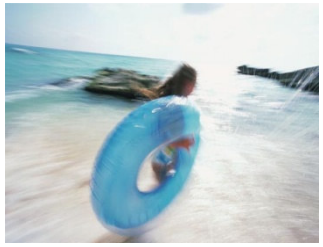
Building an archetype



Heather Leslie
Sam Heard

Ocean informatics
openEHR

Good archetype design

Requires:

a) ~~Minimum Dataset?~~

b) Maximum Dataset?

Each archetype is inclusive of
ALL
attributes clinicians might want to capture about a discrete concept

For each Subject/Activity/Task...

1. Identify all clinical concepts
2. Are there existing archetypes?
   - Re-use wherever possible
   - Modify if neccessary
   - Create a new archetype only if you have to.

1. Identify all clinical concepts

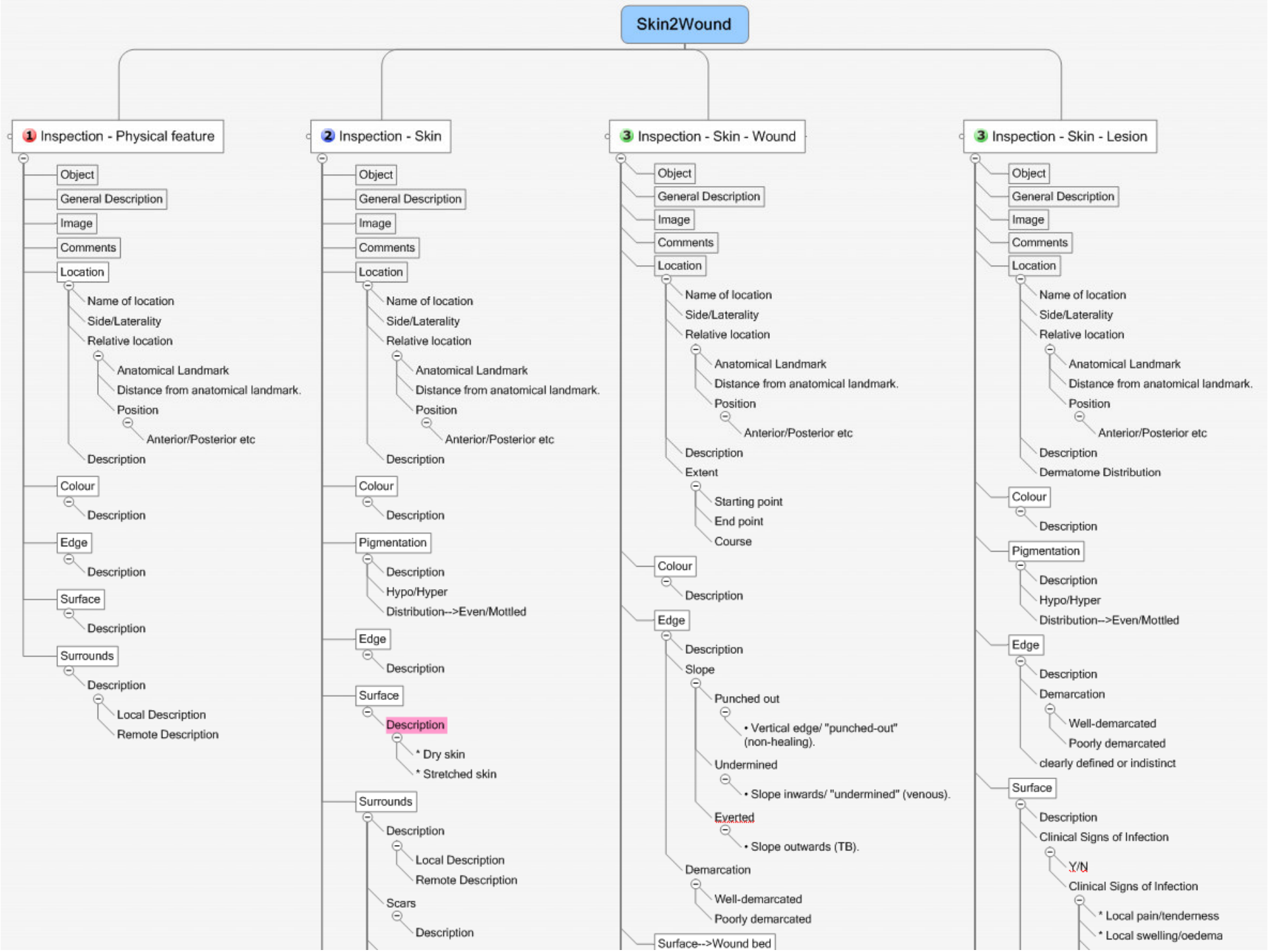
Research your subject/activity/task

- Is it a simple concept (eg Weight)? = 1 archetype, OR
- Is it made up of multiple concepts (eg Pregnancy) = multiple archetypes

Consider using a Mind Map

- Complex ideas become visually clearer
- Easier to identify individual concepts
- Easier to identify and remove any overlap

➔ Identify all discrete, separate clinical concepts involved


Skin2Wound
1 Inspection - Physical feature
Object
General Description
Image
Comments
Location
Name of location
Side/Laterality
Relative location
Anatomical Landmark
Distance from anatomical landmark.
Position
Anterior/Posterior etc
Description
Colour
Description
Edge
Description
Surface
Description
Surrounds
Description
Local Description
Remote Description
2 Inspection - Skin
Object
General Description
Image
Comments
Location
Name of location
Side/Laterality
Relative location
Anatomical Landmark
Distance from anatomical landmark.
Position
Anterior/Posterior etc
Description
Colour
Description
Pigmentation
Description
Hypo/Hyper
Distribution-->Even/Mottled
Edge
Description
Surface
Description
* Dry skin
* Stretched skin
Surrounds
Description
Local Description
Remote Description
Scars
Description
3 Inspection - Skin - Wound
Object
General Description
Image
Comments
Location
Name of location
Side/Laterality
Relative location
Anatomical Landmark
Distance from anatomical landmark.
Position
Anterior/Posterior etc
Description
Extent
Starting point
End point
Course
Colour
Description
Edge
Description
Slope
Punched out
• Vertical edge/ "punched-out" (non-healing).
Undermined
• Slope inwards/ "undermined" (venous).
Everted
• Slope outwards (TB).
Demarcation
Well-demarcated
Poorly demarcated
Surface-->Wound bed
3 Inspection - Skin - Lesion
Object
General Description
Image
Comments
Location
Name of location
Side/Laterality
Relative location
Anatomical Landmark
Distance from anatomical landmark.
Position
Anterior/Posterior etc
Description
Dermatome Distribution
Colour
Description
Pigmentation
Description
Hypo/Hyper
Distribution-->Even/Mottled
Edge
Description
Demarcation
Well-demarcated
Poorly demarcated
clearly defined or indistinct
Surface
Description
Clinical Signs of Infection
Y/N
Clinical Signs of Infection
* Local pain/tenderness
* Local swelling/oedema

