

# Introduction to *openEHR* Archetypes & Templates



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Dr Heather Leslie

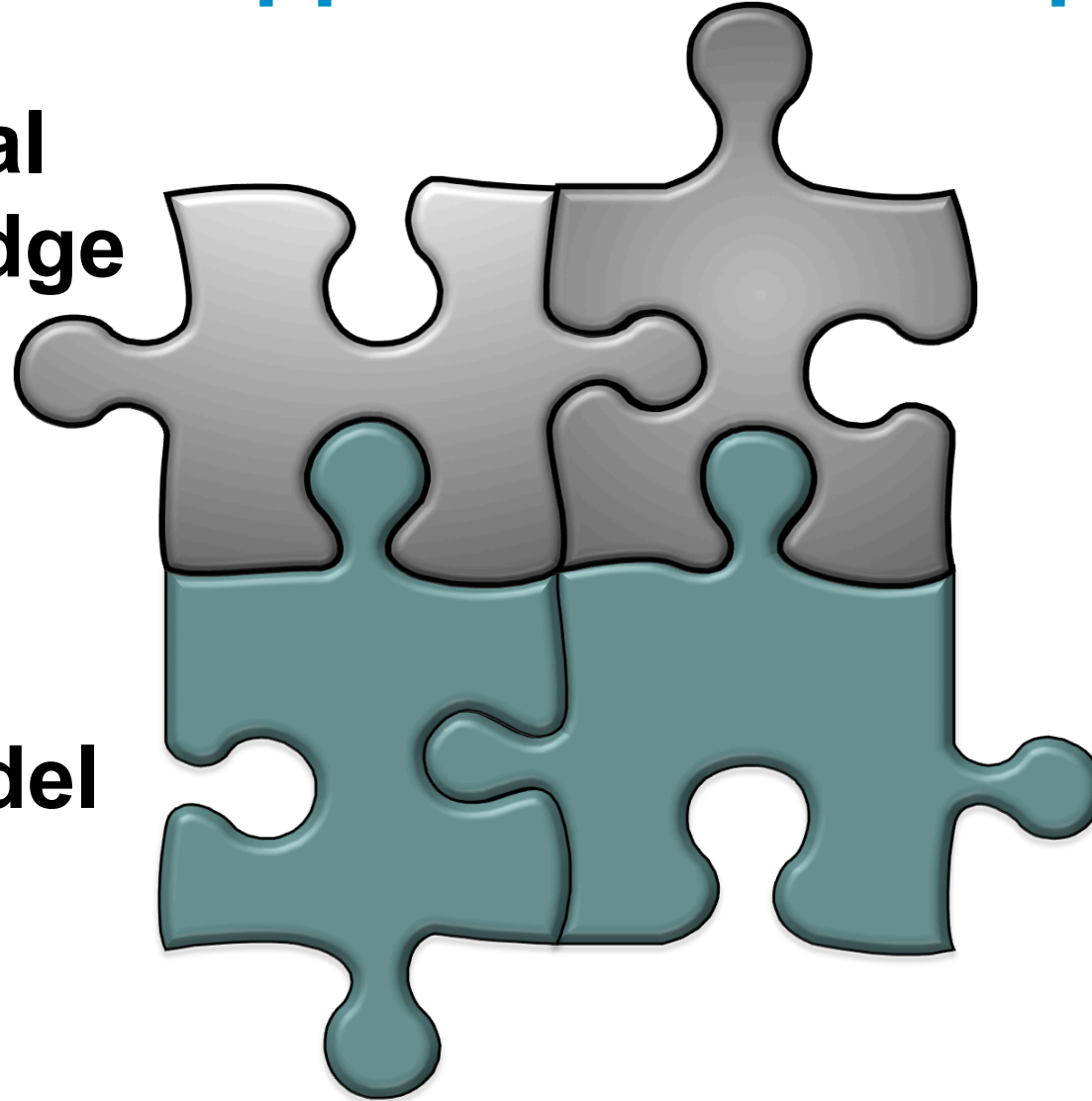


[openEHR.org](http://openEHR.org)

