

*open*EHR

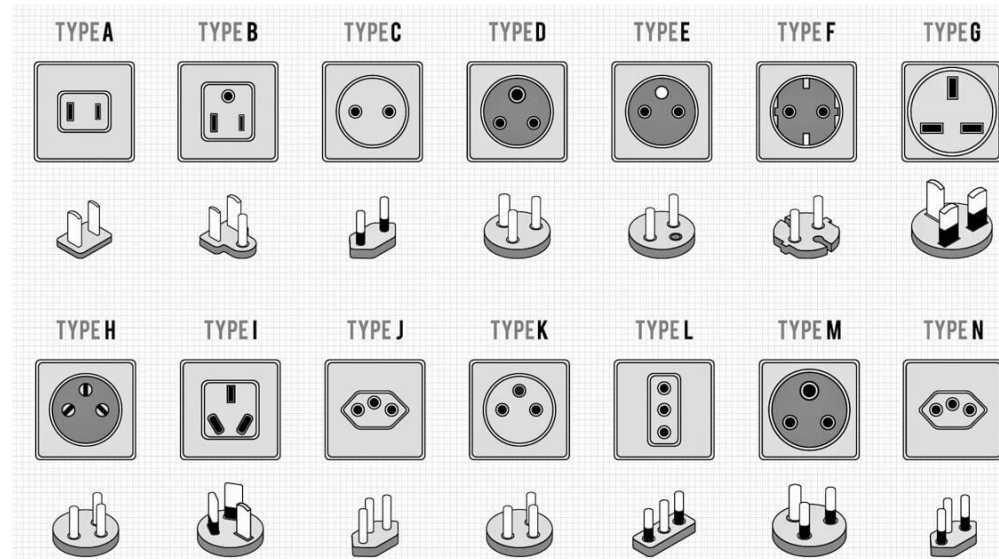
Definition, concepts, platforms

16/05/2022

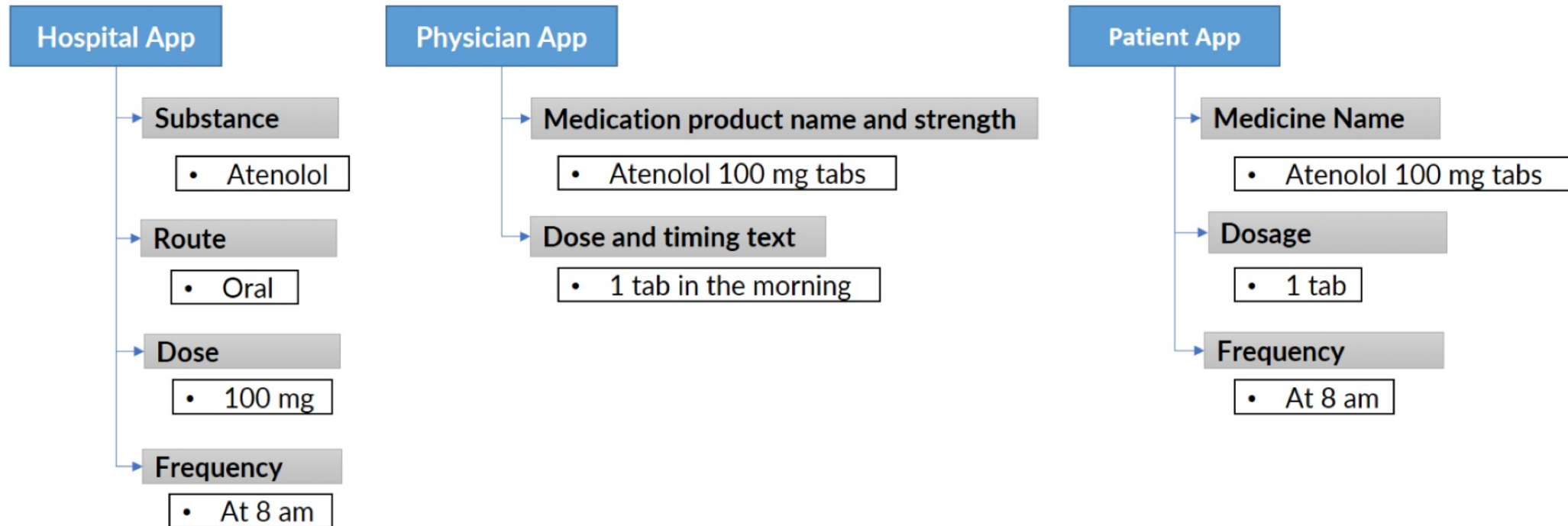
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The problem(s)

