

Health Record Information

- The information in a health record is inherently hierarchical
 - Clinical observations, reasoning and intentions can have a simple or a more complex structure
 - They are generally organised under headings, and contained in “documents” such as consultation notes, letters and reports
 - These documents are usually filed in folders
 - A patient may have more than one folder within a healthcare enterprise (e.g. medical , nursing, obstetric)
- The EHR needs to reflect this hierarchical structure and organisation

Logical building blocks of the EHR

EHR

The electronic health record for one person

Folders

High-level organisation of the EHR e.g. per episode, per clinical speciality

Compositions

A clinical care session, encounter or document e.g. test result, letter

Sections

Clinical headings reflecting the workflow and consultation process

Entries

Clinical “statements” about Observations, Evaluations, and Instructions

Clusters

Nested multi-part data structures (tables and interval time series) e.g. audiogram

Elements

Leaf nodes with single data values e.g. reason for encounter, body weight

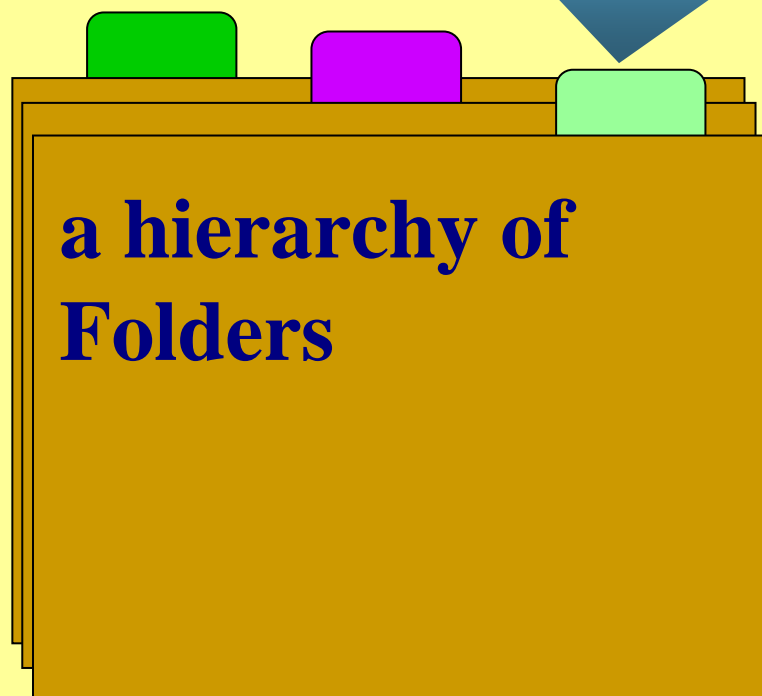
Data values

Date types for instance values e.g. coded terms, measurements with units

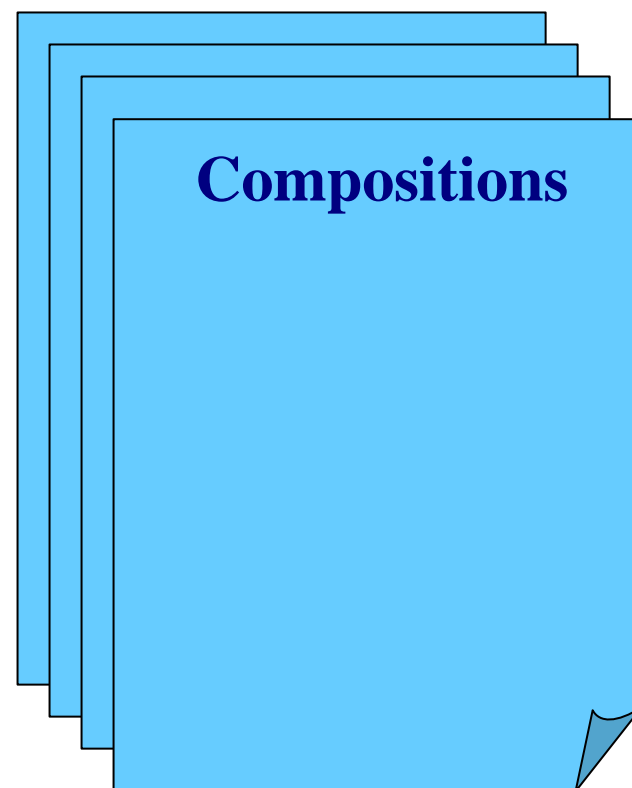
Logical building blocks of the EHR

The EHR itself

comprises...



each containing...



Logical building blocks of the EHR

Compositions
contain...

Sections

(which may be nested)

containing...

Entries with data as..

Elements

Clusters

Clusters may
be nested

& contain Elements

Logical building blocks of the EHR

Elements

have a single value
of one of a predefined
set of data value types

EHR Extract: context and content

Defining the EHR system, the patient, authorisation and date-time

Defining the date and time period covered, archetypes included, sensitivity etc.

Enterprises and Episodes
(FOLDER)



Clinical document etc.
(COMPOSITION)



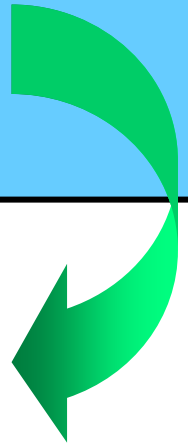
Composition: context and content

Defining committal, revision, attestation, authorship, under whose care

Defining the care encounter: who, when, where, why

Clinical workflow and care pathways
(SECTION)

Clinical statement
(ENTRY)




Entry: context and content

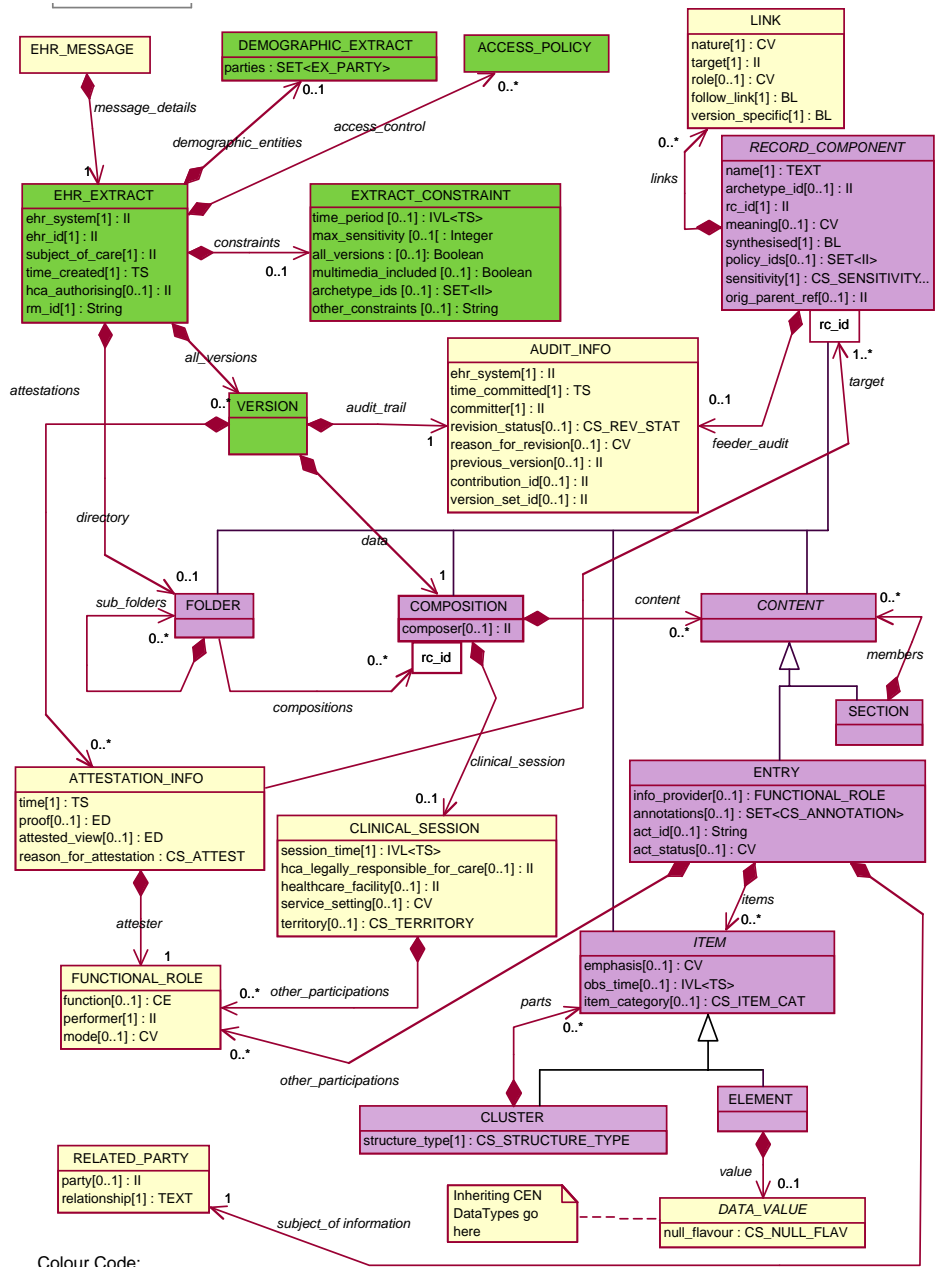
Defining committal, revision, attestation, subject of information, information provider

Defining the evolving status of a clinical act, safety interpretation (negation, certainty, at risk of, etc.)

