference Model.</p> <p>Participations Domain Models describe the involvement of entities and roles within the health record. Examples of entities include person, device and organisation, whereas examples of roles include patient, care professional and hospital departments. These entities and roles may participate in the health record in various ways (e.g. as authors, performers, subject of the care record etc.).</p> <p>Within Participations Domain Models, classes from the Participations Reference Model serve to describe the details of any entities and roles. Classes from the Care Components Reference Model act as containers for choices of Participations Reference Model classes (e.g. a FUNCTIONAL_ROLE class may serve as a container for a choice of combinations of Participations Reference Model class; each combination representing the details of an information provider).</p>
Format and Content	UML Class diagram including attributes and associations with suitable structural and semantic constraints applied.
Construction Guidelines	See LRA Authoring Guide.
Template(s)	No.
Inputs and	None.

Product name	Participations Domain Model	
Predecessor Products		
Peer Products	Structural Constraint(s). Semantic Constraint(s).	
Successor Products	Entry Domain Model(s).	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review – using review checklists.
	Encompasses and fulfils all requirements for that Participations Model.	Technical review.
	Information is semantically correct in representation.	Domain expert review. Terminology expert review.
Configuration Management	Required, as may be used across domains.	
Examples	Yes.	

6.22. Terminology Expression Constraint

Product name	Terminology Expression Constraint.	
Status	Mandatory.	
Purpose	<p>To define the terminology restrictions applicable to the meaning of component parts of a Domain Model.</p> <p>To enable consistent representation of data within Domain Models.</p> <p>To enable consistent retrieval of data within Domain Models.</p> <p>To minimise conflict and duplication of meaning of data within Domain Models.</p>	
Audience and Use	<p>Internal:</p> <ul style="list-style-type: none"> • Project Team – to meet above purpose. • Test Team – to test a system's compliance with the LRA. • Technical Architects – to inform test design. <p>External:</p> <ul style="list-style-type: none"> • Domain Experts – to verify that the requirements of the domain are fulfilled by the technical model. • Suppliers – use as input into development work. 	
Description	<p>A Terminology Expression Constraint is a computable rule that can be applied to an instance of a terminology expression to test whether it complies with rules that may relate to its meaning and/or compositional structure.</p> <p>An example of a terminology expression constraint used in the LRA is a SNOMED CT Expression Constraint.</p>	
Format and Content	The guidelines for construction of these constraints will be described in the relevant constraint formalism.	
Construction Guidelines	See LRA Authoring Guide.	
Template(s)	No.	
Inputs and Predecessor Products	Constraint Formalism.	
Peer Products	Domain Model(s).	
Successor Products	None.	
Quality Criteria	Quality Requirement	Quality check
	Conforms to the LRA Authoring Guide.	Technical review –

Product name	Terminology Expression Constraint.	
		using review checklists.
	Imposes restrictions applicable to the meaning of component parts within a Domain Model in a way that enables all applicable requirements to be met.	Knowledge/Technical review. Terminology expert review.
	Enables consistent representation and retrieval of data within Domain Models.	Technical review. Testing.
	Minimise conflict and duplication of meaning of data within Domain Models.	Technical review. Terminology expert review.
	Conforms to the relevant Constraint Formalism.	Technical review.
Configuration Management	Required, as may be imposing some semantic constraint on a Domain Model.	
Examples	Yes.	

7. Appendix B: Other Interface Artefacts

This appendix provides further context for the concrete interface artefacts described in Section 4. Abstract interface artefacts, or other artefacts provided for contextual information only are described in this section.