2. Are there existing archetypes?

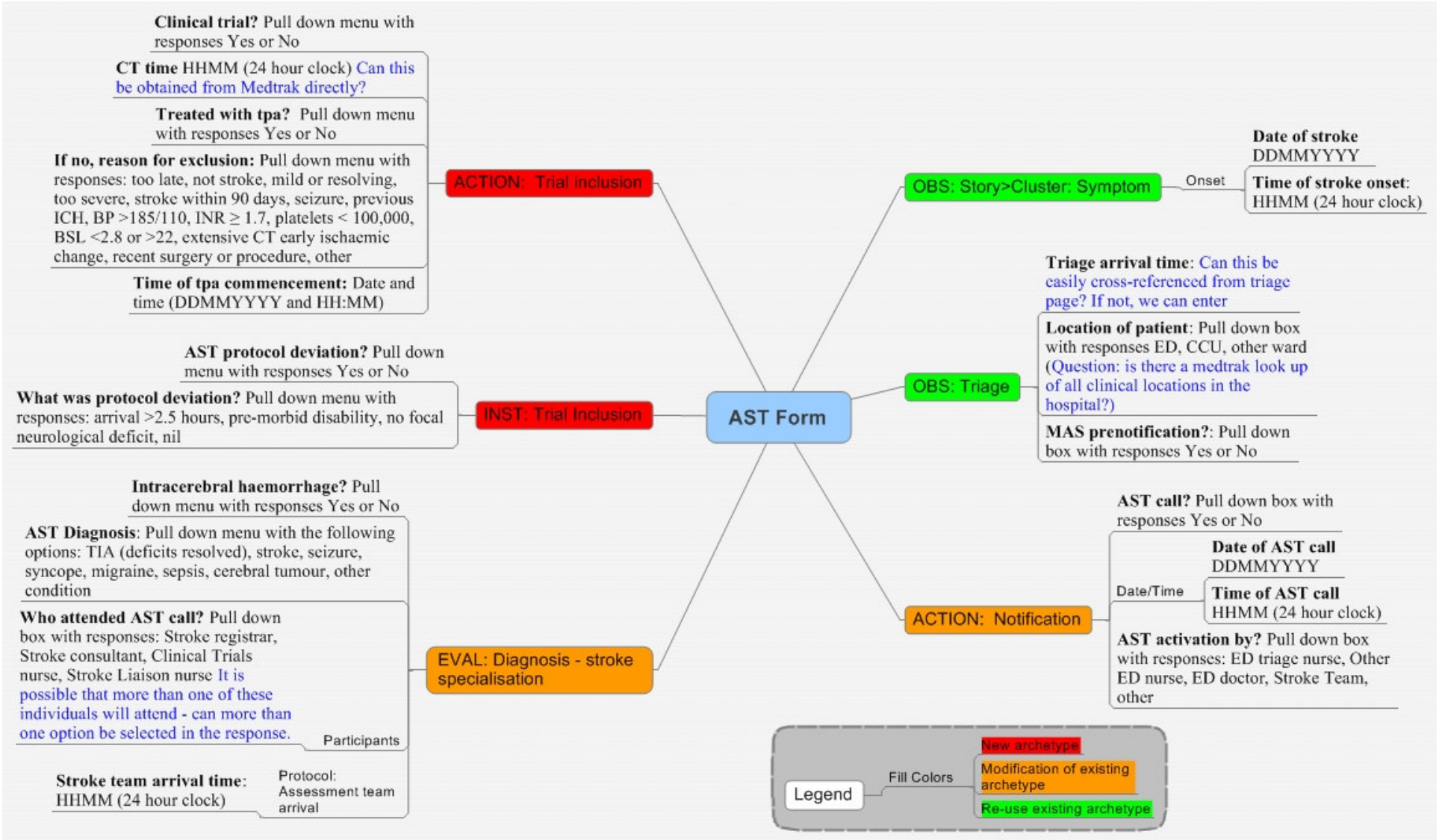
Research existing archetypes

- Pending openEHR archetype repository
- [www.archetypes.com.au]
- [NHS svn repository]
- [Default installation of Archetype Editor]

YES –> Are they a maximal dataset for your purpose?

- YES –use as is
- NO – need modification/additions

NO –> New archetype needed



Reusability

ARCHETYPES	TOTAL	Antenatal booking	Confirmation of pregnancy	Caesarean Section operative notes	Emergency - Abdominal pain	Back Pain	Chest pain	Collapse	Discharge summary	Generic Acute Presentation	Head injury	Joint	Long bone injury	Emergency-Overdose	Shortness of Breath	Antenatal handheld record	First stage labour assessment	Newborn assessment	Partogram	Postnatal assessment	Pregnancy ul	Second	Th
	1030	52	15	28	31	41	45	55	38	71	51	44	51	48	41	26	23	12	42	56	5	17	6
inspection-skin.v1draft	5							1		1	1												
inspection.v1draft	3			1		1					1												
issue.v1draft	12	1			1		1				1			1	1					4			
menstrual_cycle.v1	6	1	1																1				
move-joint.v1	0																						
move-spine.v1	2					1					1												
move.v1	0																						
oedema.v1	6	1					1	1		1					1								
palpation.v1	3					1					1												
percussion.v1	1				1																		
placeholder.v1draft	11					1		8		1	1												
relative_position_abdomen.v1draft	0																						
signs_of_infection.v1draft	1																			1			
size.v1	2																		1		1		
symptom-pain.v1	22				1	1	1	1		1	1	1	1		1		2		2	4		2	
symptom.v1	32	1	1		1	1	1	2		2	1	2	1	1	1					4			
discharge.v1draft	1								1														
encounter.v1draft	19	1	1		1	1	1	1		1	1	1	1	1	1	1	1			1		1	1

For each new archetype...

3. Gather content
4. Organise the content
5. Choose the archetype class
6. Build the archetype
    a) Name the archetype
    b) Select the structure
    c) Add data types
    d) Add constraints
    e) Add metadata
    f) Add terminology
7. Collaborate ➔ Publish
8. Add to a Template

3a Gather content

Consider the clinical concept from all angles:

- Who?
- What?
- Where?
- When?
- How?
- etc
- Max/Min?
- Normal/Abnormal?
- Simple/Complex?
- Complications?
- Be inclusive/expansive
- etc

3b Gathering content - clinical recording

Think about how the clinician may record the data:

- Narrative vs Structured
- Normal statements
- “Nil significant”
- Graphical
- Image/Multimedia
- Terminology binding – what terms need to be bound to terminology?

Different clinicians may prefer different methods

Different levels of detail – Clinical description (as free text) vs Details in structure format

3c Gathering Content - Sources

- What we are using now – ‘don’t reinvent the wheel’
  - Forms
  - Applications etc
- Minimum Data Sets
  - National/State/Local
  - Specialised
  - Reporting/Clinical
- Internet
  - Local/International
  - Similar Projects
- Written
  - Textbooks/publications

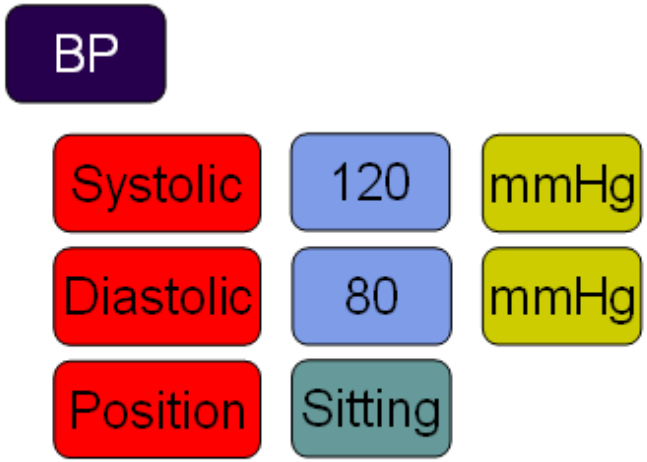
3d Gathering content - domain breadth

- Medical
- Nursing
- Allied Health
- Dental
- Researchers
- Public Health
- Clinical Decision Support
- Personal Health Record
- Devices
- ETC...