Data structures: complex tables, time series
(CLUSTER)

Leaf node with values
(ELEMENT)



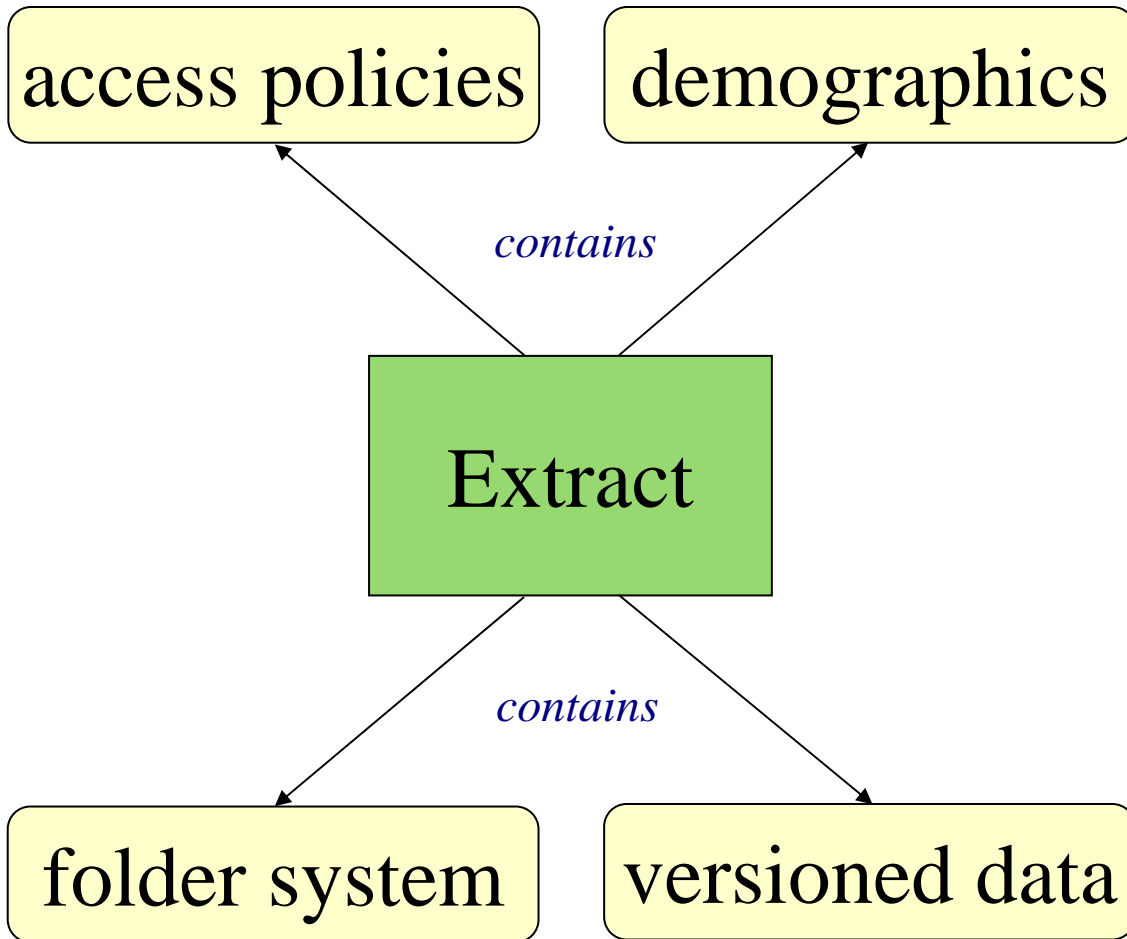


Colour Code:

- EHR_Extract and immediate associates
- Record Component and its inheritors
- Others

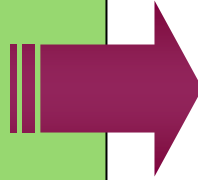
Inheriting CEN DataTypes go here



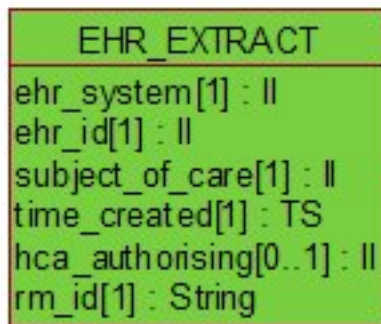


EHR context requirements

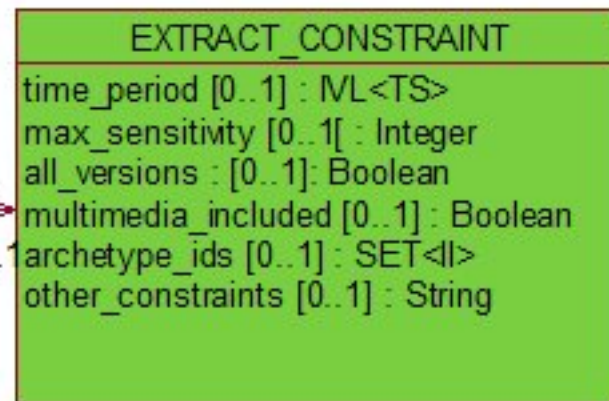
The EHR EXTRACT



- Identity of the subject of care (the patient)
- ID of this electronic record
- ID of the owning organisation (the data controller)
- Who created this Extract and when (optional)
- On which standard this Extract is based (e.g. EN 13606)
- Selection criteria (filter) by which this Extract has been created



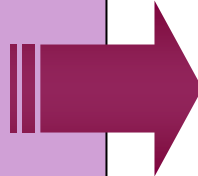
constraints



0..1

EHR context requirements

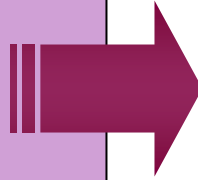
**Any kind of
Record Component
in the
EHR_EXTRACT**



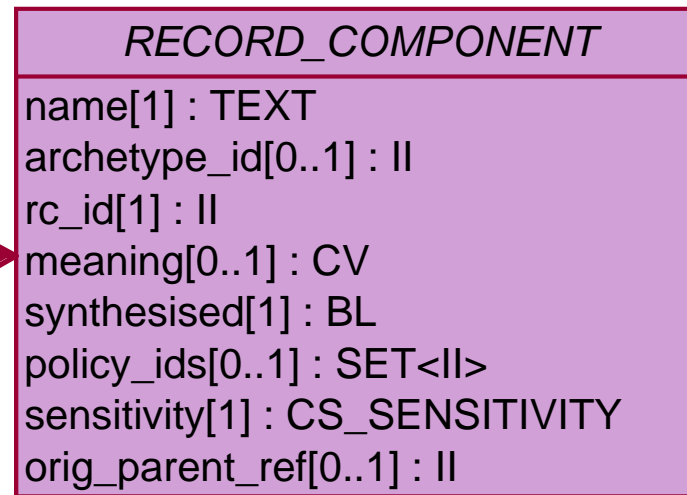
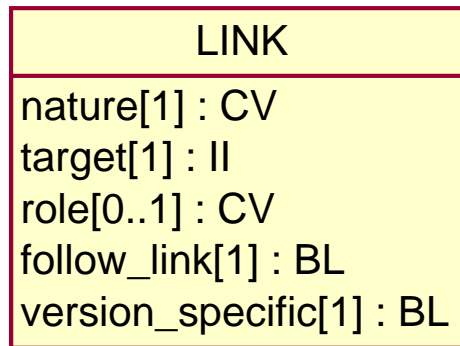
- Component unique identification
 - to be retained by recipient and used for future propagation
- Component clinical meaning
 - Component name used by user/application/feeder
 - Archetype ID and name
- Support for role-based access
 - Set of access policies applying to this component
 - sensitivity level indicator for this component
- Support for mapping legacy data
 - Indicator if a component has been synthesised

EHR context requirements

**Any kind of
Record Component
in the
EHR_EXTRACT**

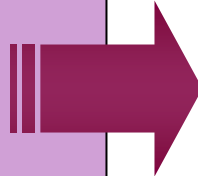


- The content of a Record Component might be new (original) data or data that are re-used from previous EHR entries
 - Components logically copied from other pre-existing parts of the EHR retain a reference their original containment (parent)
- Support for Links, between any Record Components
 - Indicator if the Link target must be included in the Extract along with the source



EHR context requirements

**Any kind of
Record Component
in the
EHR_EXTRACT**



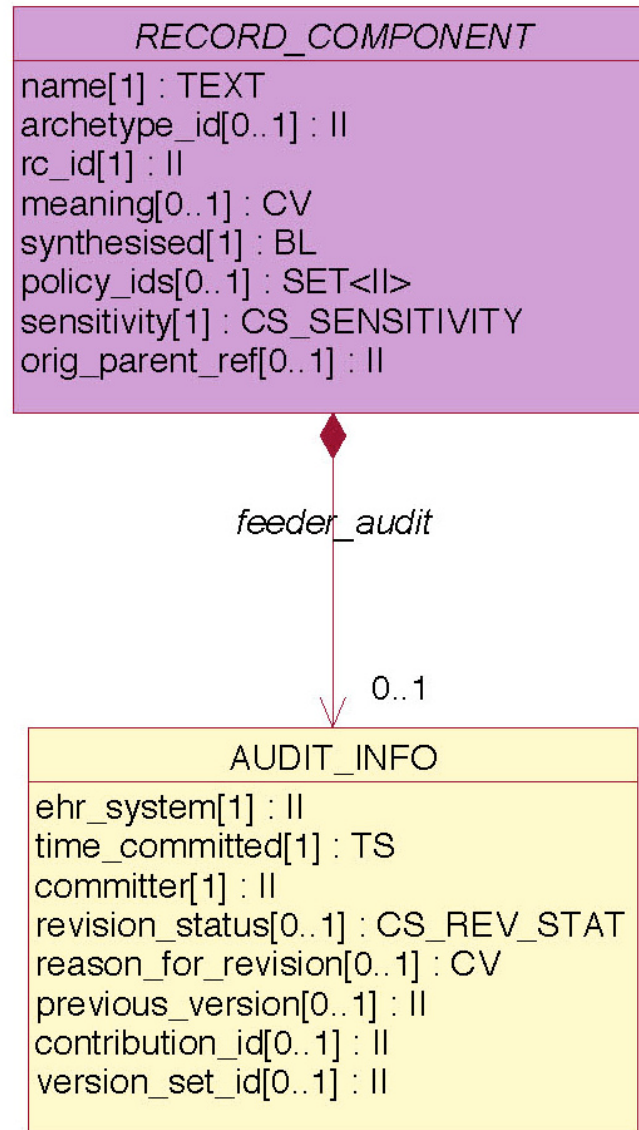
- Representation of the meta-data about:
 - committal, revision, attestation
 - these data might exist at any hierarchical level in the EHR provider system
- Each version states
 - revision status and why revised
 - ID of preceding version
 - common attribute linking all versions
- Attestations include
 - attesting party and functional role
 - reason for attestation
 - optional digital ‘proof’
 - optional “image view” of what was seen and signed
 - any number of attestations may be added at or after committal