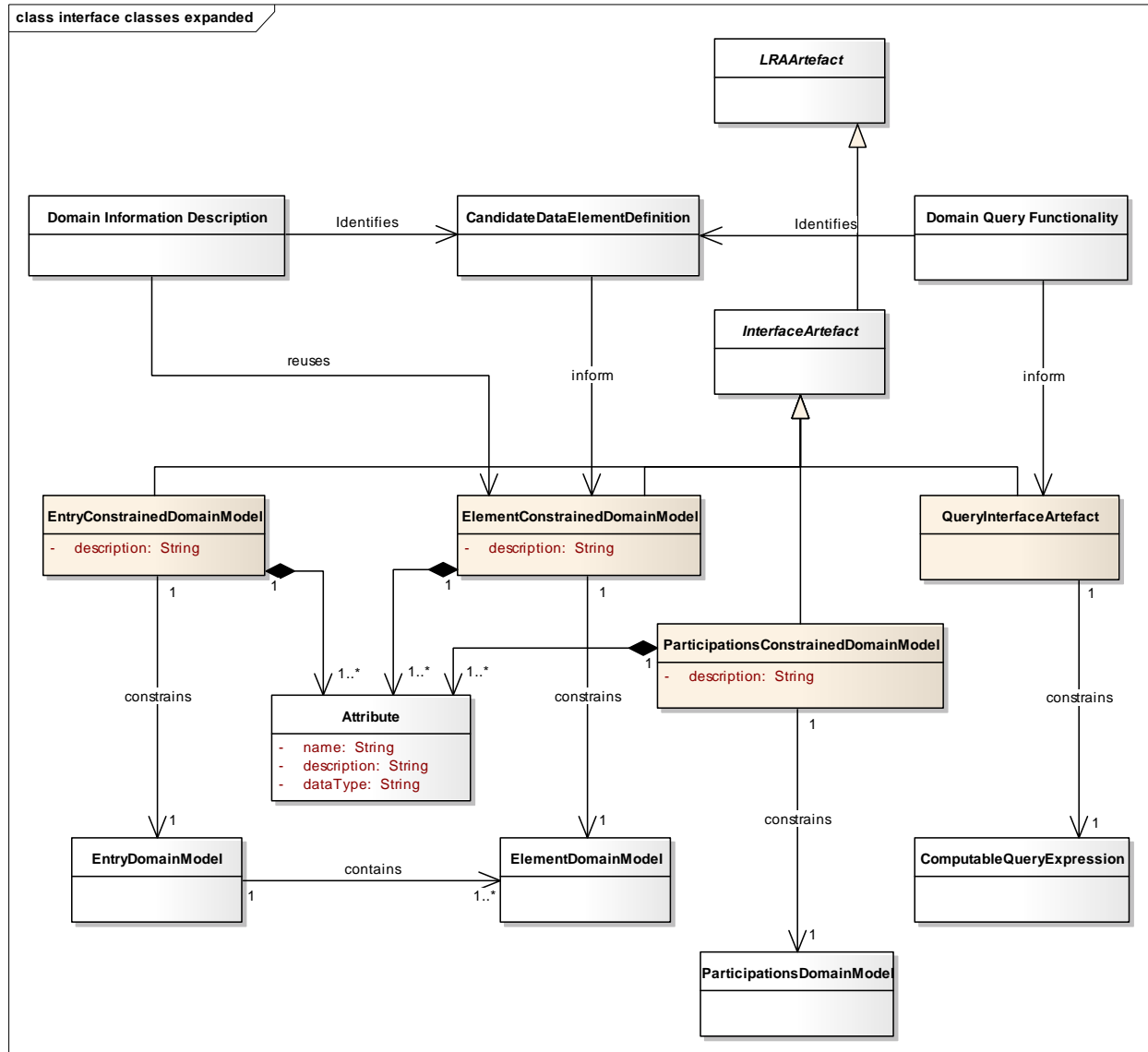


Figure 6: interface classes expanded

7.1 Interface Artefact

An Interface Artefact is an abstract artefact from which all interface artefacts are derived.

8. Appendix C: Other Technical Artefacts

This appendix provides further context for the concrete technical artefacts described in Section 5. Abstract technical artefacts, or other artefacts provided for contextual information only are described in this section.