# Traditional Application Development


**Clinical  
Knowledge**

**Data Model**



# Traditional Information model

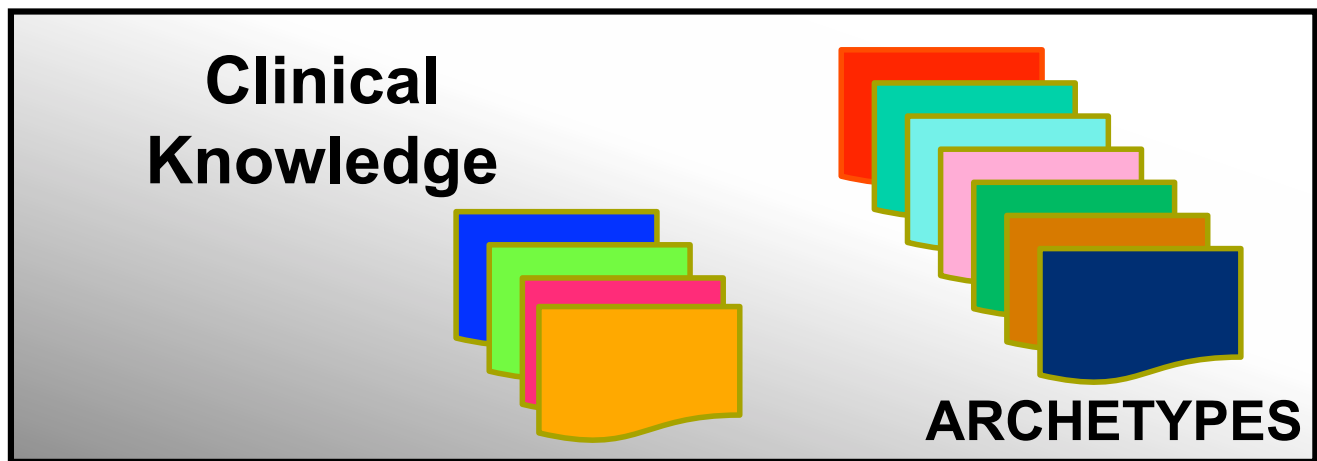
## Fields

	Name	Description
	TypeId	Retrieves the unique identifier for the item type.

## Properties

	Name	Description
	AllergenCode	Gets or sets the code for the allergen that causes an allergic reaction.
	AllergenType	Gets or sets the type of allergen that causes an allergic reaction.
	CommonData	Gets the common data for the <a href="#">HealthRecordItem</a> . (Inherited from <a href="#">HealthRecordItem</a> .)
	Created	Gets the audit information associated with the creation of this health record item. (Inherited from <a href="#">HealthRecordItem</a> .)
	EffectiveDate	Gets the date and time that the health record item data was taken. (Inherited from <a href="#">HealthRecordItem</a> .)
	EffectivePermissions	Gets the effective permissions on the item granted to the person retrieving the <a href="#">HealthRecordItem</a> . (Inherited from <a href="#">HealthRecordItem</a> .)
	FirstObserved	Gets or sets the approximate date of the first occurrence of the allergy.
	Flags	Gets the <a href="#">HealthRecordItem</a> flags. (Inherited from <a href="#">HealthRecordItem</a> .)
	HealthRecordItemSignatures	Gets the signatures for the <a href="#">HealthRecordItem</a> . (Inherited from <a href="#">HealthRecordItem</a> .)
	IsDownVersioned	Gets the value indicating if the <a href="#">HealthRecordItem</a> is down-versioned. (Inherited from <a href="#">HealthRecordItem</a> .)
	IsImmutable	Gets a value indicating whether the <a href="#">HealthRecordItem</a> is immutable. (Inherited from <a href="#">HealthRecordItem</a> .)
	IsNegated	Gets or sets a value indicating whether the allergic reaction is negated with treatment.
	IsPersonal	Gets or sets the value indicating if the <a href="#">HealthRecordItem</a> is private. (Inherited from <a href="#">HealthRecordItem</a> .)