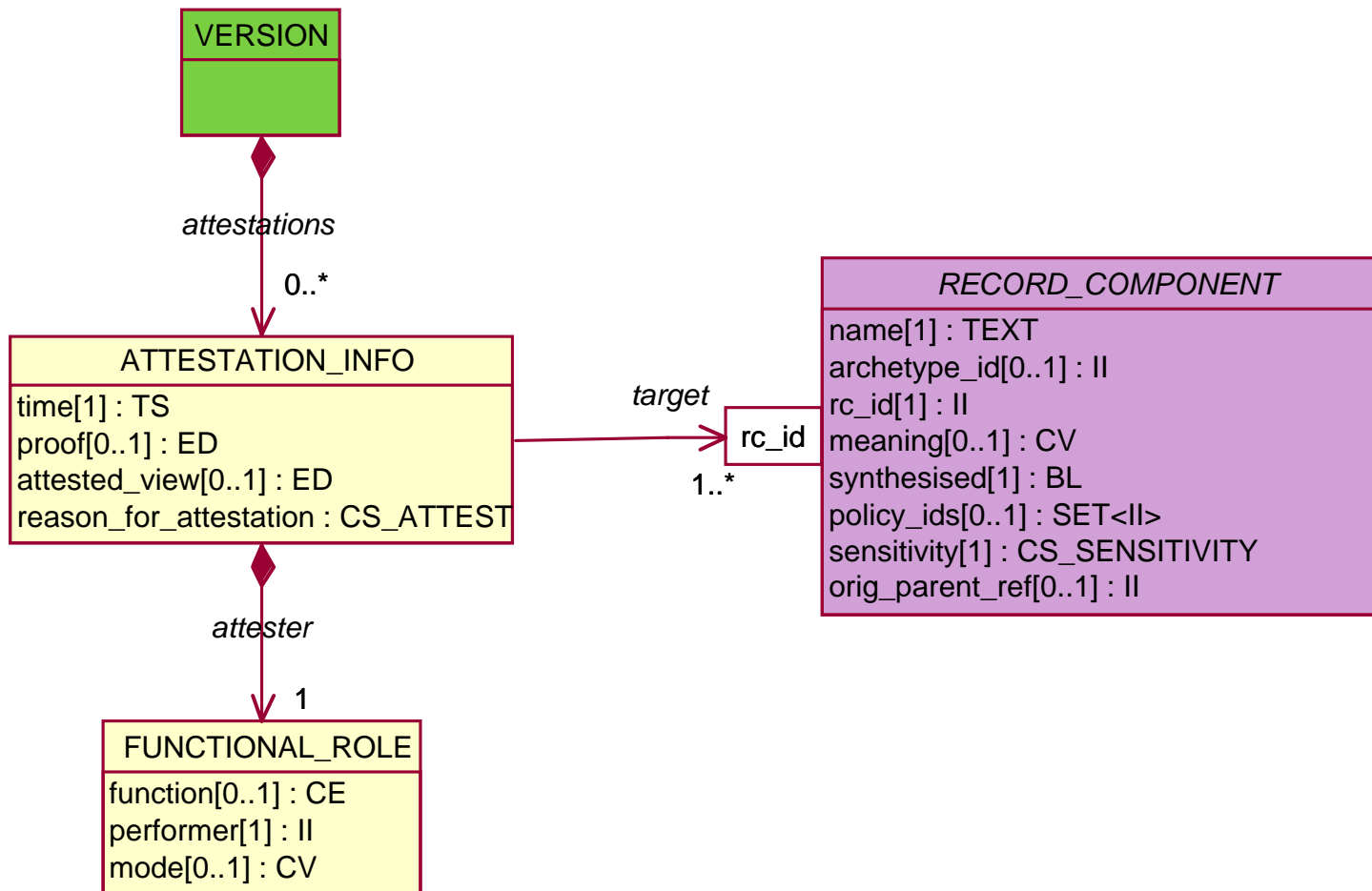
EHR context requirements

The Contribution



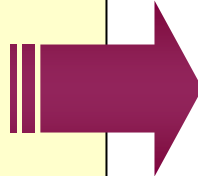
- All of the Record Components created or amended at one record interaction session
 - irrespective of the Compositions they are contained in
 - references all changes and updates made in that EHR during that session. e.g.
 - addition of a new consultation
 - (add a new Composition)
 - and
 - correction of a drug prescription elsewhere in the EHR
 - (revise a pre-existing Composition)



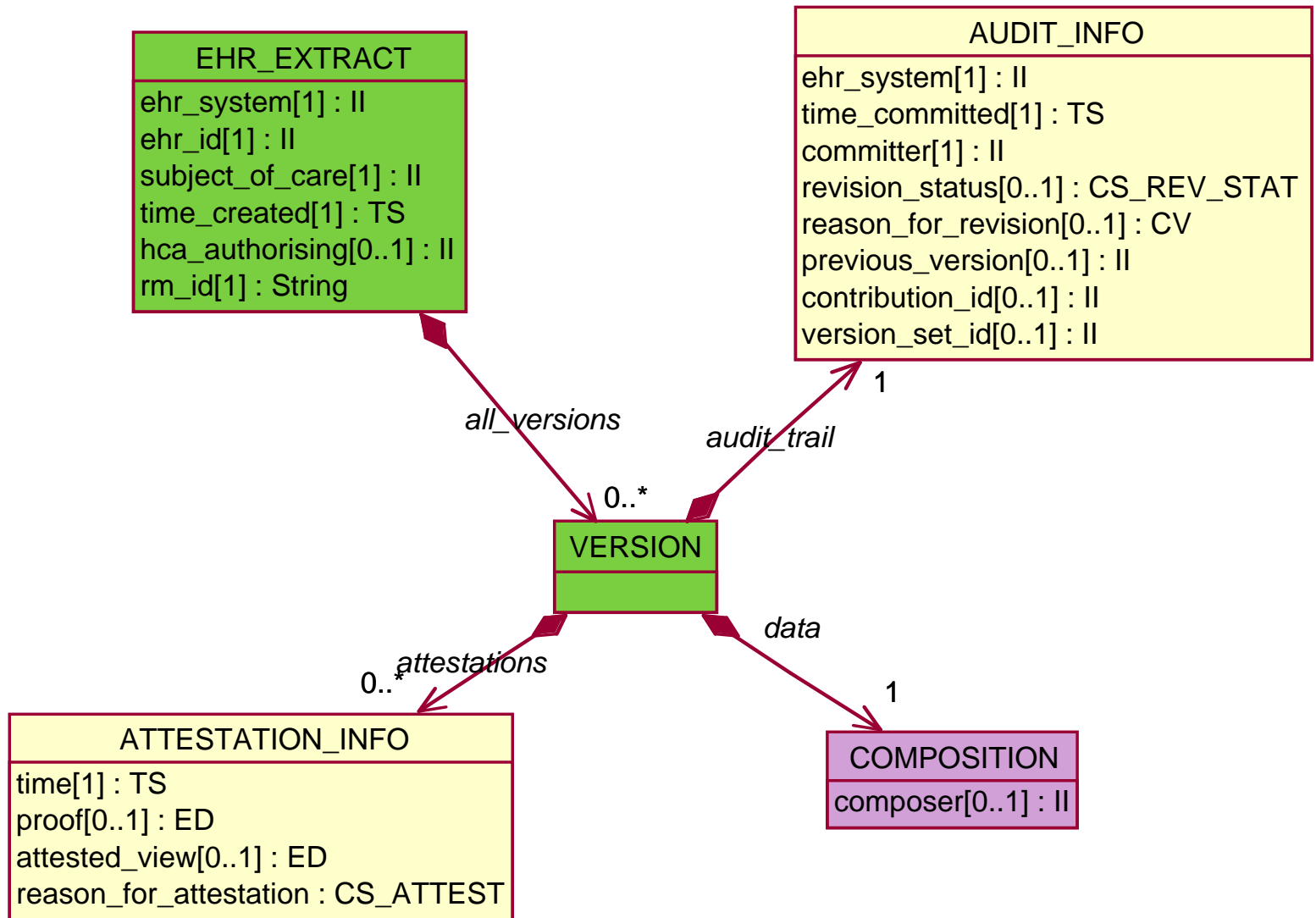


EHR context requirements

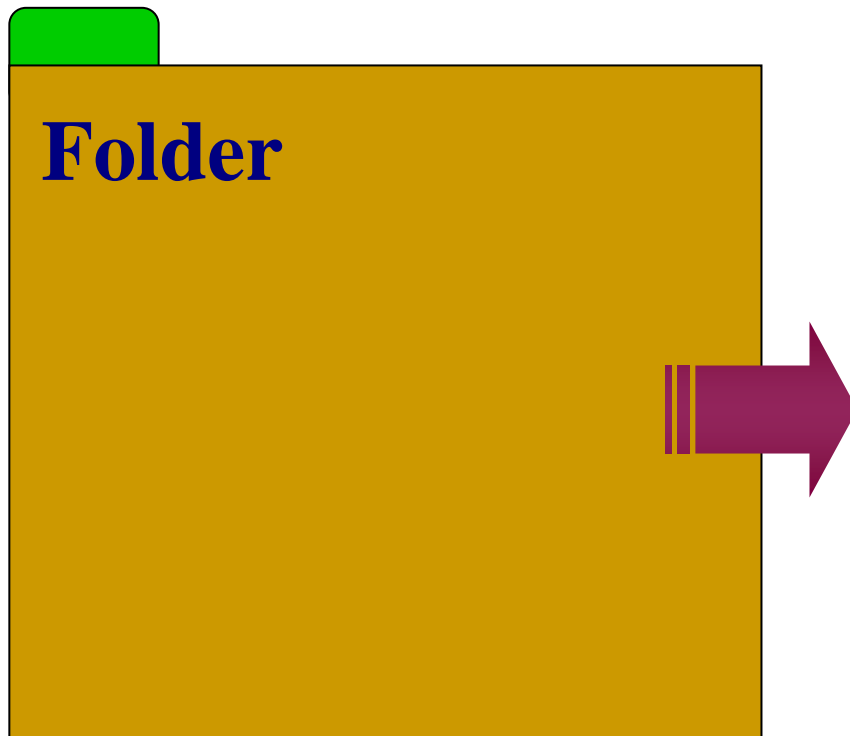
Version control within the EHR Extract



- The EHR Extract contains a set of versioned data, comprising
 - EHR data, as Compositions
 - the consistent building block of the Extract
 - the wrapper class for additions to and revisions of EHR data
within the Extract
 - Attestations, referencing any Record Components within that Composition