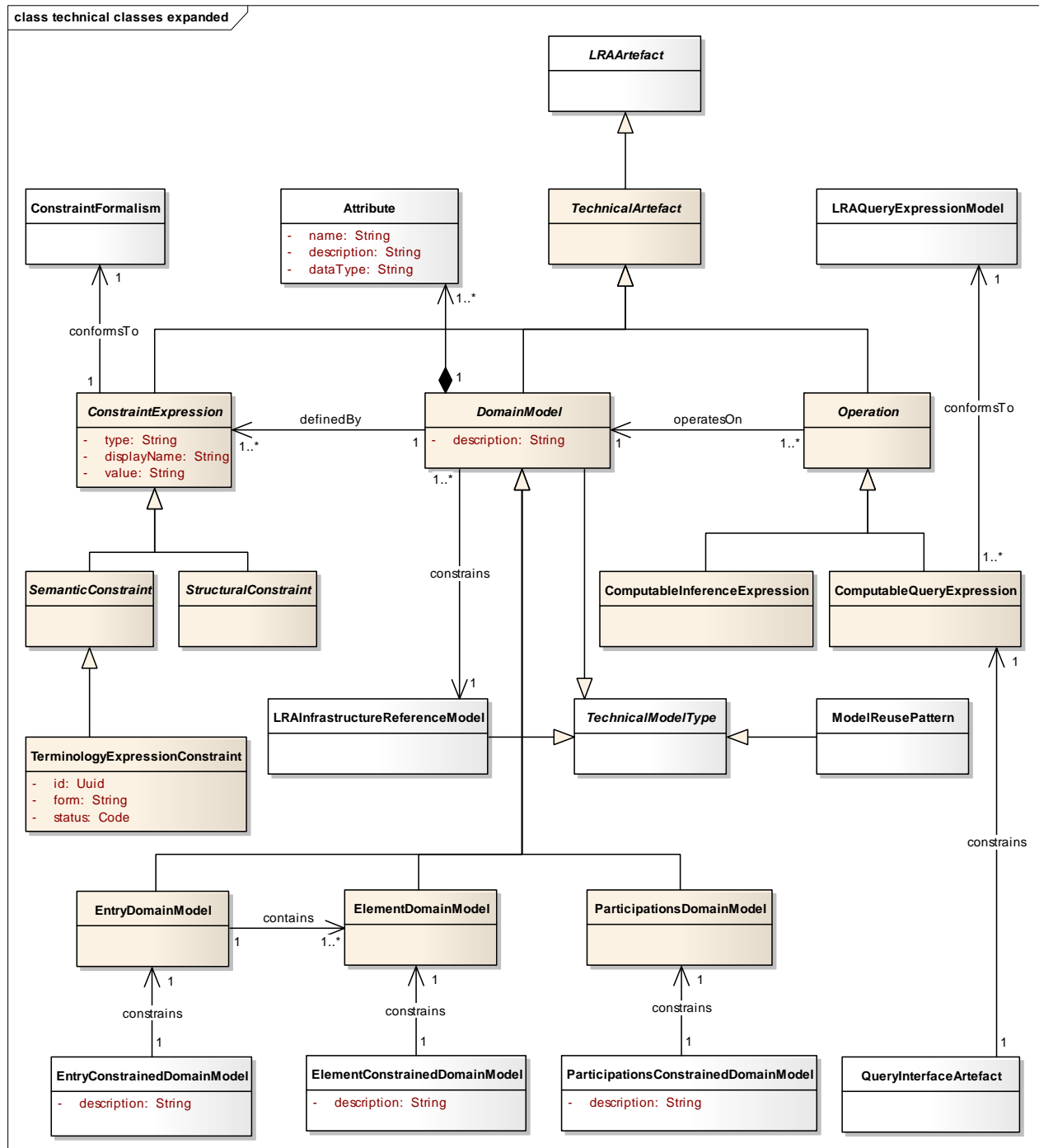


Figure 7: technical classes expanded

8.1. Constraint Expression

A constraint expression is a rule described using a machine interpretable syntax. Each constraint expression may be structural or semantic in nature.

Constraint Expressions are used to define the structure and semantics of Domain Models. Constraint Expressions conform to Constraint Formalisms, e.g. HL7 v3 Metadata Interchange Format (MIF), Schematron, OMG XML Metadata Interchange (XMI) and SNOMED CT terminology bindings.

8.2. Domain Model

A Domain Model is a technical model that is conformant to the LRA Technical Infrastructure Reference Model. A Domain Model is defined by a set of structural and semantic constraints and may be operated on by computable inference and query expressions.

8.3. Operation

An Operation is an abstract representation of all operations (e.g. query or inference expression) that operate on Domain Models.

8.4. Semantic Constraint

A Semantic Constraint Expression is a rule described using a machine interpretable syntax to impose or restrict the meaning of component parts of a Domain Model.

8.5. Structural Constraint

A Structural Constraint Expression is a rule described using a machine interpretable syntax to impose or restrict the relationship or organisation of the component parts of a Domain Technical Model.

Examples of Structural Constraint Specifications that may be considered for use in the LRA include Schematron, HL7 v3 Metadata Interchange Format (MIF), OMG Object Constraint Language (OCL) and OMG XML Metadata Interchange (XMI).

8.6. Technical Artefact

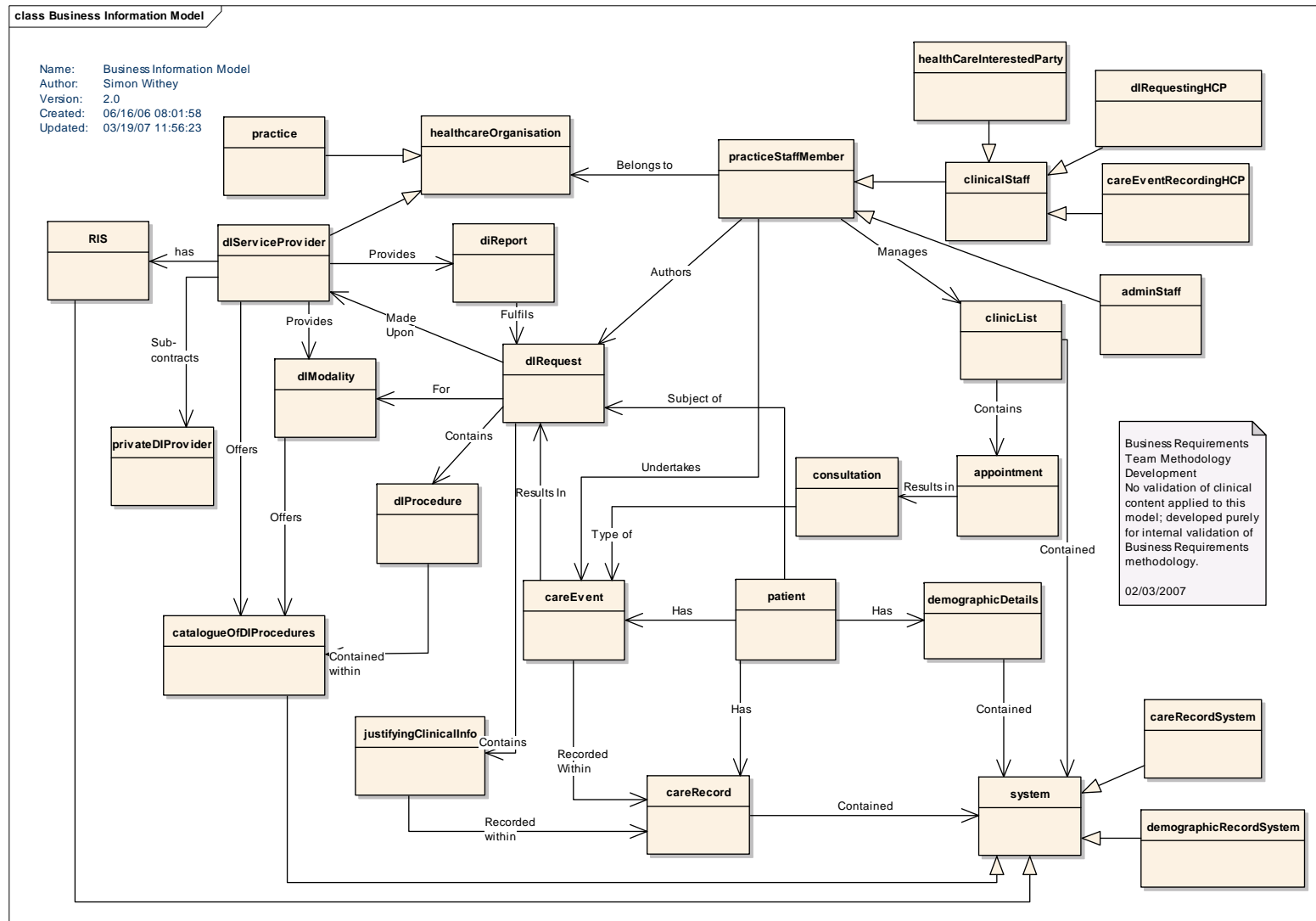
A Technical Artefact is an abstract artefact from which all technical artefacts are derived.