# 2 level modelling

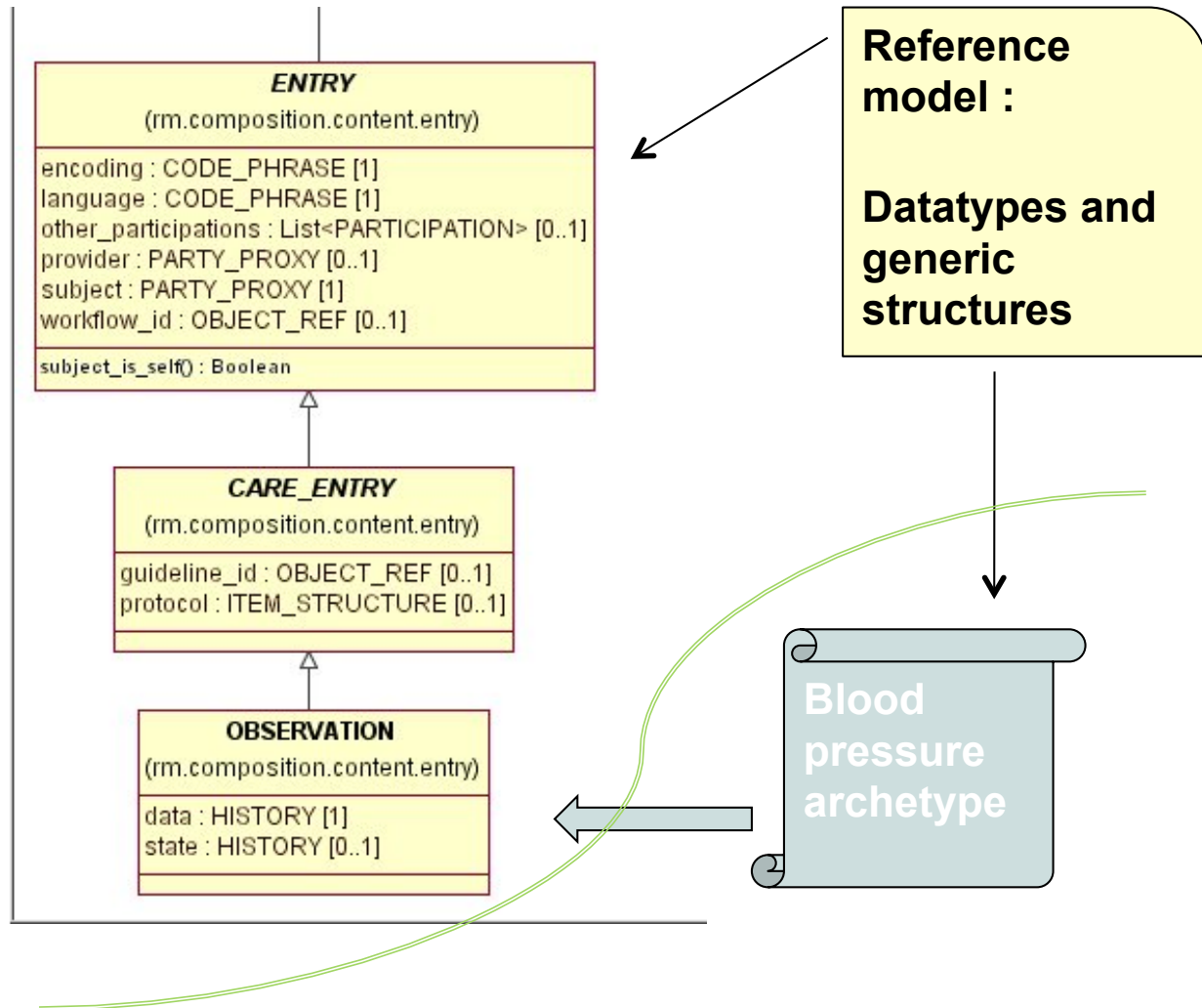


Easier and cheaper to build and maintain

Contains only generic knowledge and business rules

Much smaller and simpler

# openEHR – 2 level modelling



# Archetypes

Dictionary definition => a model or prototype

## **openEHR archetypes are:**

- Computable models of discrete clinical concepts
- Maximal data set
- Universal use case

## **Model a range of concepts:**

- Simple and straightforward concepts
  - 'blood pressure'; 'weight'; 'symptom'
- Complex compound concepts such as
  - 'medication order', 'family history'