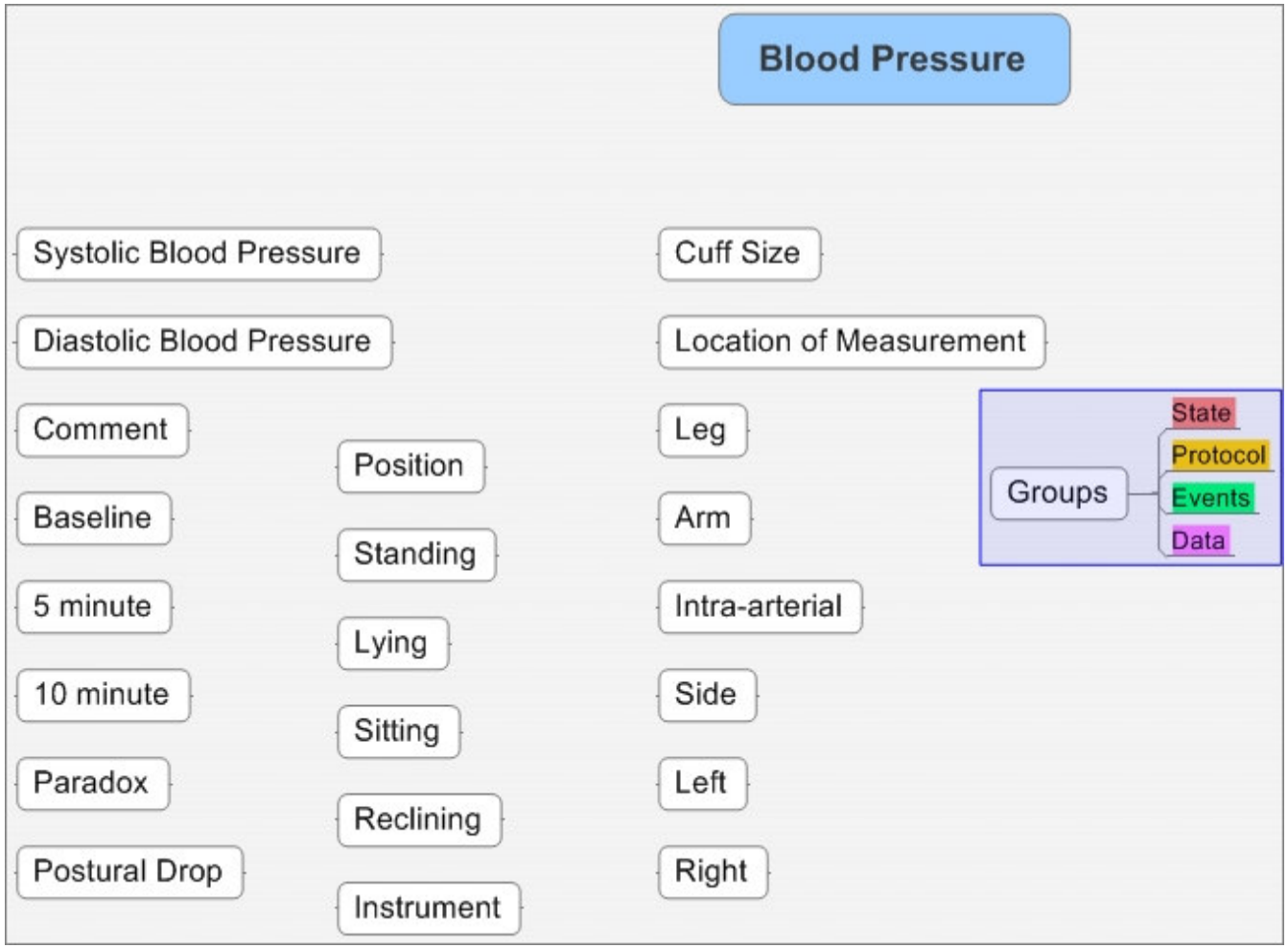
Example - Blood Pressure

Structure:

BP: 120/80



Brainstorm → Mind Map dump

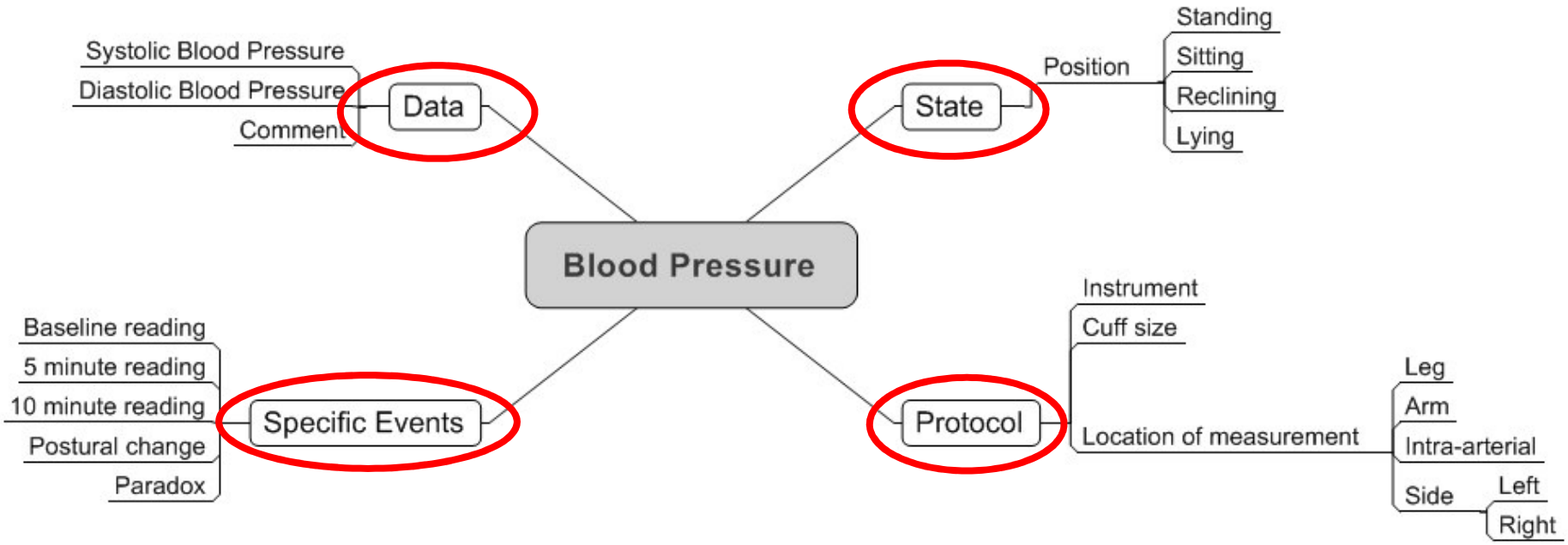


4. Organising the content

Consider a Mind Map

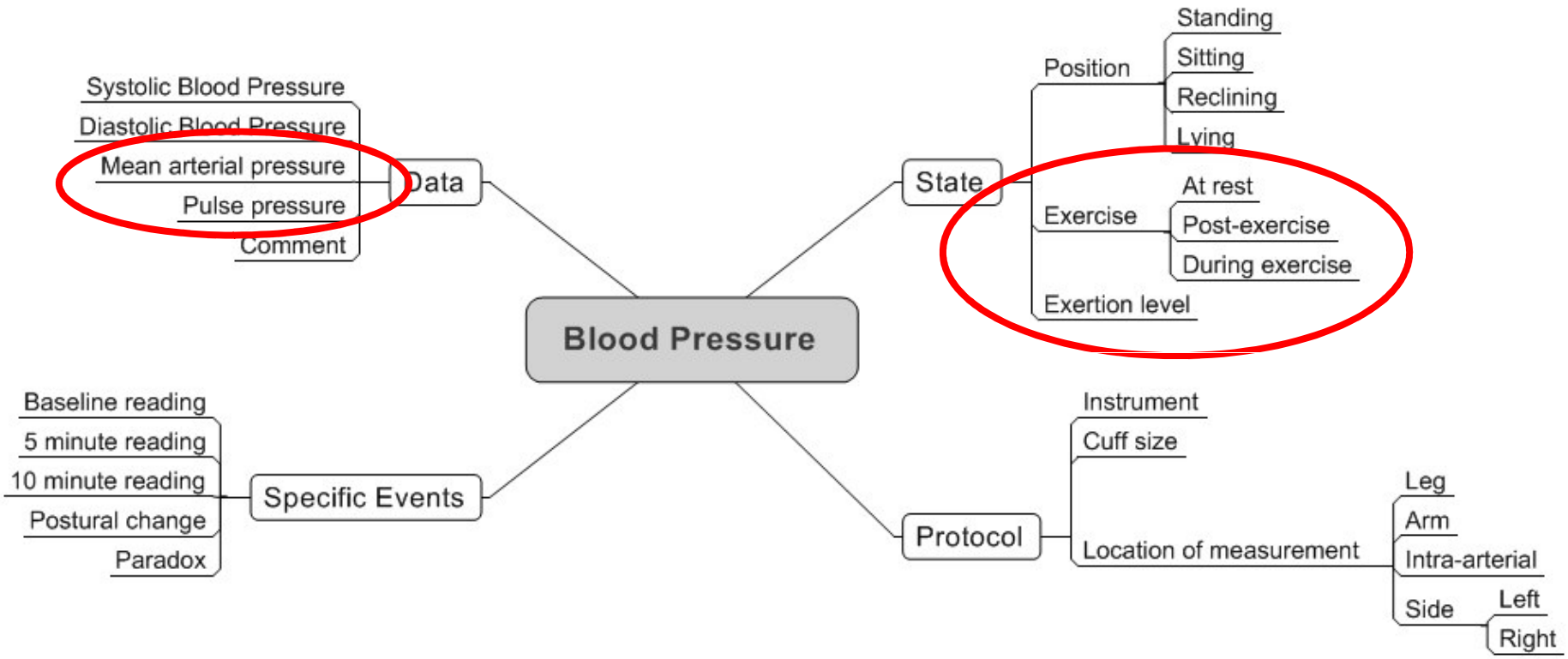
- Focus on identifying:
  - Purpose – container or navigation
  - Context
  - Data elements
  - Protocol
  - State – context for interpretation
  - Allowable Events
  - Pathway steps
  - Concepts needing coding/terminology