9. Appendix D: LRA Artefact Examples

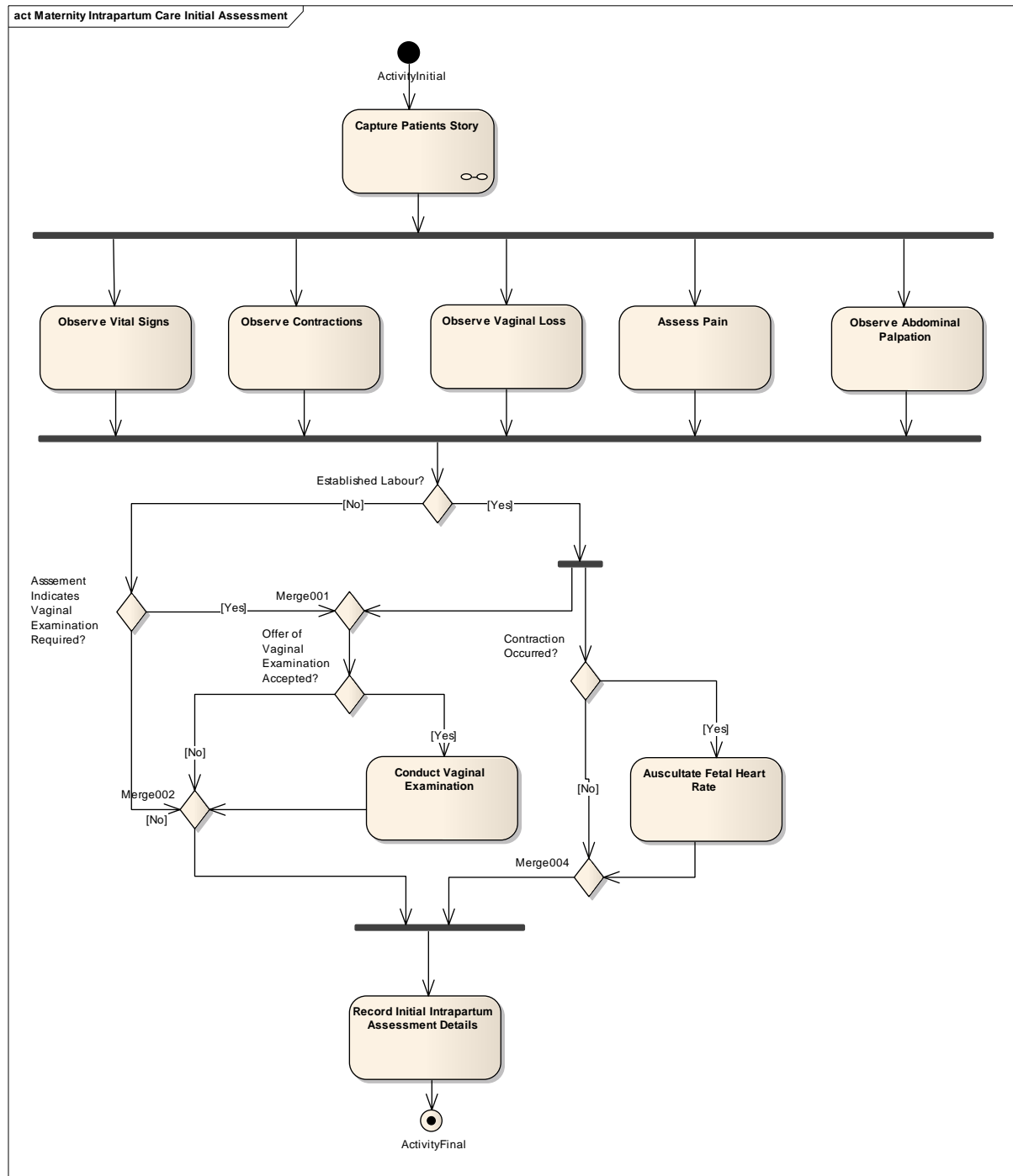
This section contains a number of examples of Knowledge Artefacts. The reader is referred to the demonstration site of LRA Release 1.0 for examples of Interface and Technical Artefacts.

DN: The following Knowledge Artefact examples are presented as broad indication for the reader to give a little insight as to how they might look. Currently they are not fully worked and contain many inaccuracies. In some cases are they are entirely absent. They should not be taken as a literal representation and they will be subject to change once they is more certainty around the technical artefact set.