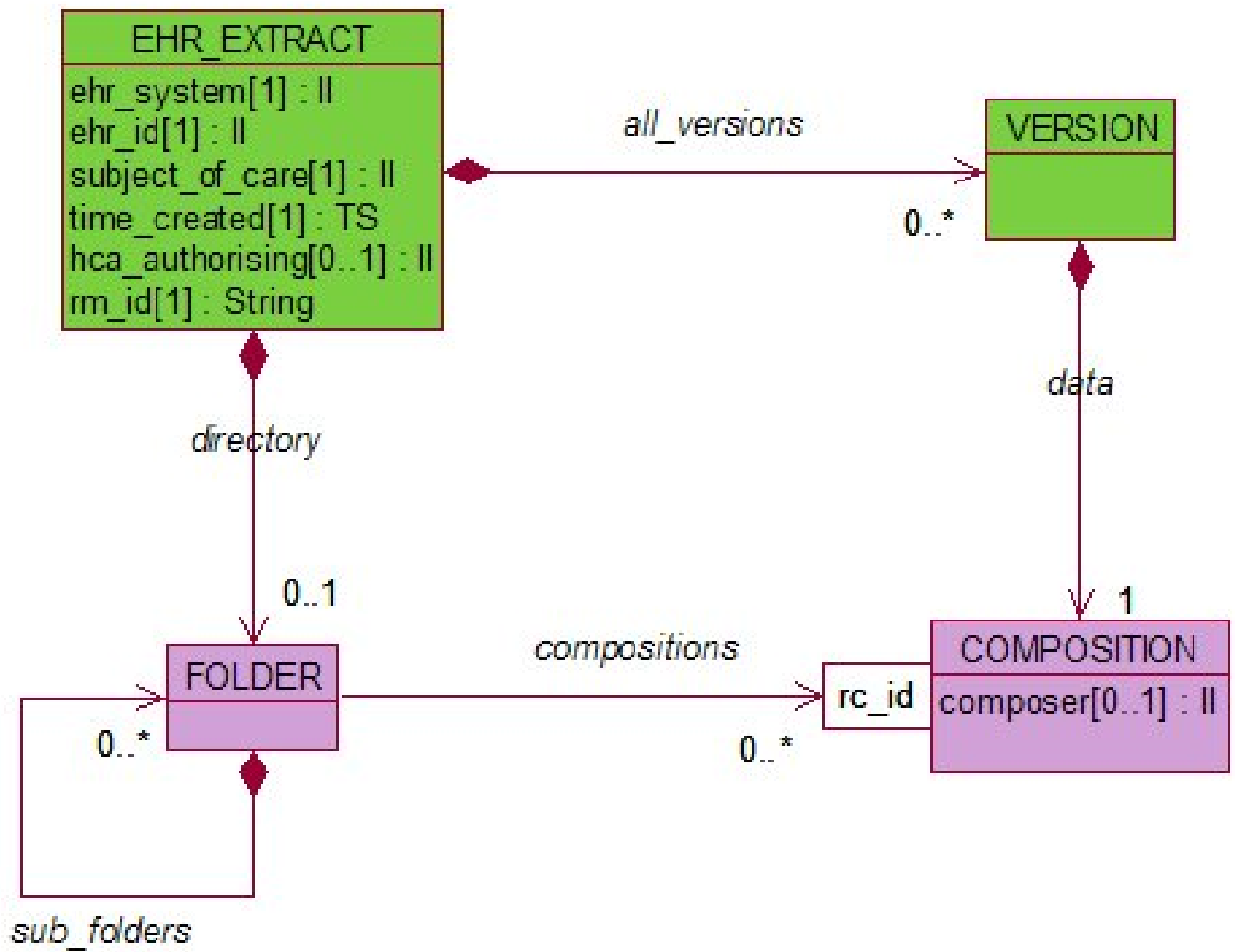
EHR context requirements



- The high-level organisation of Record Components within an EHR Extract
- An optional hierarchy
 - Folders may contain other Folders
- Permitting many to many containment by reference
 - e.g. a Composition might be contained by more than one Folder
- Folders might need to be constructed specifically for the Extract, to help organise the Compositions being sent
- Folders may be attested, and marked has having a fixed content, if appropriate

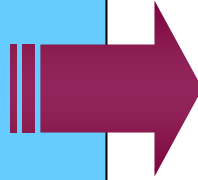
Folder use cases supported

- 1 complete optionality and a freedom not to use them
- 2 to use them for informal navigation and filing, with many-to-many containment
- 3 the ability for EHR_EXTRACTS to have FOLDERS that are created specifically for the communication purpose and are not representative of the underlying system data
- 4 for FOLDERS in the EHR_EXTRACT to contain only some of the data within the corresponding FOLDERS in the EHR Provider's system
- 5 for FOLDERS to represent the original containment context of one or more COMPOSITIONs, faithfully to the EHR system creating the Extract
- 6 for FOLDERS to represent the original containment context of one or more COMPOSITIONs that were committed together or in close proximity of time, as part of a single clinical care session
- 7 for FOLDERS to be communicated together with attestations of their existence and content



EHR context requirements

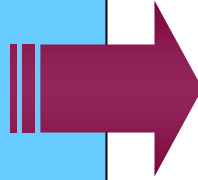
Composition



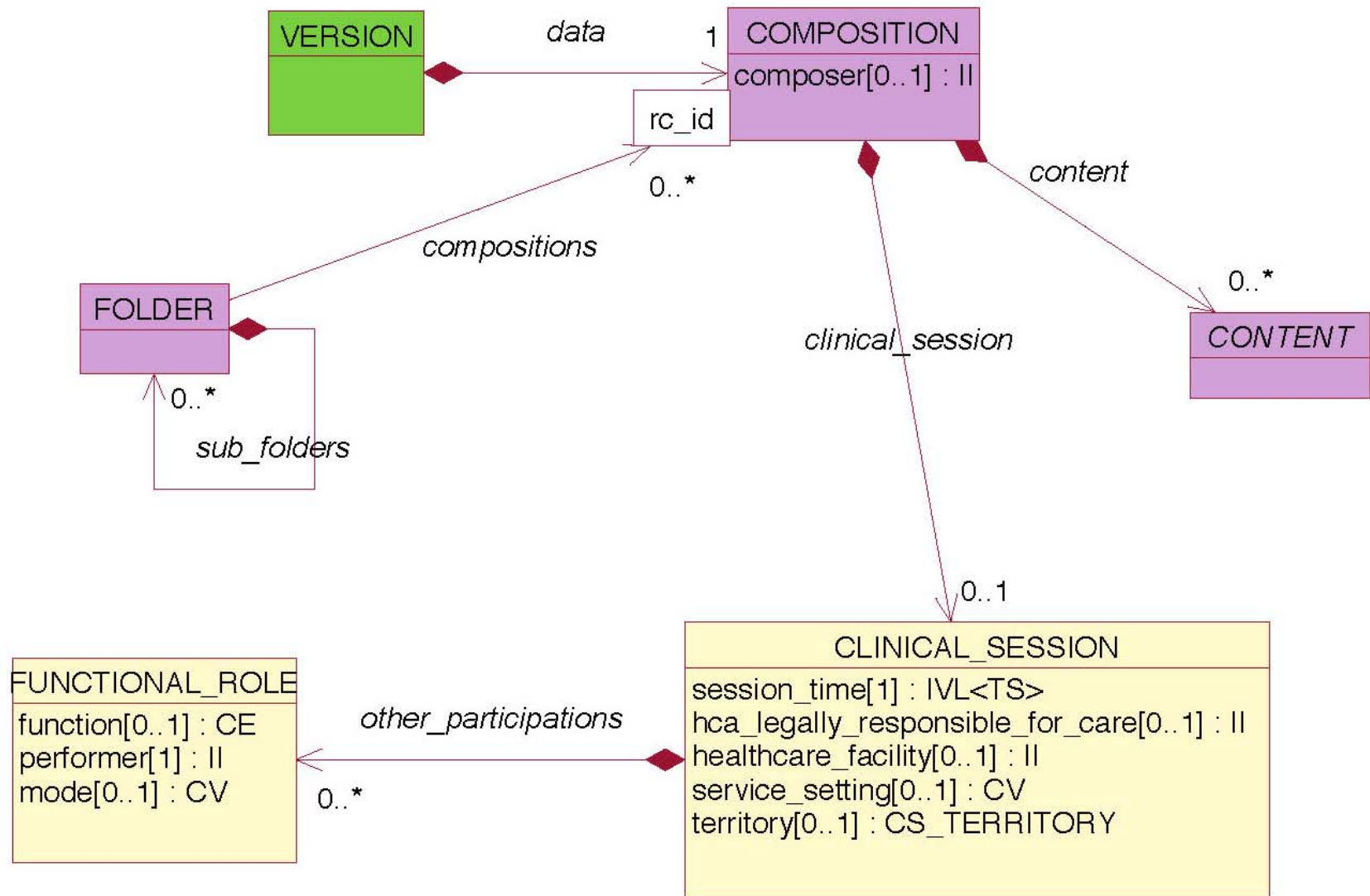
- Corresponding to a single clinical session or record interaction
- Corresponding to an HL7 CDA document
- The conventional unit of committal, attestation and revision within an EHR system
- The unit of version control within the *EHR Extract*

EHR context requirements

Composition



- Clinical session context
 - when and when the care activity took place
 - at which care facility, as part of what service and at which location
 - under what legal jurisdiction (territory)
 - which clinician was in charge of the care
 - optionally describe any other participants in the care process
- Basic medico-legal data set about a clinic contact
- Composer is optional, to cater for scanned documents
- Placeholder for work with CONTSYS