Organise Blood Pressure



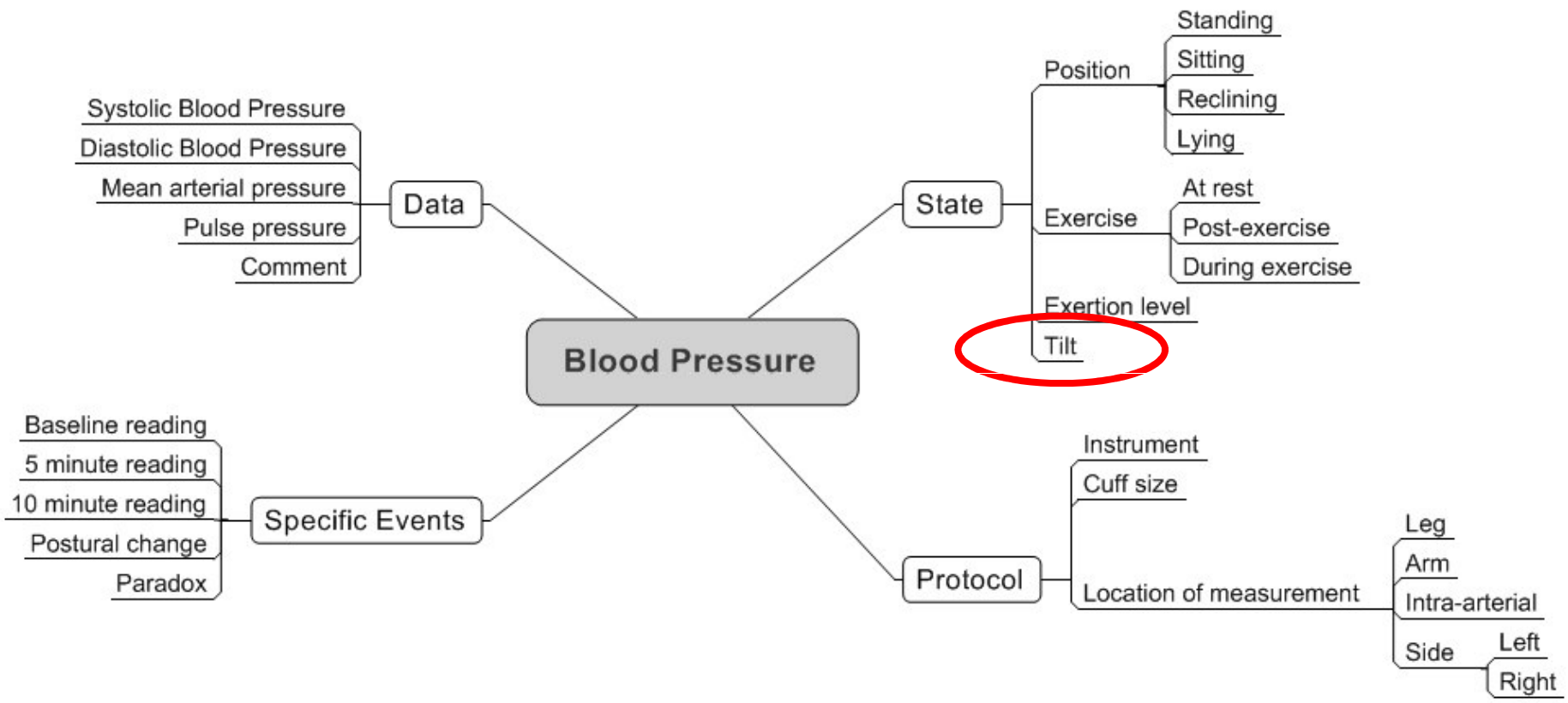
Then…WHAT HAVE WE MISSED?