- Medical information is complex.
- EHR are usually made by an aggregation of requests made to many companies. Each company made the system in the way they think its right – no consensus.
- Meaning of the system was made by a programmer – no domain knowledge.
- Systems do not know how to “speak” with each other.
- Privacy by design was not considered.



The problem(s) - Mismatched information models



Mismatched information models between different applications (adapted from Ian McNicoll presentation on openEHR Day London 2017)

- Prescribing medication defined in $O(n)$ different ways by different implementers.
- Replicated concepts, weird structure.

The problem(s)

- Non existent privacy by design
 - Clinical data is recorded together with patient indentifiable data
- No focus on semantics
 - The same clinical concept can be defined N ways
 - Care settings and context are not considered – primary, secondary, tertiary, registries
- Data belongs to the application
 - Applications have a limited lifespan
 - Patients lifespan >>> applications lifespan

How to mitigate and fix

- Invest on domain knowledge
 - Involve clinical personnel ASAP in the development of clinical systems and clinically driven
- Semantics, data definition and structured data should be the focus
- Get vendor neutral platforms based on open data standards
 - Lock-in of data is very profitable.
 - Dissociate health records from dependency of clinical softwares



What is *open*EHR

OpenEHR stands for open electronic health record



An open specification/architecture

Provides rules of how to work, share and store health data with the principal idea of separating this data from applications as an agnostic approach. Based on ISO/TR 20514, ISO/TS 18308, etc.



Vendor lock-in and technology avoider

Data belongs to hospital institutions and not to IT companies.



Research friendly

Clinical data is separated from demographics data. Great for secondary use of data.