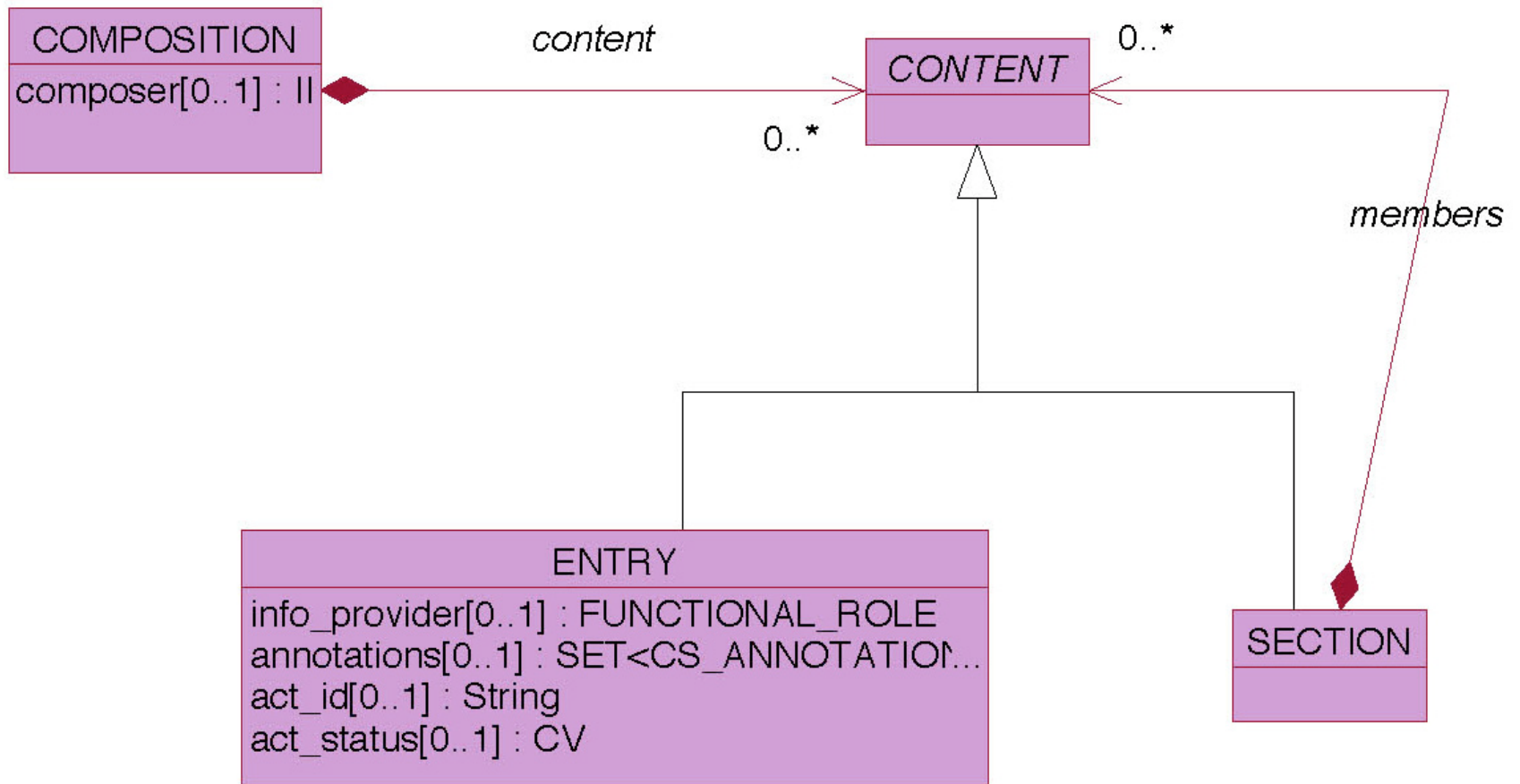


EHR context requirements

Section



- Optional hierarchy
- Informal containment for human navigation, filtering and readability
- Corresponding to the clinical understanding of headings

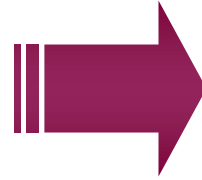


EHR context requirements

Entry

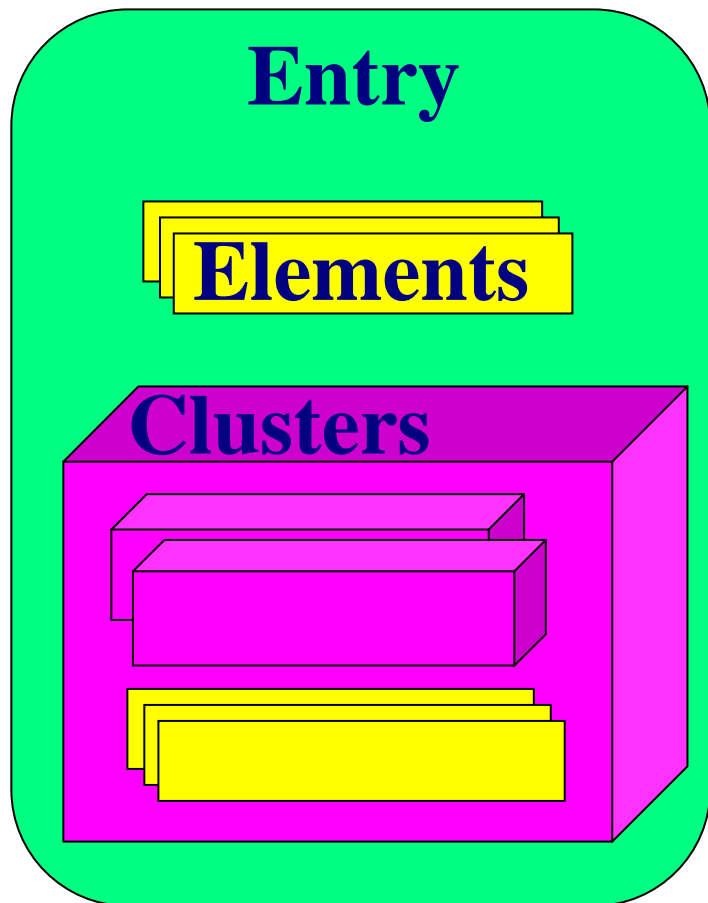
Elements

Clusters



- An Entry corresponds to a single clinical "statement"
- May contain one or more Elements and/or one or more Clusters
- Represents the data structure of clinical observations, inferences and intended actions
 - which may be simple or multi-part (lists, tables etc.)
 - which may be time series

EHR context requirements



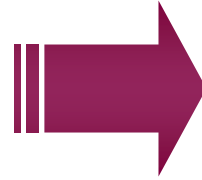
- Information in an entry may be about someone other than the patient (e.g. relative)
- Information in an entry may have been provided by someone other than the patient/clinician
- Other participants might need to be identified with the Entry
- The Entry may represent the evolving status of a clinical Act (e.g. requested, performed, reported, cancelled)
- Support for HL7 mood code and safety Component Annotations

EHR context requirements

Entry

Elements

Clusters



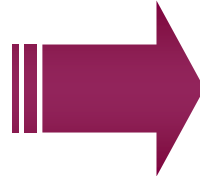
- Representing different kinds of Entry data:
- the clinical reasoning process
 - if an observation or conclusion is uncertain
 - if an observation or conclusion is unusual, abnormal or unexpected
 - if an observation or conclusion is not the actual state of the patient
 - e.g. at risk of, goal, prognosis, negated, excluded
 - explanation of reasoning/actions
 - guideline reference
 - reference to published knowledge