Blood Pressure #2



…additional input from cardiologists

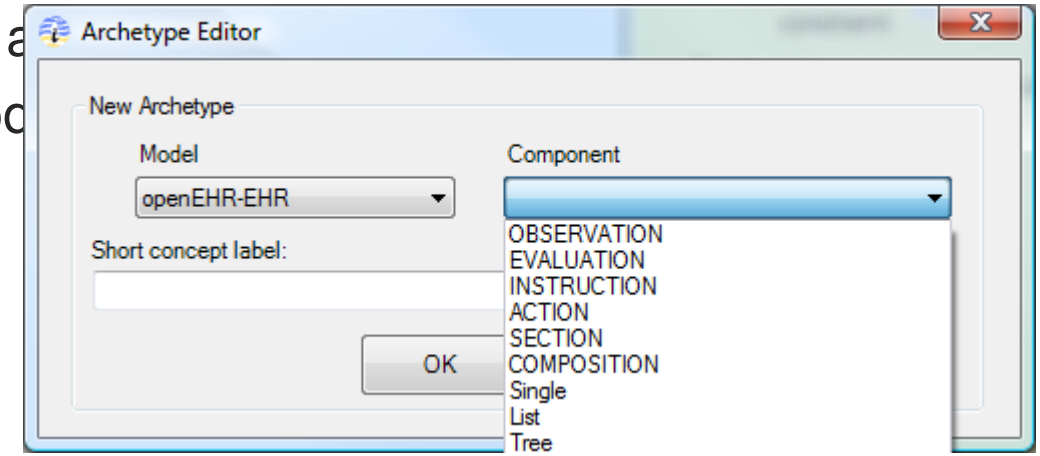
Blood Pressure #3



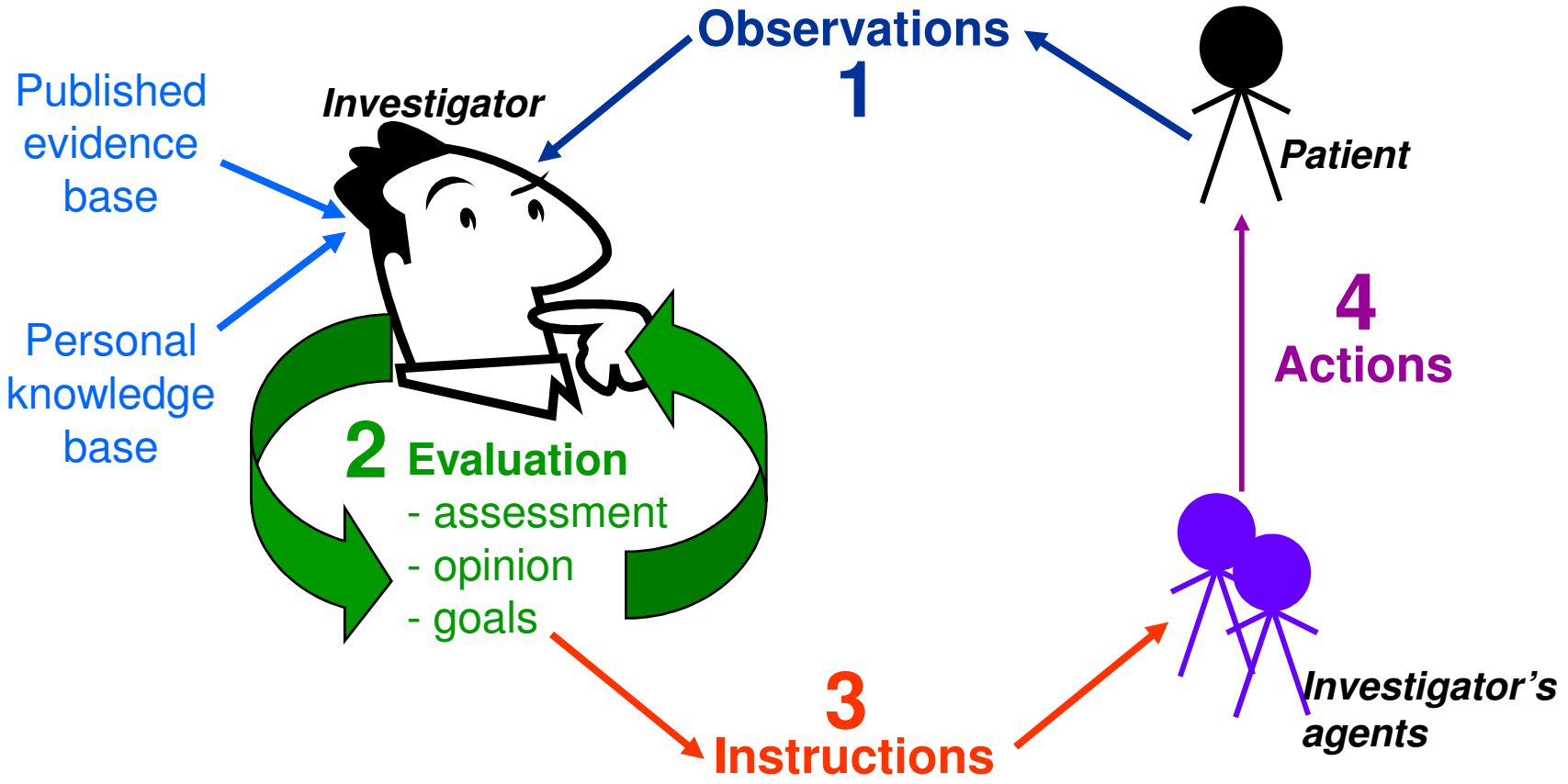
…and researchers → COLLABORATE!

5. Choose the archetype class

- Composition: document or container
- Section: layout and human navigation
- Entry: clinical statement, constant meaning
  - Action, Evaluation, Instruction, Observation
  - Reusable within entries
    - Structure (list, table, tree, single) (embedded)
    - Cluster (node in a
    - Element (leaf noc



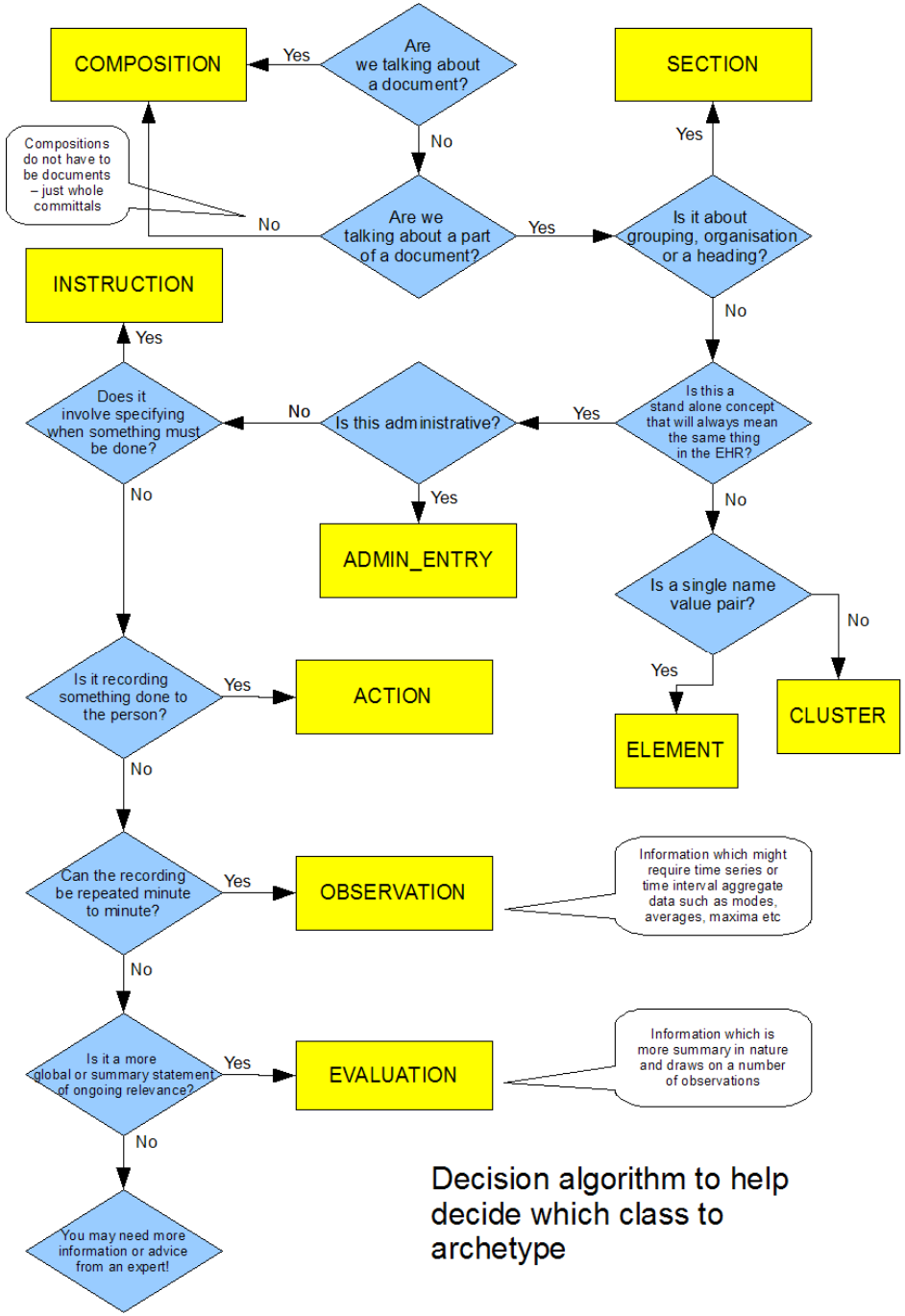
Class ⟷ Clinical process



Entry class features

Feature	*Eval*	*Obs*	*Inst*	*Act*	*Adm*
Subject - who it relates to	✔	✔	✔	✔	✔
Protocol - how, recording	✔	✔	✔	✔	
History - time-series, aggregates		✔			
State - data for interpretation		✔			
Pathway - work flow steps, states				✔	

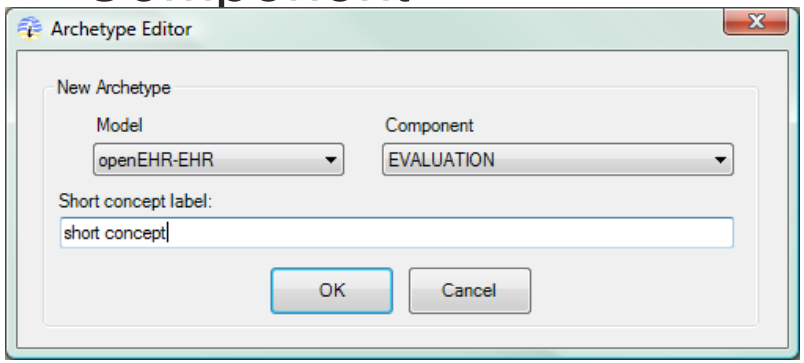
Which entry class?