9.1. Stakeholder Information View

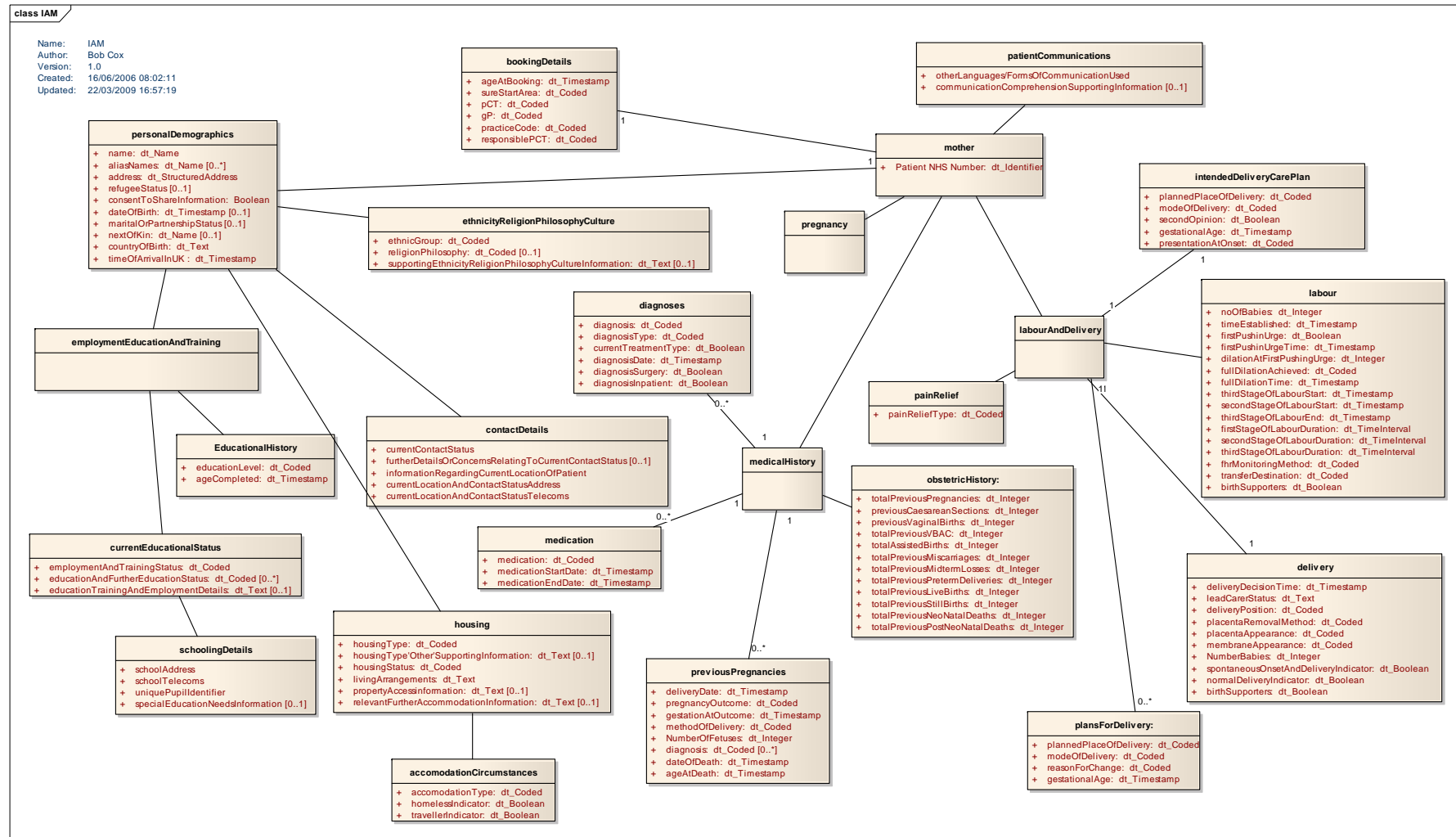


9.2. Stakeholder Business Model

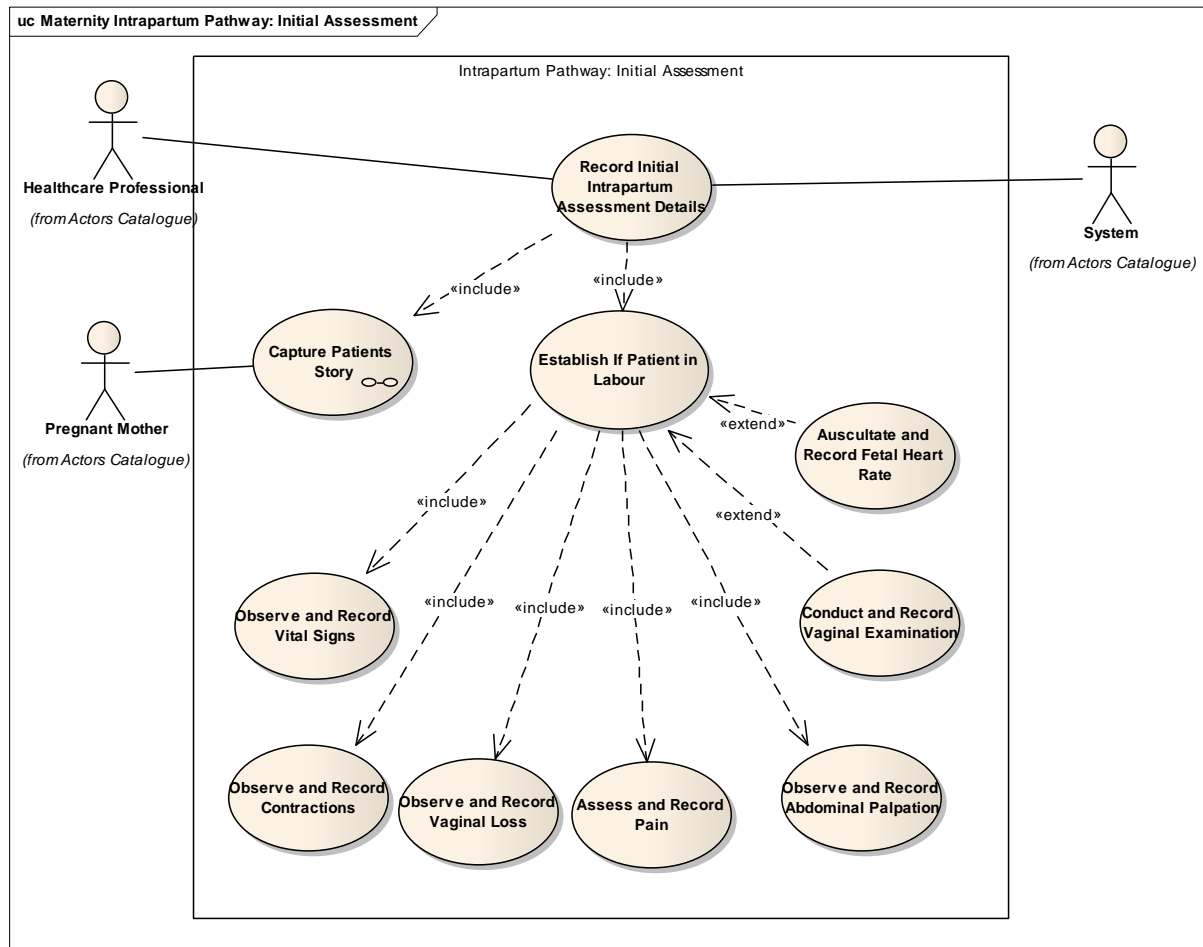