EHR context requirements

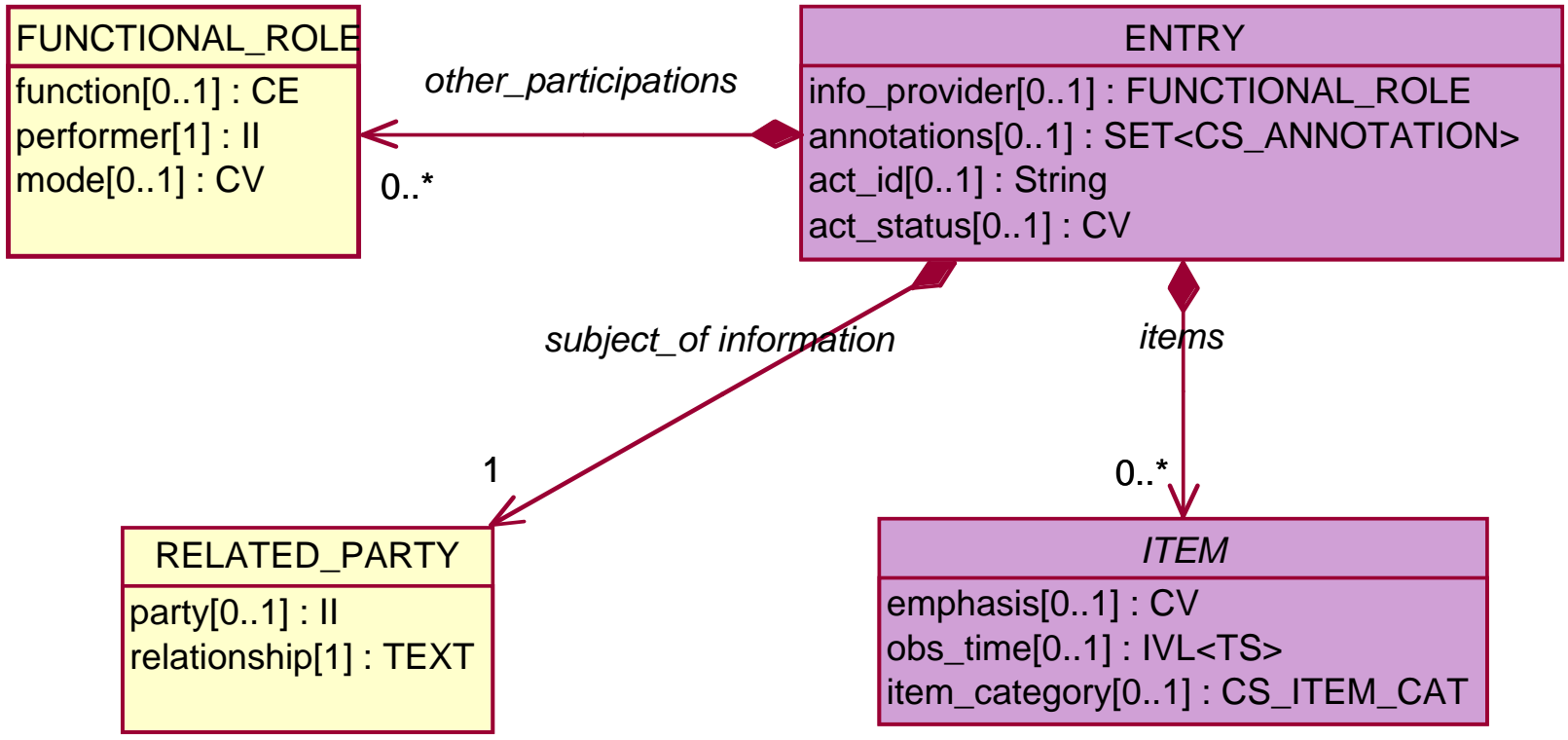
Entry

Elements

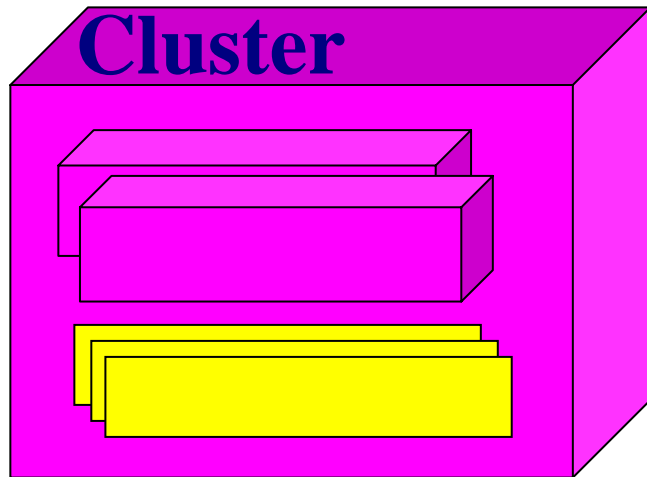
Clusters



- Representing different kinds of Entry data:
- the state of the patient for the observation e.g.
 - fasting
 - standing
 - after exercise
 - 20 minutes after taking bronchodilator medication
- settings (or other context) for the observation e.g.
 - cuff size
 - frequency of stimulation
 - measurement device used

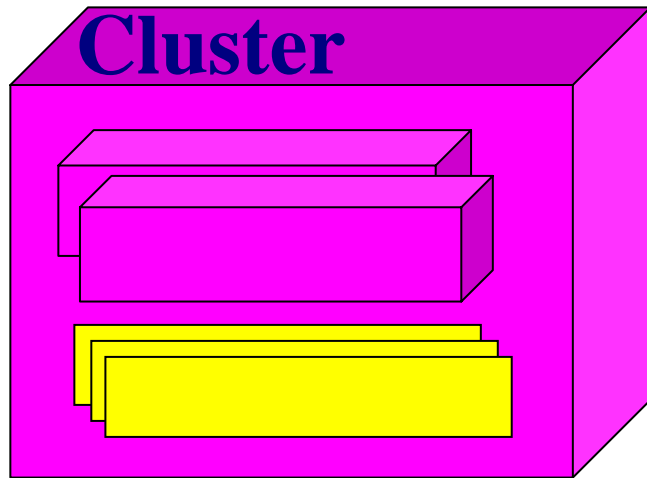


Structured data

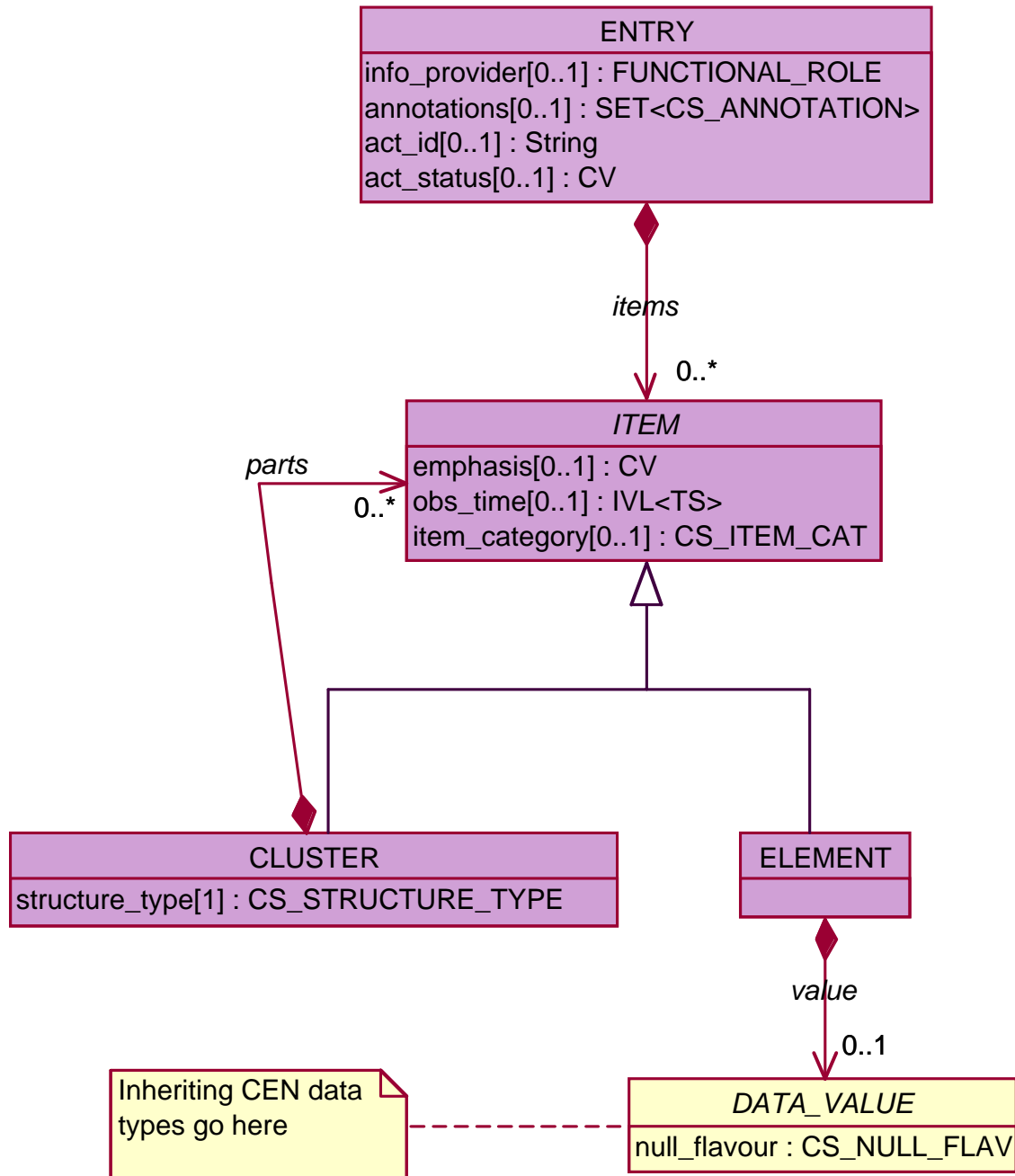


- Complex entries may, for example, be measurements, test results or treatment instructions
- These may need to be represented as a list, table, a tree or a time series
- Time series might be absolute times or relative to an origin
 - the data at each time point might themselves be complex
- Some time series might have regular intervals, or be intermittent 'bursts'

Structured data



- Information in an Item (a Cluster or Element) might have originated at a date/time different from the care activity or its recording
- Information in an Item might be emphasised by the author as being exceptional or noteworthy



Representing Structure

- In this model, Lists, Tables, Trees are represented by specific configurations of the Cluster Class.
- Encoding rules will be defined, to ensure that the organisation of the data within tables etc. can be consistently communicated (e.g. defining which components will contain row and column headings)

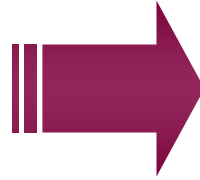
Representing Time Series

- In principle, any time-related sequence of simple or complex data can be represented by the Cluster, with suitable Elements to represent the time points and data value parts.
- In this model, it is recognised that time-series of simple values will be a common occurrence, so the attribute **obs_time** has been provided. Without this attribute, even a simple time series would require a Cluster of Clusters.
- The attribute **obs_time** also provides a way to meet the requirement for the separate recording of the originating date time of the data.

Element

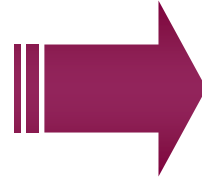
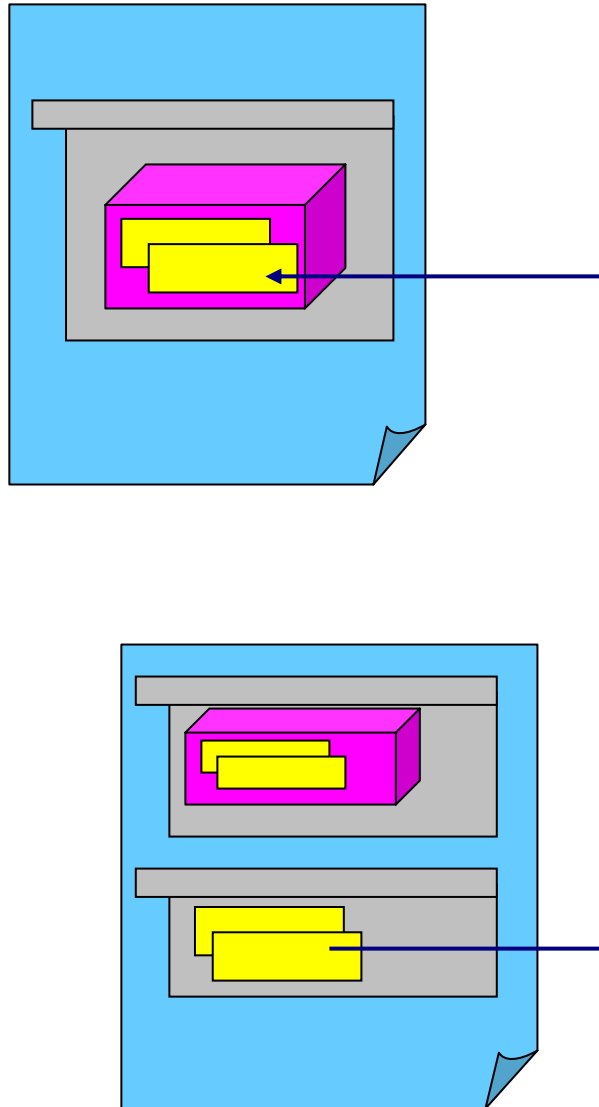