# Archetypes 2

Can be standalone – local use case

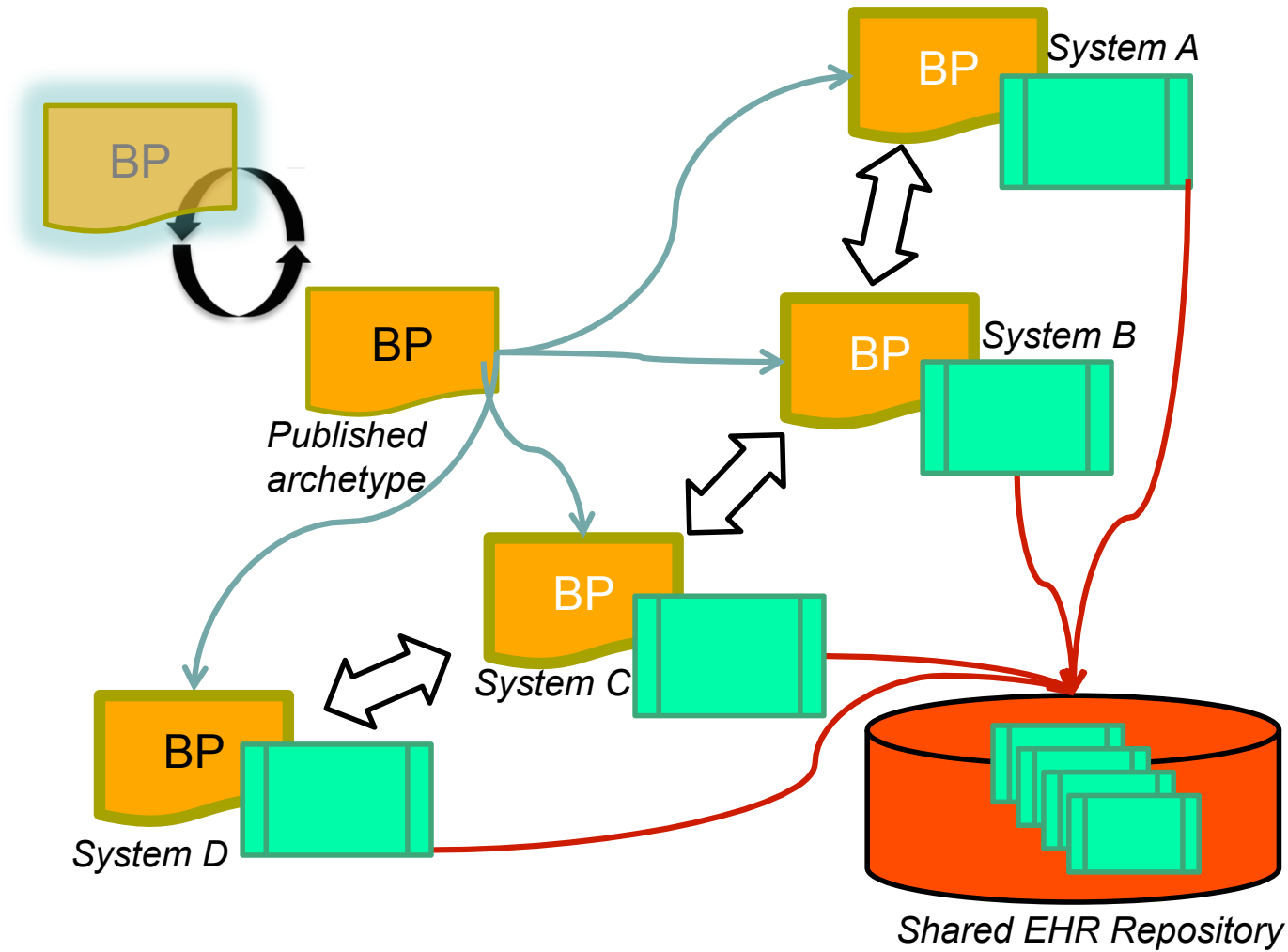
BUT

Archetypes are most useful when

- Shared
  - Re-used
- } **Clinical Knowledge Manager** [www.openehr.org/knowledge](http://www.openehr.org/knowledge)