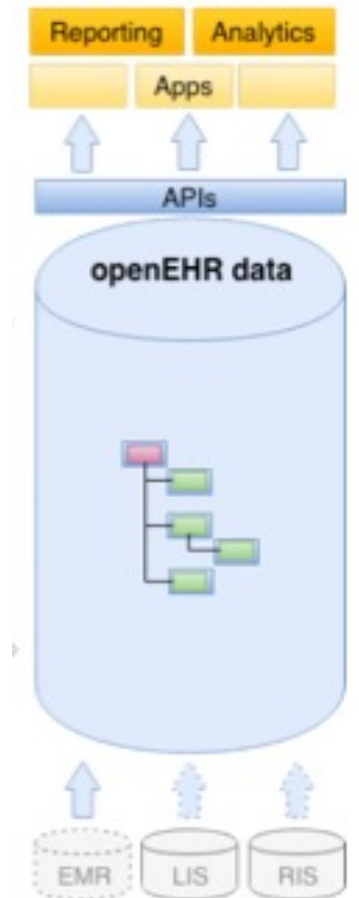


Guideline on how to model HI

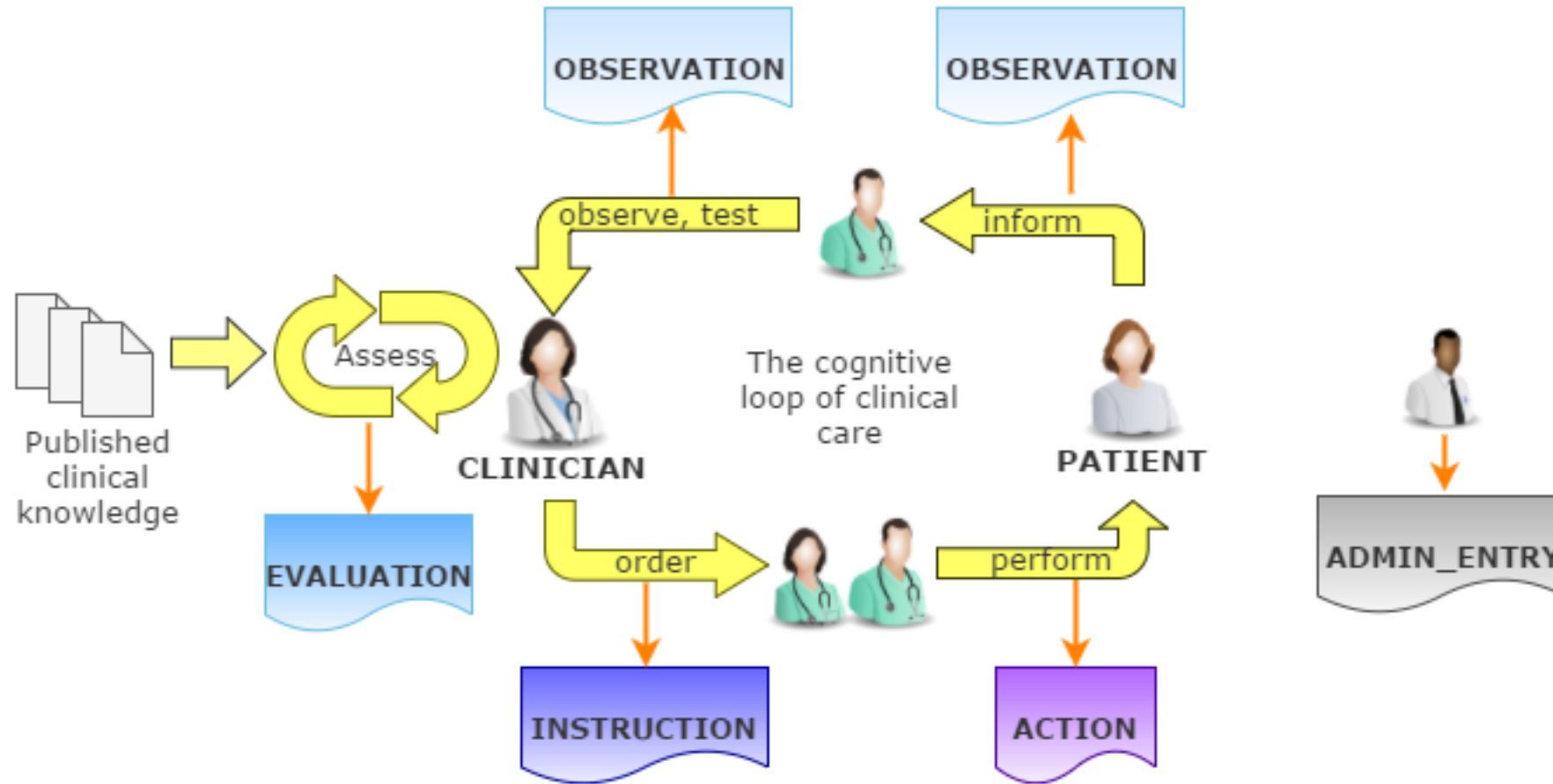
Same datatypes will be used across different systems based on openEHR

Aim is to save detailed fine grained structured data

openEHR based systems will always understand the clinical concept (e.g. Blood pressure) in the same way