Element

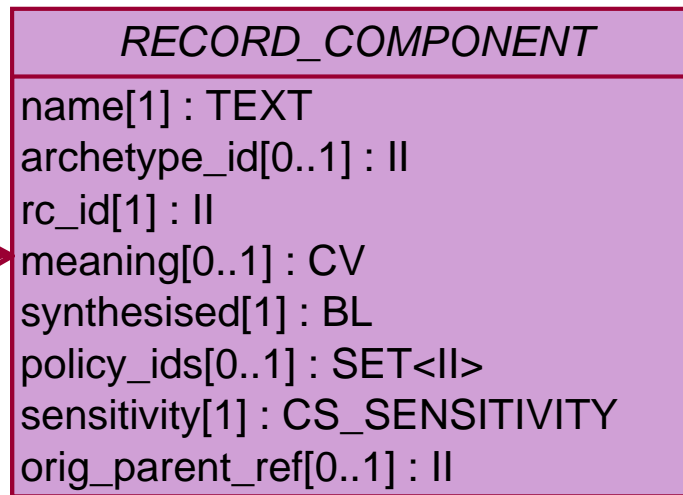
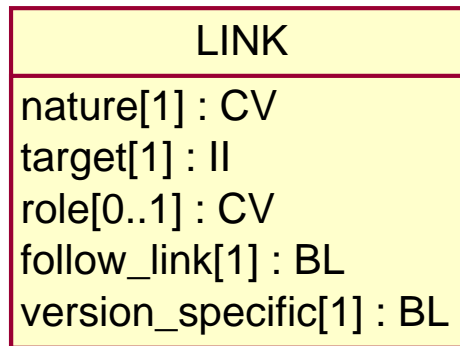


- An Element may have a null data value
 - for example if a value is not known

Links between components



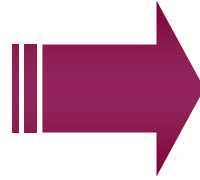
- Links may be required between any two record components
 - e.g. to indicate cause and effect
 - e.g. to track the evolution of orders from request to completion
- These might need to form linkage networks
 - e.g. for clinical problems
 - e.g. for clinical or service episodes



Linkage nets

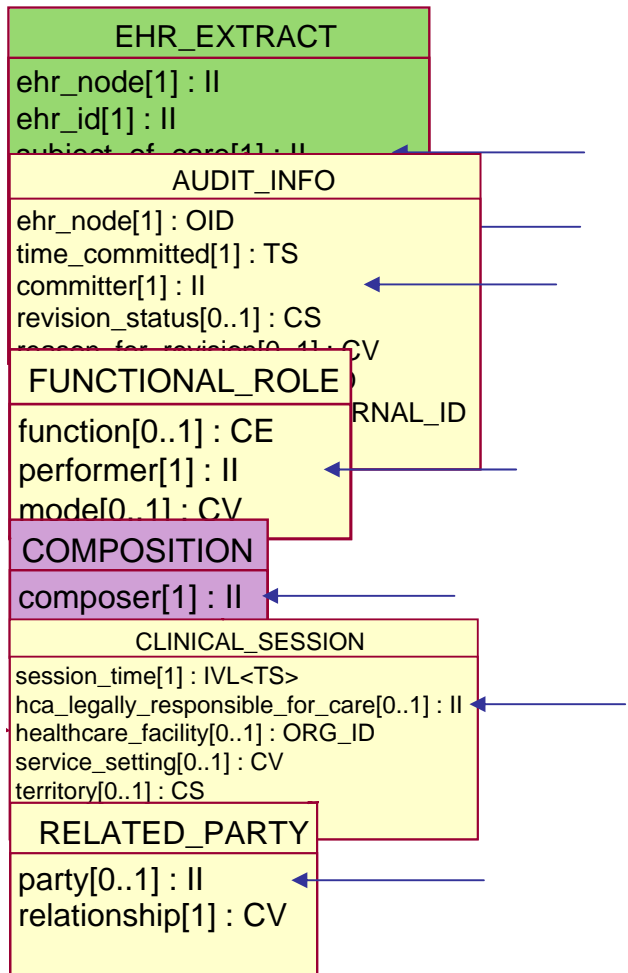
- Networks of links, for example to implement a problem-oriented view of the record, are expected to use an Element to represent the “hub” of the network, with suitable naming and value
 - e.g. **name** = “Problem” and **value** = “dizzy spell”.
- All other components (including future components) that are considered to be related to this problem will have their LINK class instantiated with:
 - the **target_rc_id** attribute pointing to the “hub” element
 - the **nature** attribute set to “problem”
 - the **target_role** attribute set e.g. to “cause” or “contributing factor”.

Data types



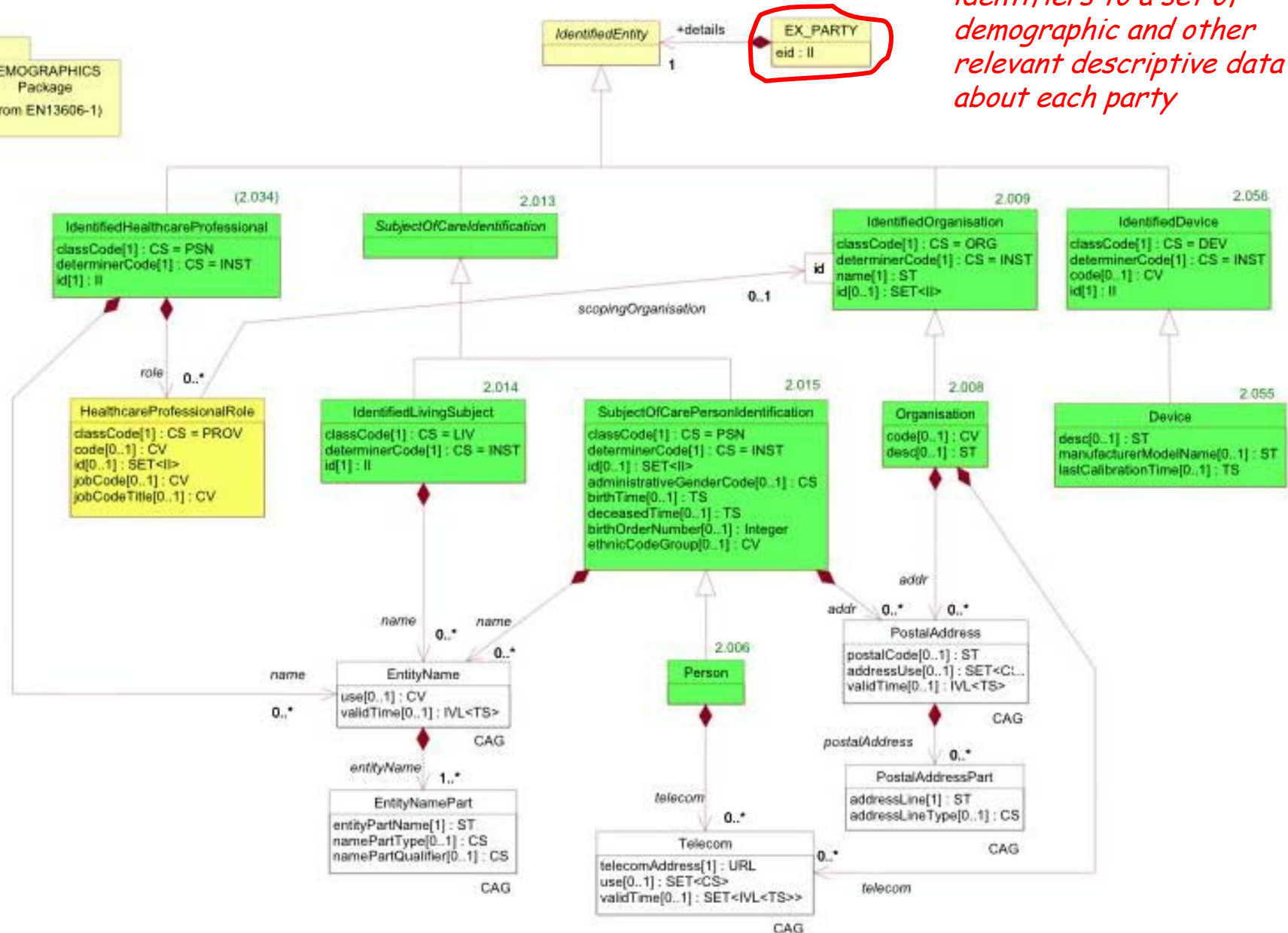
- The Element is the leaf node containing a single data value, which may be
 - text
 - numeric
 - date/time
 - person/software/agent ID
 - graphical
 - other MIME type
 - e.g. image, signal
- Each of these data types has its own context model
- EHRcom uses the new CEN data types

Identifying parties



- Several attributes identify parties that play a role in the EHR
- The data type of these is II (Instance Identifier)
- These identifiers will reference a party whose basic demographic data is provided in a distinct part of the Extract model
 - requiring each party to be defined only once per Extract
- The demographic model uses the CEN GPICs
 - General Purpose Information Components
 - (derived from the HL7 RIM)