Decision algorithm to help decide which class to archetype

6a Start a new Archetype

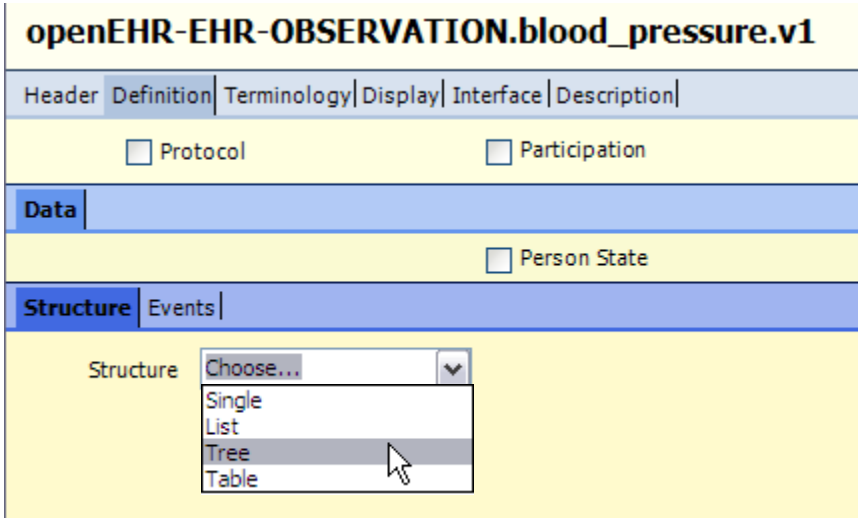
1. Select ‘New’ archetype
2. Select the type of archetype – ‘Component’
3. Name the archetype:
   - = Short concept label
   - Must be unique
   - Easily changed if necessary
   - Examples of some not-so-good names:
     - social_and_community_network
     - termination_patient_information_checklist
4. Next screen - Header Tab
   - Name the concept (usually same or similar to the ‘short concept label’
   - Describe the concept



6b Definition Tab

Choose the structure

- SINGLE is for a very simple archetype that must not get cluttered
- Use a LIST for simplicity and layout
- If in doubt choose a TREE for most flexibility
- TABLE when a matrix is needed

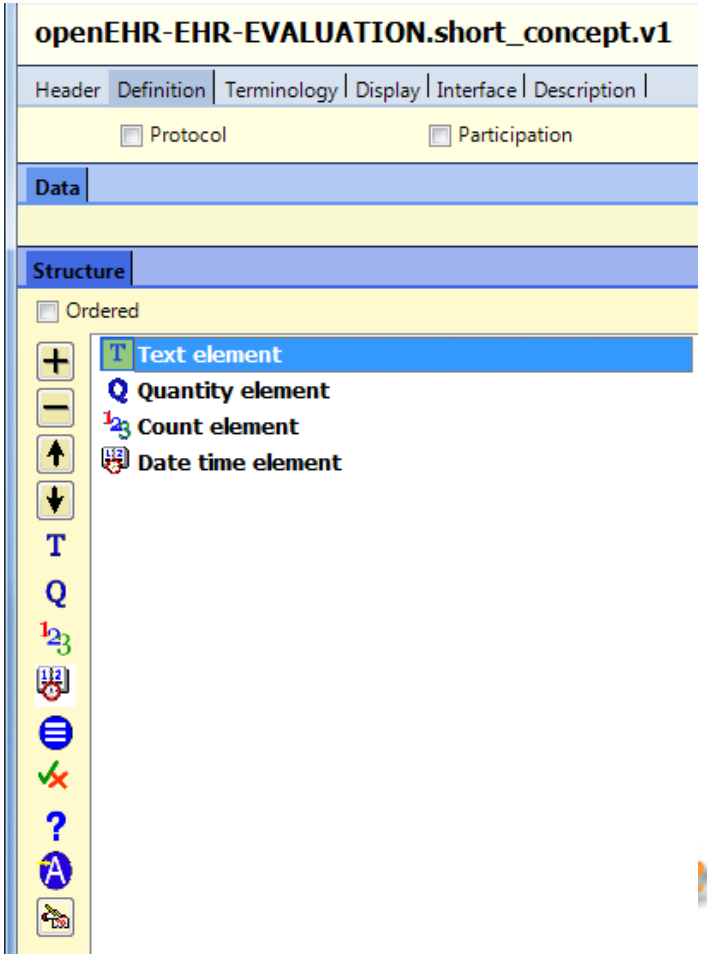


Note – an archetype structure can be modified later – by right clicking on the structure and reselect

6c Add the archetype content

‘Drag and drop’ Data Types into the Data, Protocol and State tabs

- Quantity
- Count
- Duration
- Text types
- Date/times



Demonstration Observation Archetype

Entity: OBSERVATION

Concept description:	**Identification:**
Demonstration archetype with descriptions and explanations	*Id*: openEHR-EHR-OBSERVATION.demo.v1draft *Reference model*: openEHR_EHR

Data

Concept	Description	Constraints	Values
Cluster 1	This is a symbol for a cluster which can have other elements 'nested' within it	***Cluster*** 0..*	
Free text or coded	Text which can be coded or free text	***Text*** 1..1	Text;
Text that uses Internal codes	Text which can use internal terms	***Text*** 0..1	Internal; 'Lying', 'Reclining', 'Sitting', 'Standing'
Text that is sourced from an external terminology	Text from an external terminology	***Text*** 0..1	Terminology; New constraint

Quantity	A quantity or measurement associated with appropriate units - can range from length through to units of pressure, volume, mass, etc etc. These are derived from ISO standards and allow for use of either imperial or metric units.	***Quantity*** 0..1	Property = Length Units = cm; Units = mm; Units = in; Units = ft;
Count	Count - an integer with no units eg for number of standard drinks of alcohol in a week, or number of previous pregnancies	***Count*** 0..1	*
Proportion	Allows for percentage, fractions and proportions to be modelled	***Proportion*** 0..1	1..100 : <=100
Date/Time	Allows entry of a date and/or time, including partial dates	***DateTime*** 0..1	Allow all
Ordinal	Ordinals pair a number and text - in this way scores can be calculated in software, or progression can be assessed eg if used in a pain score	***Ordinal*** 0..1	0: *No pain* *1: Slight pain* *2: Mild pain* *3: etc* *5: Moderate pain* *6: etc* *10: Most severe pain*
Duration	Allows for recording duration of clinical concepts, including minimum and maximum values	***Duration*** 0..1	Units: yr, min, wk, min
Boolean	Allows for true or false answers. The underlying reference model also caters for not answered or not known here, but is not required to be specific in the archetype.	***Boolean*** 0..1	True, False

Multimedia	Can allow for the inclusion of many types of multimedia files to be captured	***MultiMedia*** 0..1	
Any type of element	This element can be specified or constrained in a template or at run-time	***Any*** 0..1	
Choice	The Choice allows for a number of types of element to be specified and which can constrained or selected within a template or at run-time	***Quantity*** --- ***Count*** 0..1	Property = --- *
Cluster 2	This is a symbol for a cluster which can have other elements 'nested' within it	***Cluster*** 0..1	
Cluster		***Slot*** ***Include:*** inspection.v1draft palpation.v1draft	

State

Concept	Description	Constraints	Values
State	The concept of state is recorded using the same range of elements described above. It is used to proved a context to the data so that it may safely be interpreted.	***Text*** 0..1	Internal;