9.3. Requirements Catalogue

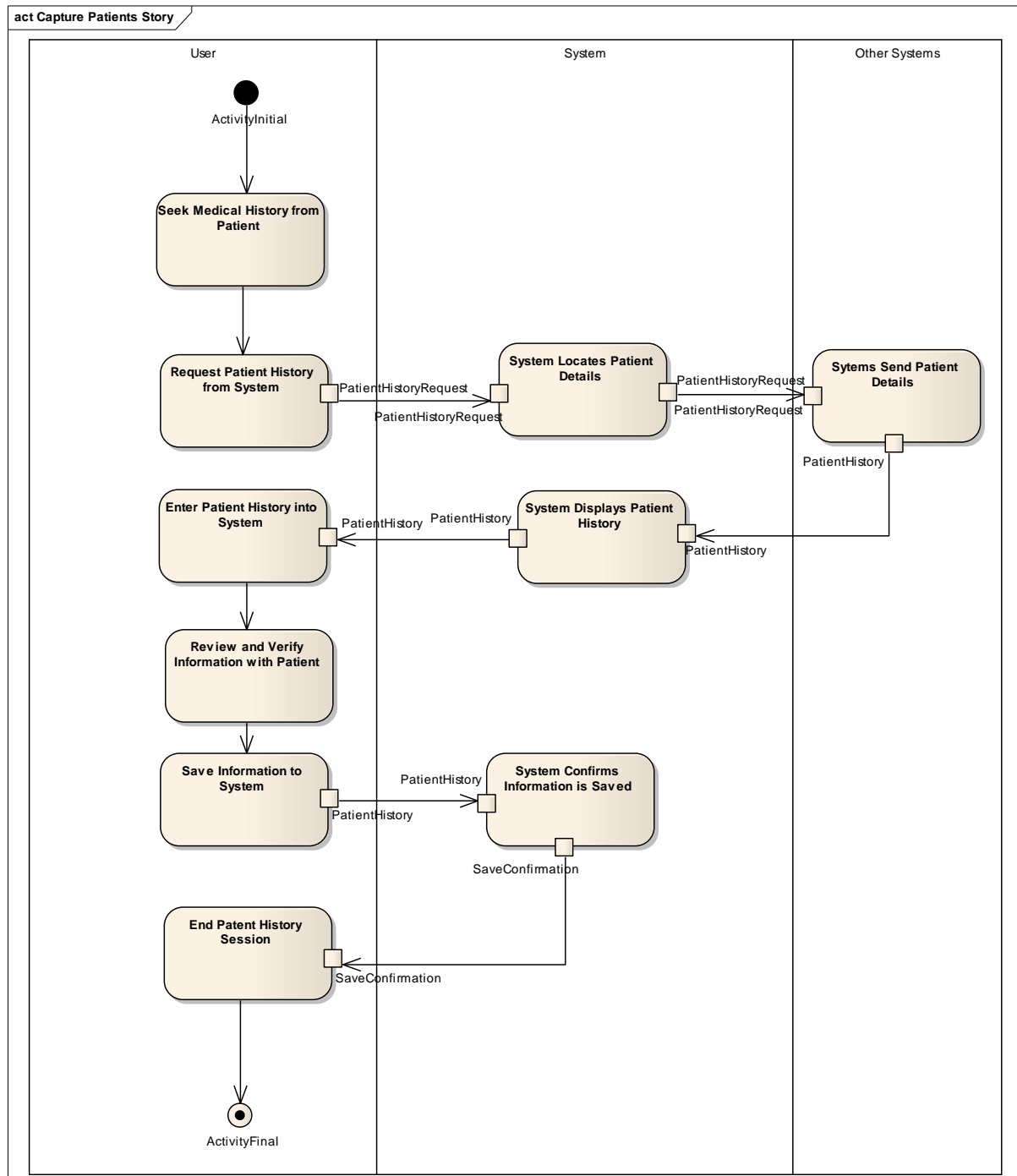
9.4. Information Analysis Model



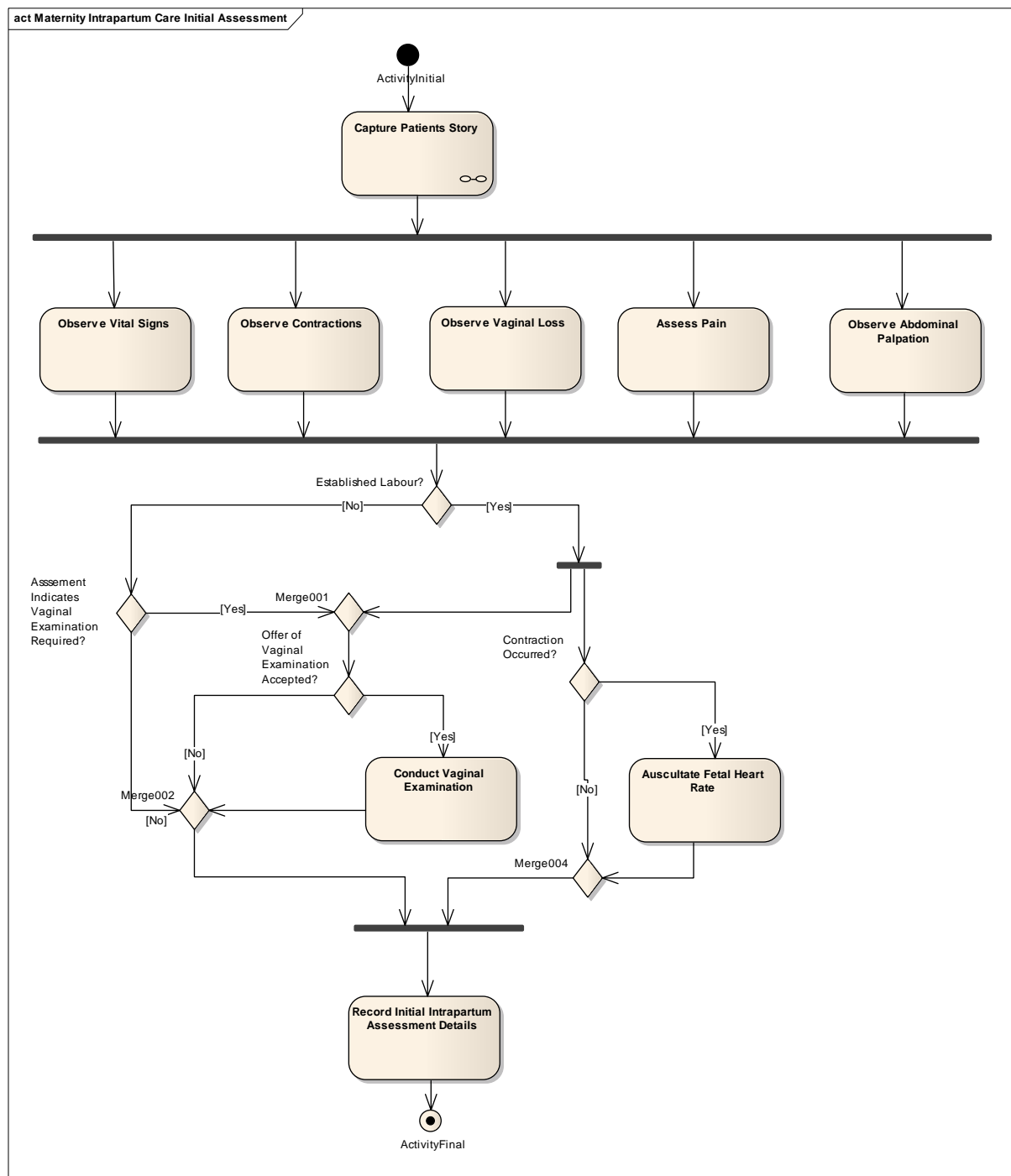