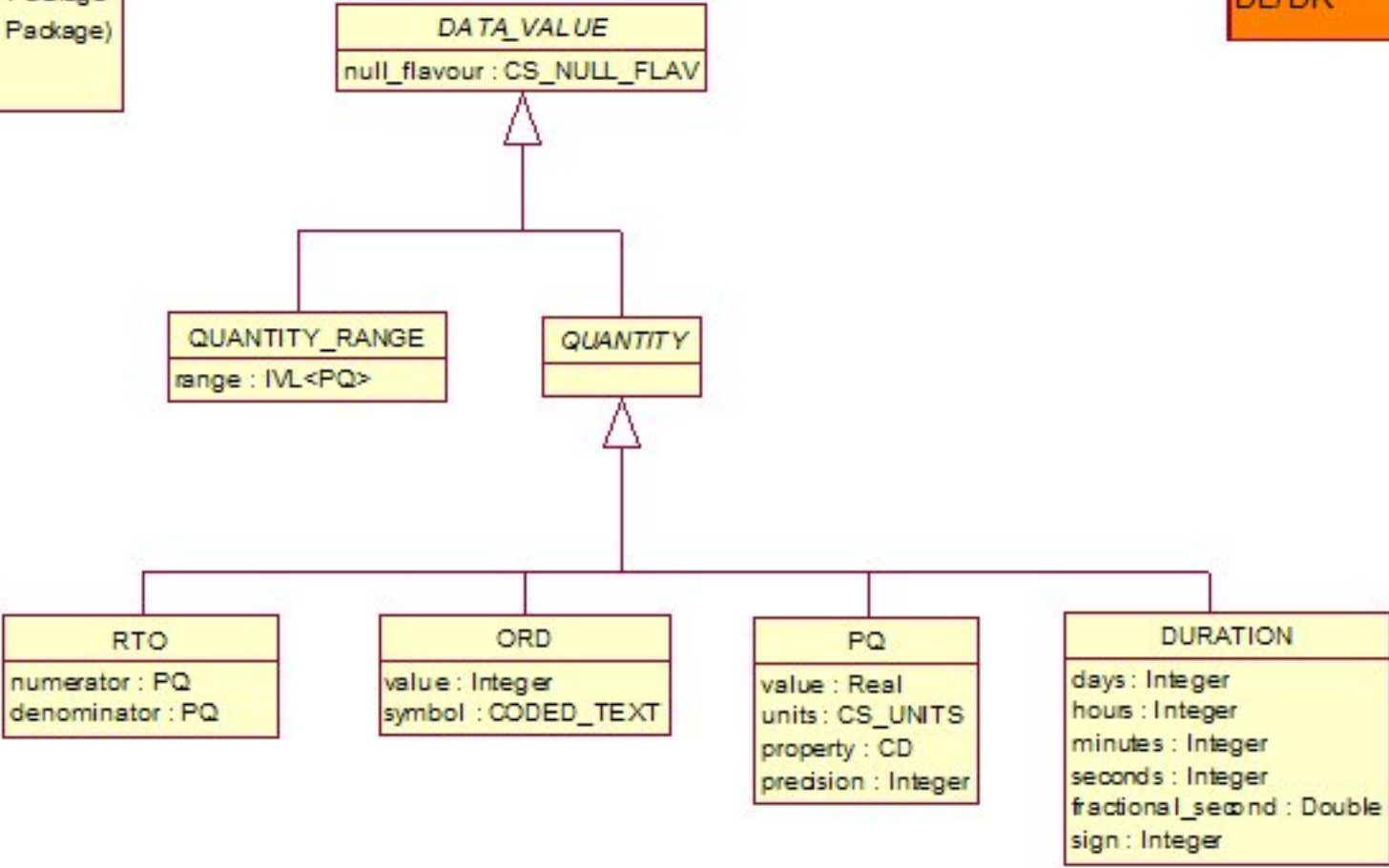
DEMOGRAPHICS
Package
(from EN13606-1)



this attribute links those identifiers to a set of demographic and other relevant descriptive data about each party

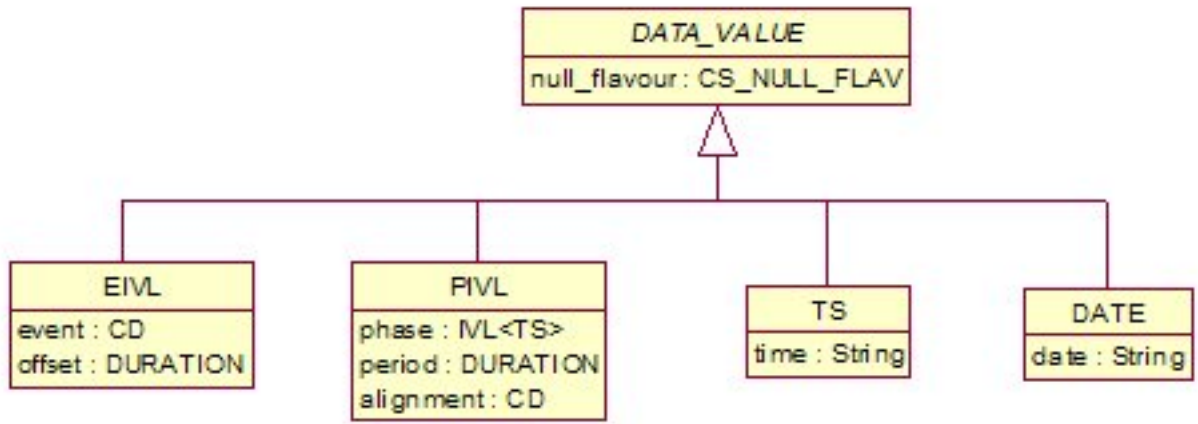
Quantity Package
(from DV Package)

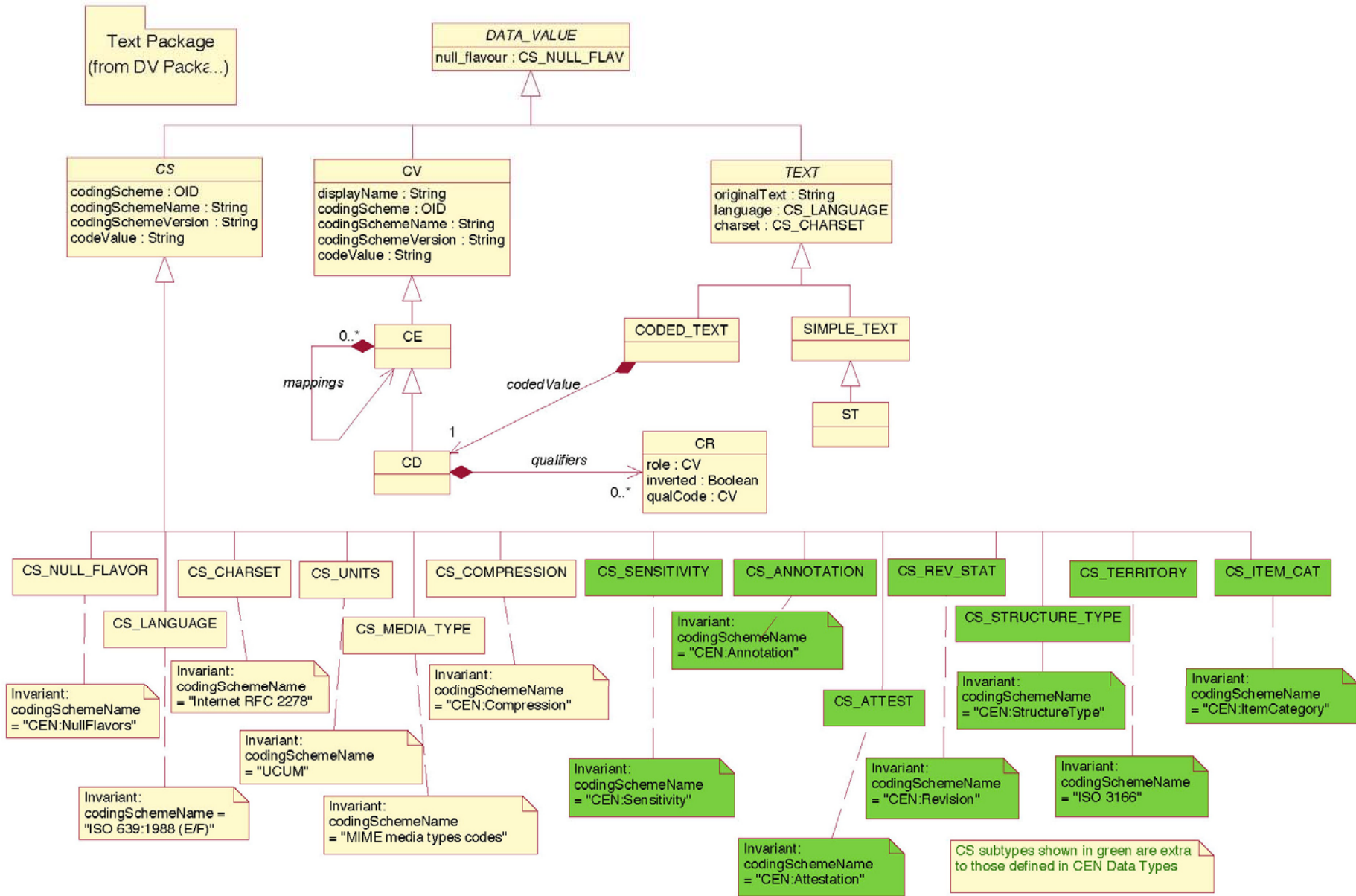
Version Merge2
2004-01-20
DL/DK



Version Merge2
2004-01-20
DL/DK

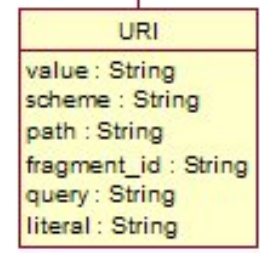
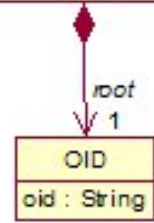
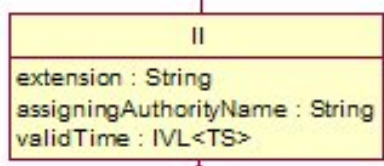
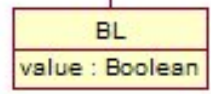
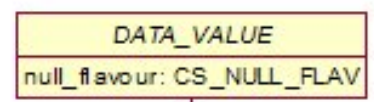
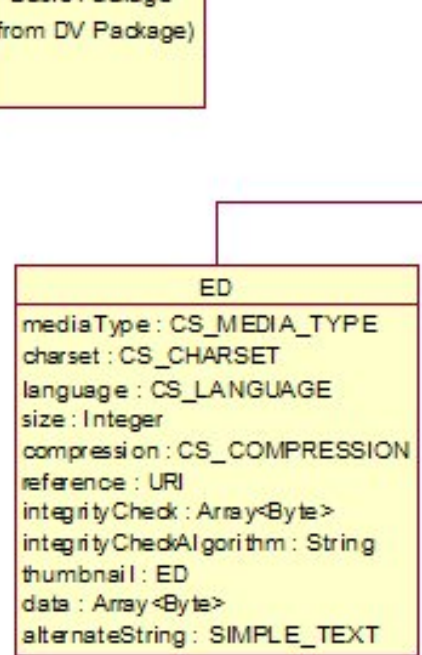
Time Package
(from DV Package)





Version Merge2
2004-01-20
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Basic Package
(from DV Package)



Primitives Package
(from EN13606-1)

Version Merge2
2004-01-20
DL/DK

Note: these classes do not inherit
from DATA_VALUE