Event Series

Events	Description	Constraints
Any event – Point in time	**This is the default event that can record any observation - in this case it is recorded at a point in time**	PointEvent
Any event - Interval	**This is the default event that can record any observation - in this case it is recorded over an interval and can reflect some mathematical functions - in this case it is change, but can also be decrease, increase, maximum, minimum, mean, median, mode, total and variation**	IntervalEvent Event math function = change
Specific event or action	**This records the data related to a specific event or action**	PointEvent
Baseline	**This event is a specific event simpley renamed as baseline**	PointEvent
Time based offset to baseline	**This event records a point in time with a fixed offset of 5 minutes from a baseline**	PointEvent Offset = 5 min

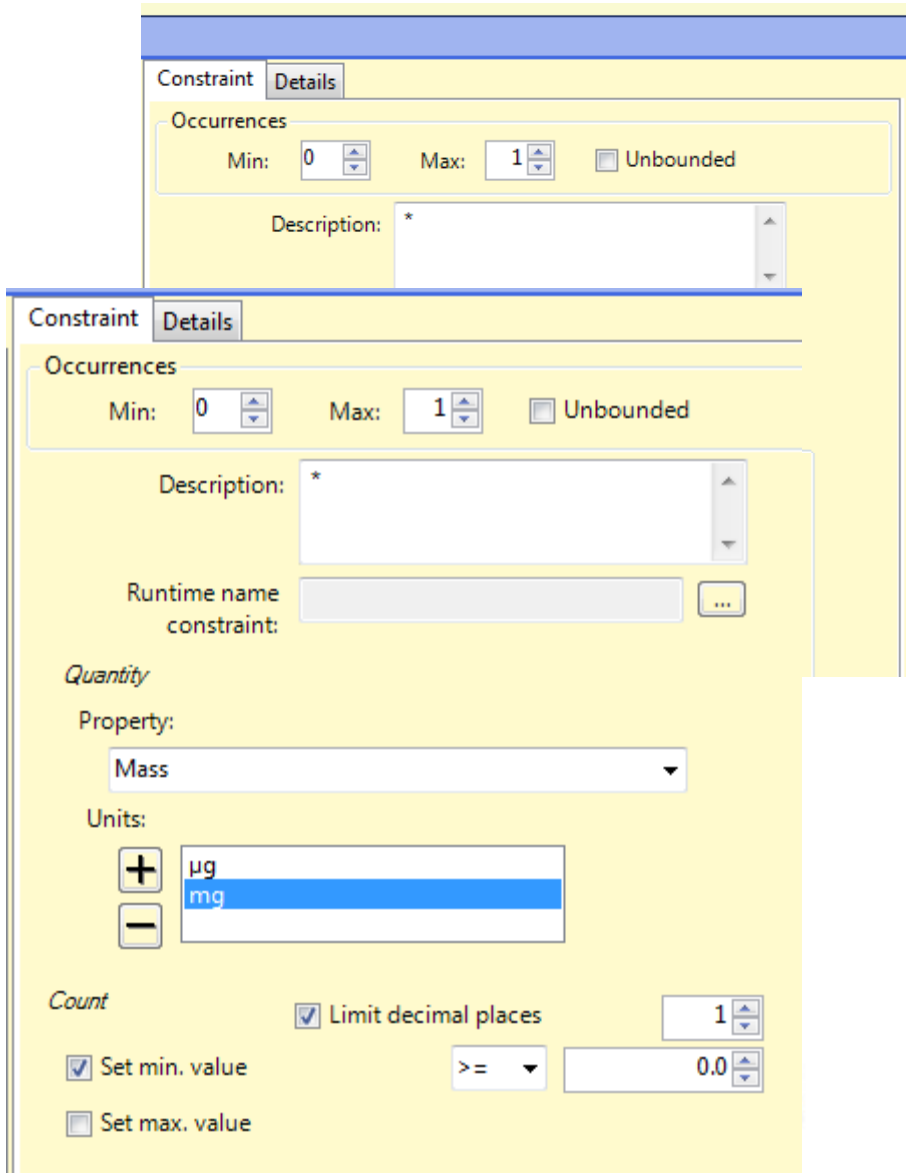
Protocol

Concept	Description	Constraints	Values
T Method	Aspect of protocol can be gathered by using the same elements as defined above. Protocol reflects the way the data is gathered.	***Text*** 0..1	Internal;

6d Add constraints

Consider

- Occurrences
- Allowed values
- Ranges
- Decimal places
- Ordinal values
- Etc...

