Designing Archetypes

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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
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
2. Are there existing archetypes?

Research existing archetypes

- openEHR CKM www.openehr.org/ckm
- NEHTA CKM
- NHS archetypes
- Other DCM sources

- YES
  - Are they a maximal dataset for your purpose?
    - NO : need modification/additions
  - NO : New archetype needed
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
Brainstorm...
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

- **Systolic:** 120 mmHg
- **Diastolic:** 80 mmHg
- **Position:** Sitting
Brainstorm → Mind Map dump

Blood Pressure

- Systolic Blood Pressure
- Diastolic Blood Pressure

Comment
- Baseline
- 5 minute
- 10 minute
- Paradox
- Postural Drop

Position
- Standing
- Lying
- Sitting
- Reclining
- Instrument

Cuff Size
- Location of Measurement

- Leg
- Arm
- Intra-arterial
- Side
- Left
- Right

Groups
- State
- Protocol
- Events
- Data
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 tree)
  - Element (leaf node)
Which entry class?

Decision algorithm to help decide which class to archetype.
Entry Class ↔ Clinical process

1. Observations
   - Time/Event series; State
   - measurable or observable

2. Evaluation
   - clinically interpreted findings
   - Domain Expert
   - OR
   - Persistent Summary
   - Published evidence base
   - Personal knowledge base

3. Instructions
   - order or initiation of a workflow process

4. Actions
   - Recording each activity
   - Investigator’s agents

5. Admin Entry
   - Recording each activity

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# Entry class features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Eval</th>
<th>Obs</th>
<th>Inst</th>
<th>Act</th>
<th>Adm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject</strong></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
</tr>
<tr>
<td>- who it relates to</td>
<td></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
</tr>
<tr>
<td>- how, recording</td>
<td></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
</tr>
<tr>
<td><strong>History</strong></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- time-series, aggregates</td>
<td></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>State</strong></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- data for interpretation</td>
<td></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pathway</strong></td>
<td></td>
<td></td>
<td></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
</tr>
<tr>
<td>- work flow steps, states</td>
<td></td>
<td></td>
<td></td>
<td>![ ✔ ]</td>
<td>![ ✔ ]</td>
</tr>
</tbody>
</table>
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
- In almost situations, 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 – for example:

- Quantity
- Count
- Duration
- Text types
- Date/times
# Node datatypes

## Demonstration Observation Archetype

**Entity:** OBSERVATION

<table>
<thead>
<tr>
<th>Concept description:</th>
<th>Identification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration archetype with descriptions and explanations</td>
<td>Id: openEHR-EHR-OBSERVATION.demo.v1draft</td>
</tr>
<tr>
<td></td>
<td>Reference model: openEHR_EHR</td>
</tr>
</tbody>
</table>

## Data

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
<th>Constraints</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clusters</td>
<td>This is a symbol for a cluster which can have other elements 'nested' within it</td>
<td>Cluster 0..*</td>
<td></td>
</tr>
<tr>
<td>Text or coded</td>
<td>Text which can be coded or free text</td>
<td>Text 1..1</td>
<td>Text;</td>
</tr>
<tr>
<td>Text</td>
<td>Text which can use internal terms</td>
<td>Text 0..1</td>
<td>Internal; 'Lying', 'Reclining', 'Sitting', 'Standing'</td>
</tr>
<tr>
<td>Text sourced from an</td>
<td>Text from an external terminology</td>
<td>Text 0..1</td>
<td>Terminology; New</td>
</tr>
<tr>
<td>external terminology</td>
<td></td>
<td></td>
<td>constraint</td>
</tr>
</tbody>
</table>
| **Q** 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**  
|  
|  
| Property = Length  
| Units = cm;  
| Units = mm;  
| Units = in;  
| Units = ft; |  

| 123 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 | * |  

| 1:2 Proportion | Allows for percentage, fractions and proportions to be modelled | **Proportion**  
|  
| 0..1 | 1..100 : <=100 |  

| 12 DateTime | 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 |  

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<table>
<thead>
<tr>
<th><strong>Multimedia</strong></th>
<th>Can allow for the inclusion of many types of multimedia files to be captured</th>
<th><strong>MultiMedia</strong></th>
<th>0..1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Any type of element</strong></td>
<td>This element can be specified or constrained in a template or at run-time</td>
<td><strong>Any</strong></td>
<td>0..1</td>
</tr>
<tr>
<td><strong>Choice</strong></td>
<td>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</td>
<td><strong>Quantity</strong></td>
<td>Property =</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0..1</td>
</tr>
<tr>
<td><strong>Cluster 2</strong></td>
<td>This is a symbol for a cluster which can have other elements 'nested' within it</td>
<td><strong>Cluster</strong></td>
<td>0..1</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td></td>
<td><strong>Slot Include:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>inspection.v1draft</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>palpation.v1draft</td>
<td></td>
</tr>
</tbody>
</table>

### State

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
<th>Constraints</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T State</strong></td>
<td>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.</td>
<td><strong>Text</strong></td>
<td>Internal;</td>
</tr>
</tbody>
</table>
### Event Series

<table>
<thead>
<tr>
<th>Events</th>
<th>Description</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any event – Point in time</td>
<td>This is the default event that can record any observation - in this case it is recorded at a point in time</td>
<td>PointEvent</td>
</tr>
</tbody>
</table>
| 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 simply 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

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
<th>Constraints</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>T Method</td>
<td>Aspect of protocol can be gathered by using the same elements as defined above. Protocol reflects the way the data is gathered.</td>
<td>Text 0..1</td>
<td>Internal;</td>
</tr>
</tbody>
</table>
6d Add constraints

Consider

- Occurrences
- Allowed values
- Ranges
- Decimal places
- Ordinal values
- Etc...
6e Add terminology bindings

Add terminology bindings

- Semantic tagging
  - The meaning of a node
- Termsets – it is possible
  - Never yet in an archetype!!
6f Add metadata

Purpose
To record the systemic blood pressure of a person. The measurement records the systolic and the diastolic pressure by some means suitable for the result to be seen as a surrogate for the general and systemic blood pressure.

Use
All blood pressure measurements are recorded using this archetype. There is a rich state model for use with exercise ECGs and Tilt Table measurements.

Misuse
Not to be used for intravascular pressure.
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 too much at once
    ● Small is good \(\rightarrow\) 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