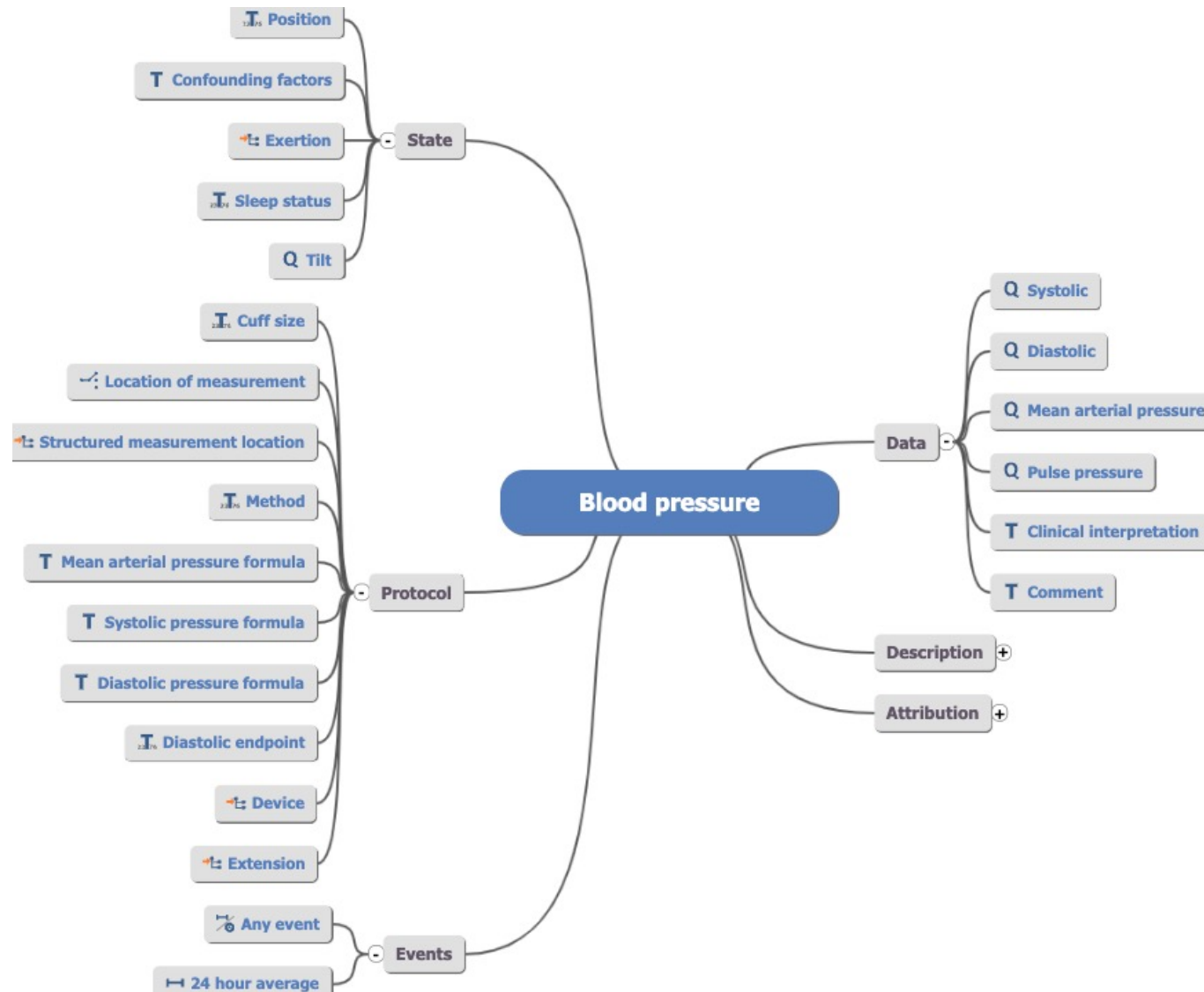


Clinical investigator recording process



Data models (archetypes)

<https://ckm.openehr.org/ckm/archetypes/1013.1.3574/mindmap> - Blood Pressure archetype



Q Systolic

Quantity

Optional

[SNOMED-CT(2003)::271649006 | Systolic blood pressure]

Peak systemic arterial blood pressure - measured in systolic or contraction phase of the heart cycle.