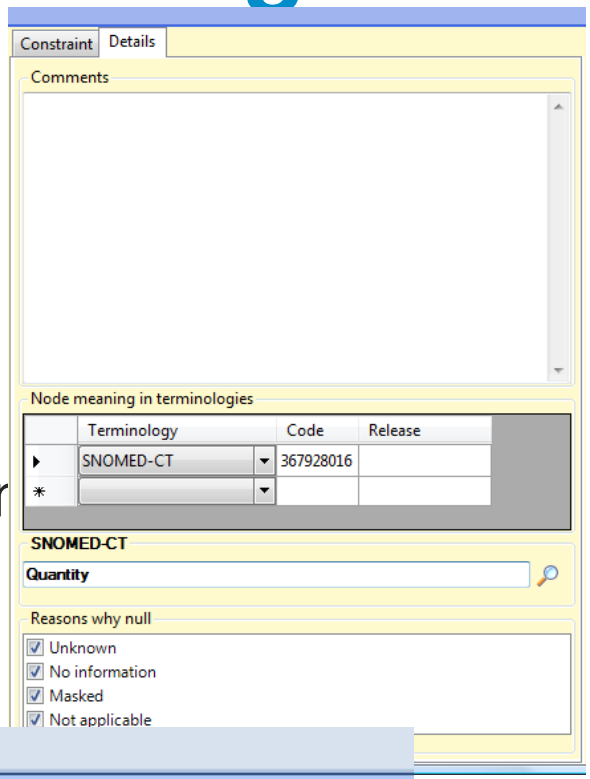


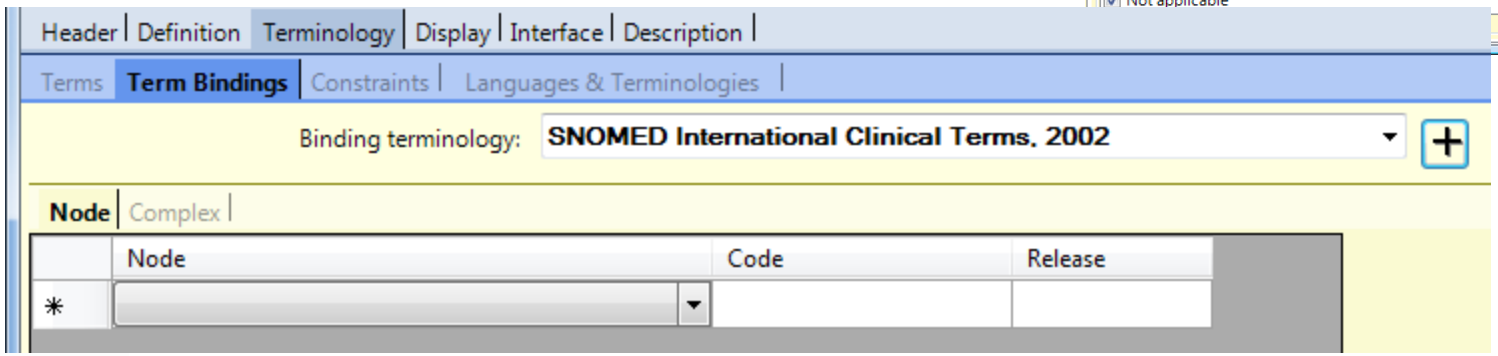
Ocean Informatics

6e Add terminology bindings

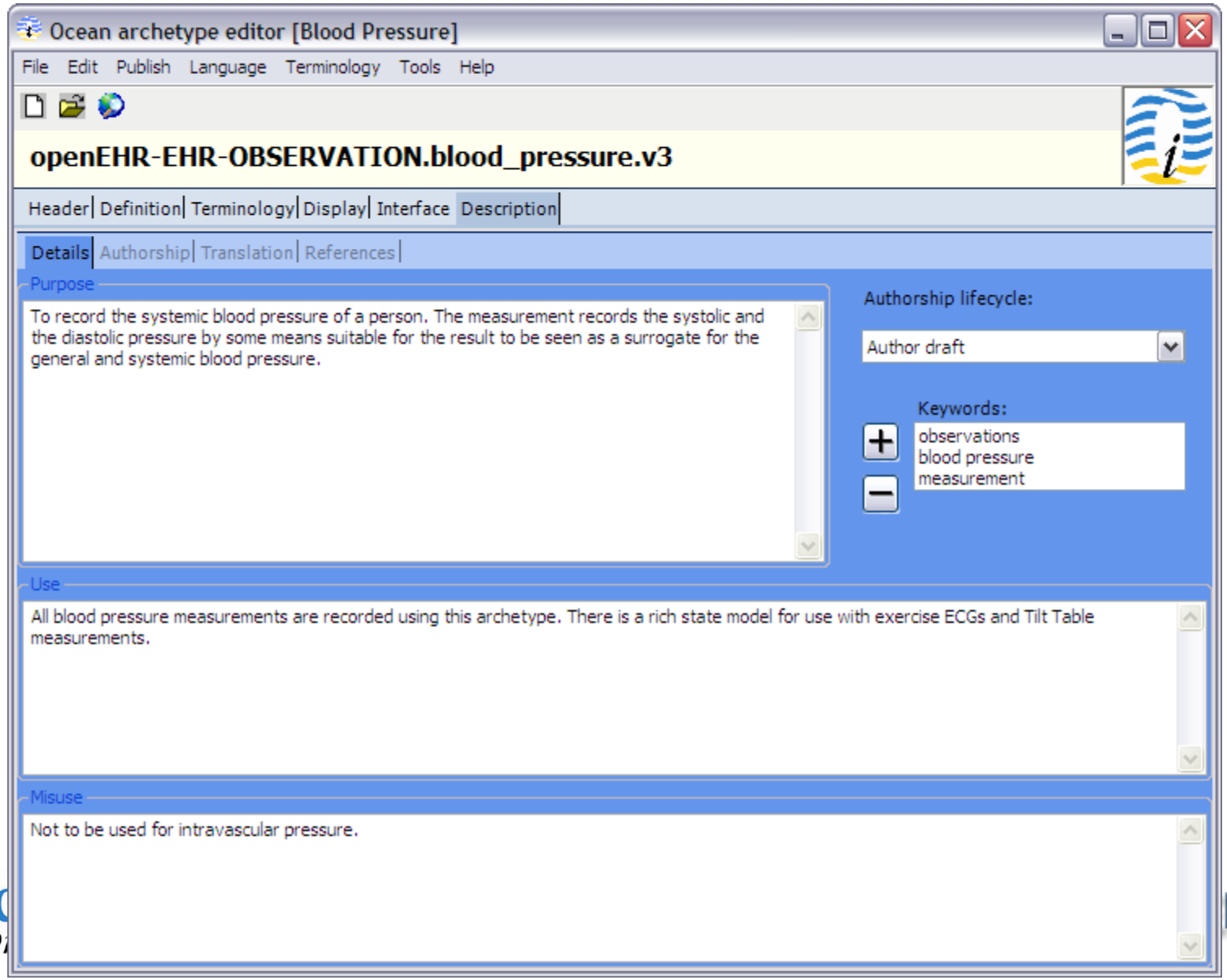
Add terminology bindings

- Semantic tagging
  - The meaning of a node
- Value sets
  - Appropriate value sets from a terr





6f Add metadata



Save, View and Export

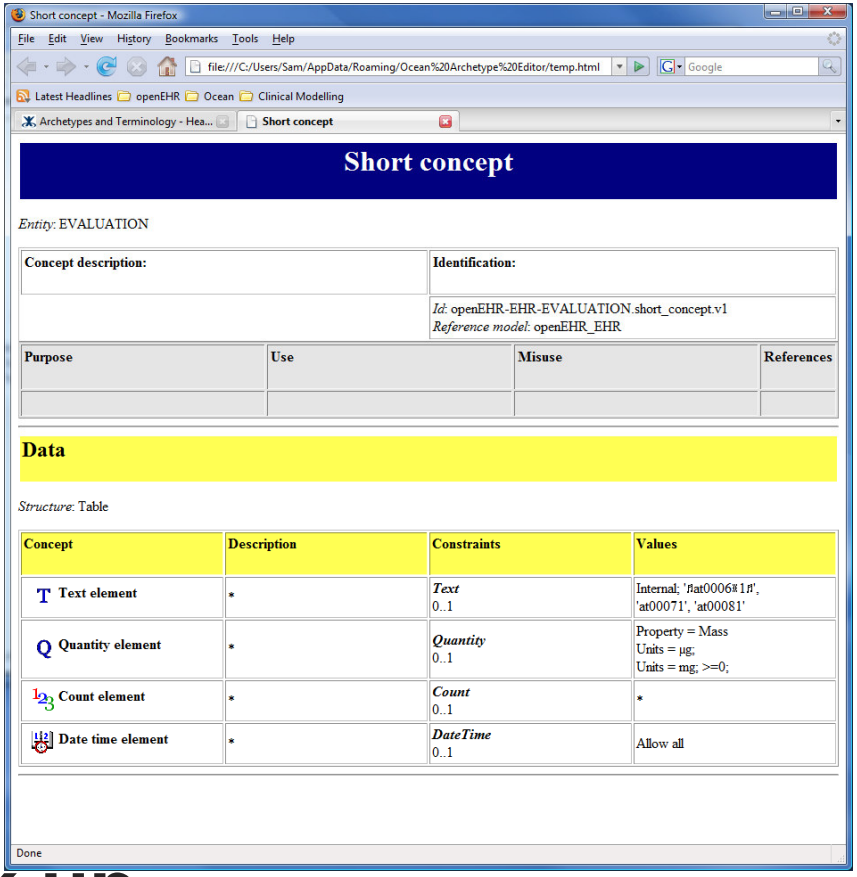
Save the archetype

- As ADL (default)
- As XML

View/Print output

- HTML
- ADL, XML
- RTF

View Interface mock up



Design of archetypes

- **Wholeness**
  - The information in each archetype should be able to be interpreted in isolation

    = MAXIMAL data set
  - Each archetype should be as complete as possible
    - Multiple sectors
    - Multiple purposes
    - Multiple priorities

Design of archetypes

- **Wholeness**
- **Discrete**
  - Try to represent a single concept within a single archetype
  - Don't try to model the too much at once
    - Small is good → multiple archetypes can be combined within larger composite archetypes
  - Overlapping concepts, where possible, should be resolved into a set of archetypes which do not overlap

Design of archetypes

- **Wholeness**
- **Discrete**
- **Specialisation**
  - Used to resolve overlapping concepts with different information requirements
  - Allows:
    - new data points to be added
    - further constraint on existing data points

Design of archetypes

- **Wholeness**
- **Discrete**
- **Specialisation**
- **Approach**
  - Organise by simple, generic and re-usable principles eg measurement or palpation
  - Archetypes are content models, not models of reality – that is SNOMED's role

Useful URLs

1. www.openehr.org
2. www.oceaninformatics.com
3. Archetype Repository Prototype: www.archetypes.com.au
4. NHS 13606 project: www.ehr.chime.ucl.ac.uk/display/nhsmodels/
5. SNOMED

http://terminology.vetmed.vt.edu/sct/menu.cfm

Assumptions

You know

- The archetype classes and their attributes & features
- What you don't need to archetype
- What can be archetyped

You have the background material in a usable form

You know what archetypes are already available