9.5. Use Case and Use Case Model



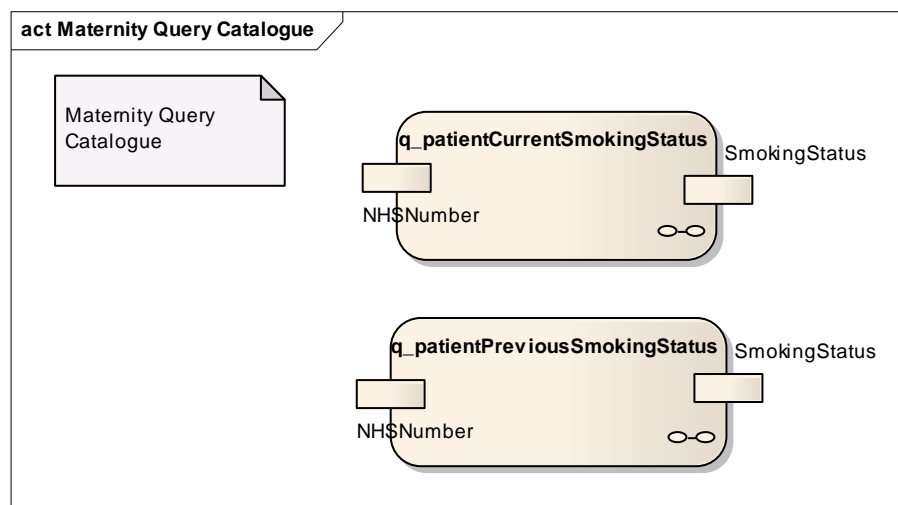
9.6. Use Case Activity Diagram



9.7. Business Process Model

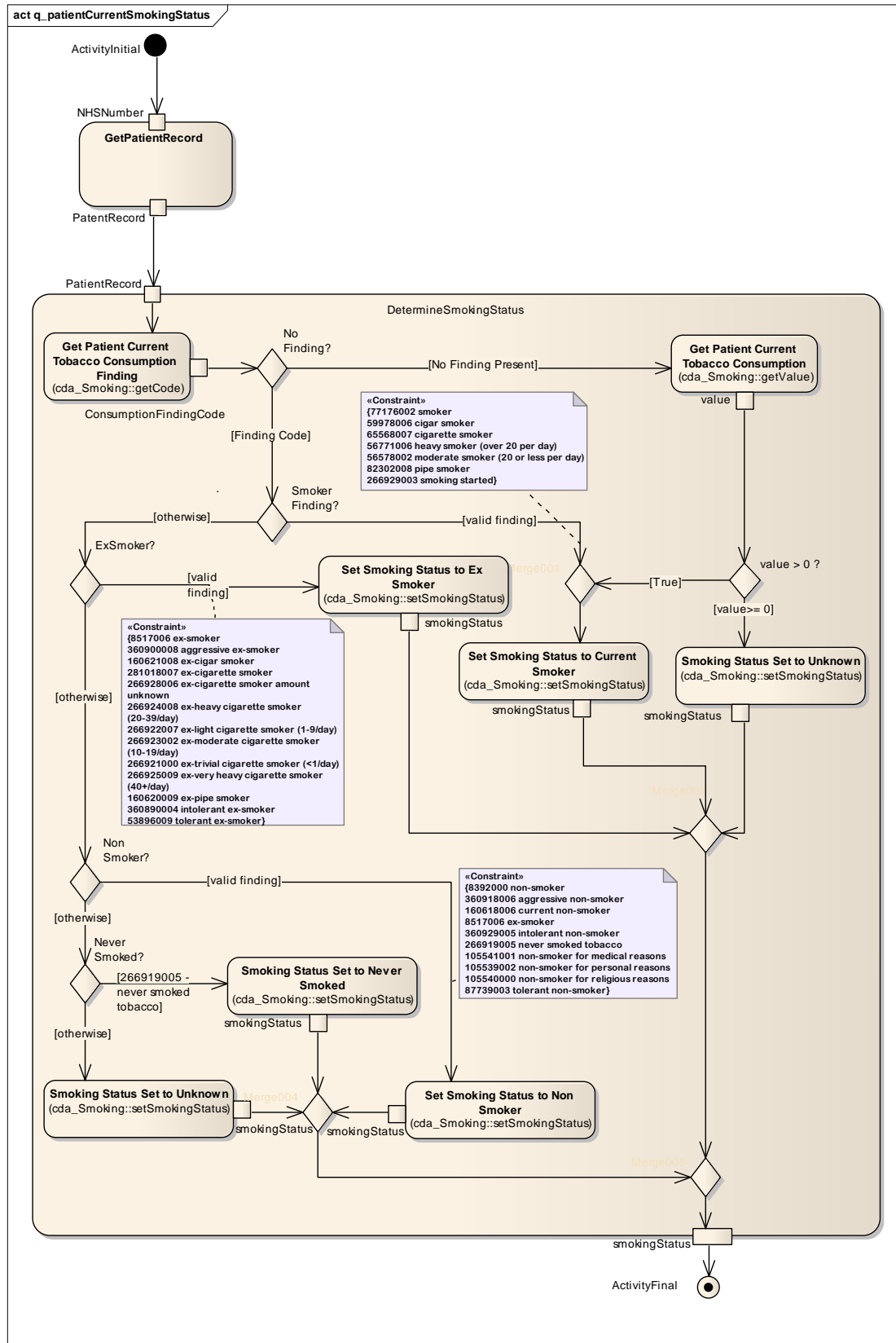


9.8. Query Catalogue



9.9. LRA Domain Information Descriptions

9.10. LRA Domain Query Functionality



9.11. Candidate Data Element Definitions