Property: Pressure

Units: 0.0..<1000.0 mm[Hg]

Limit decimal places: 0

T Position

Coded Text

Optional

The position of the individual at the time of measurement.

- Standing [Standing at the time of blood pressure measurement.]
- Sitting [Sitting (for example on bed or chair) at the time of blood pressure measurement.]
- Reclining [Reclining at the time of blood pressure measurement.]
- Lying [Lying flat at the time of blood pressure measurement.]
- Lying with tilt to left [Lying flat with some lateral tilt, usually angled towards the left side. Commonly required in the last trimester of pregnancy to relieve aortocaval compression.]

T Cuff size

Coded Text

Optional

[SNOMED-CT(2003)::246153002 | Type of cuff]

The size of the cuff used for blood pressure measurement.

Perloff D, Grim C, Flack J, Frohlich ED, Hill M, McDonald M, Morgenstern BZ. Human blood pressure determination by sphygmomanometry. Circulation 1993;88;2460-2470.

- Adult Thigh [A cuff used for an adult thigh.]
- Large Adult [A cuff for adults with larger arms.]
- Adult [A cuff that is standard for an adult.]
- Small Adult [A cuff used for a small adult.]
- Paediatric/Child [A cuff that is appropriate for a child or adult with a thin arm.]
- Infant [A cuff used for infants.]
- Neonatal [A cuff used for a neonate, assuming cuff is the appropriate size for maturity and birthweight of the neonate.]

Archetypes vs templates

- **Archetype** – defines a clinical concept or a clinical instrument (e.g.: Blood pressure, body temperature, NEWS2)
- **Template** – defines a use case within a context (e.g.: Vital signs measurement during the encounter with the patient)



Archetypes:



Templates:



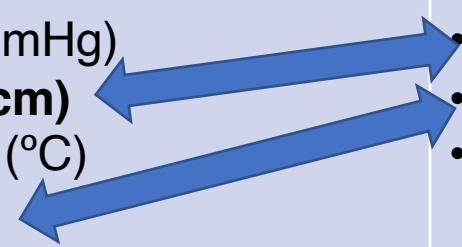
CKM:



Archetypes reusability

- The same archetype can be reused in different templates.
 - Data elements can be constrained if not necessary for a specific use case.

Template - Vital signs	Template - BMI
Archetypes: <ul style="list-style-type: none">• Blood pressure (mmHg)• Body height (m, cm)• Body temperature (°C)• Body weight (kg)• Respiration (/min)	Archetypes: <ul style="list-style-type: none">• Body height (m, cm)• Body weight (kg)• Body mass index (kg/m²)



Archetypes are defined once and only changed if new clinical evidence proves that is necessary to be modified.

openEHR – Clinical Knowledge Manager (CKM)

<https://ckm.openehr.org/>

- Main **web tool** that makes the management of clinical models' resources (archetypes and templates)
- Created in April 2009, product from Ocean Health System (ex-Ocean Informatics).
- Currently under management of the openEHR community.
- **Free registration** for individuals from all around the world, focused on giving added value to the repository on a voluntary basis.
- All non-technical healthcare area professions are also encouraged to contribute, it is not a requirement to be a physician to redound.
- Has functionality for **translations** of archetypes.



openEHR CKM instances

Main:

- openEHR CKM (**International**): <https://ckm.openehr.org/ckm/>

National:

- Apperta (**United Kingdom**): <https://ckm.apperta.org/ckm/>
- Nasjonal IKT (**Norway**): <https://arketyper.no/ckm/>
- Highmed (**Germany**): <https://ckm.highmed.org/ckm/>
- Ezdrav (**Slovenia**): <http://ukz.ezdrav.si/ckm/>