Potential for a  
**SINGLE, SEMANTIC MODEL**  
of clinical content

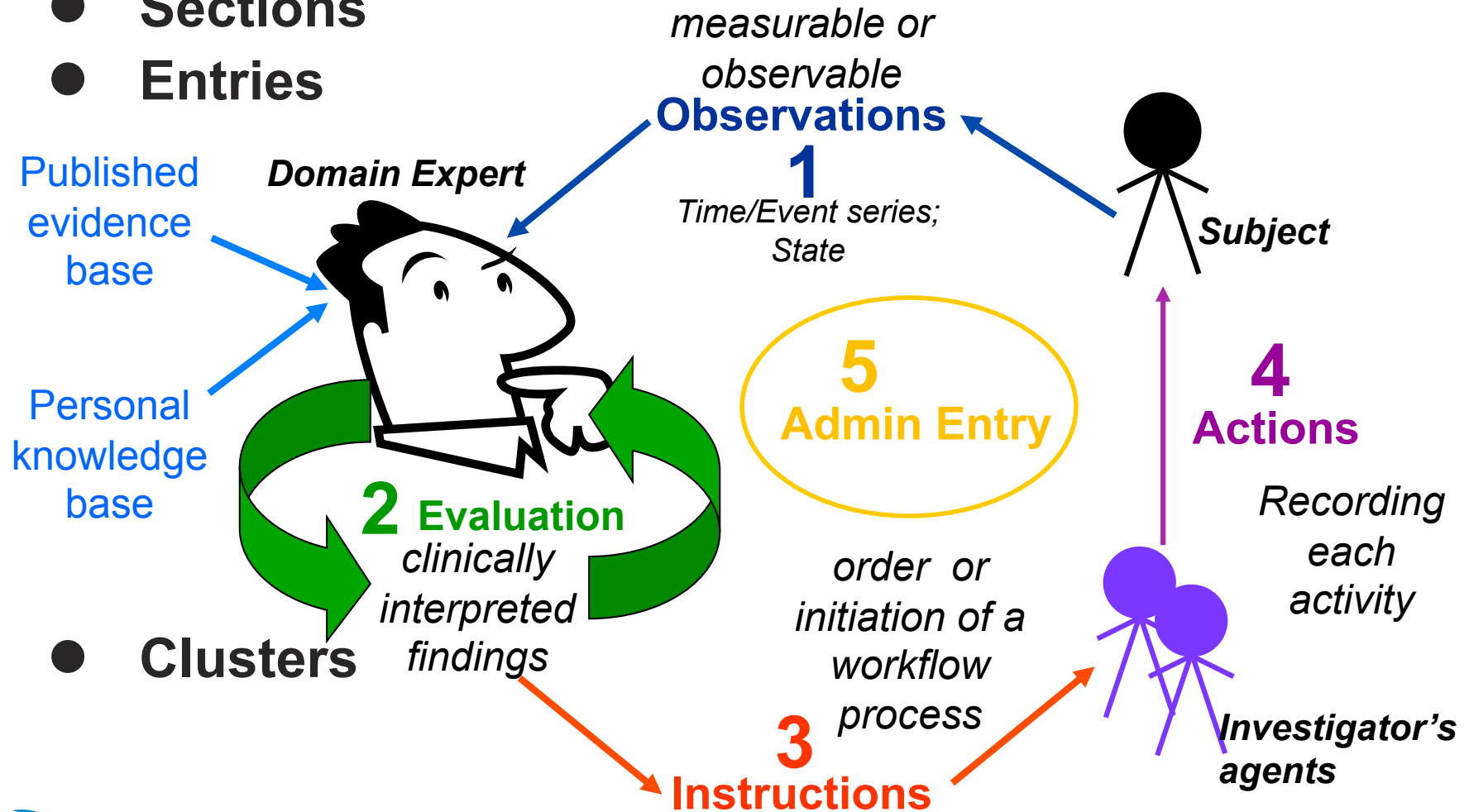
# Single Semantic Model





# Class ↔ Process

- Compositions
- Sections
- Entries



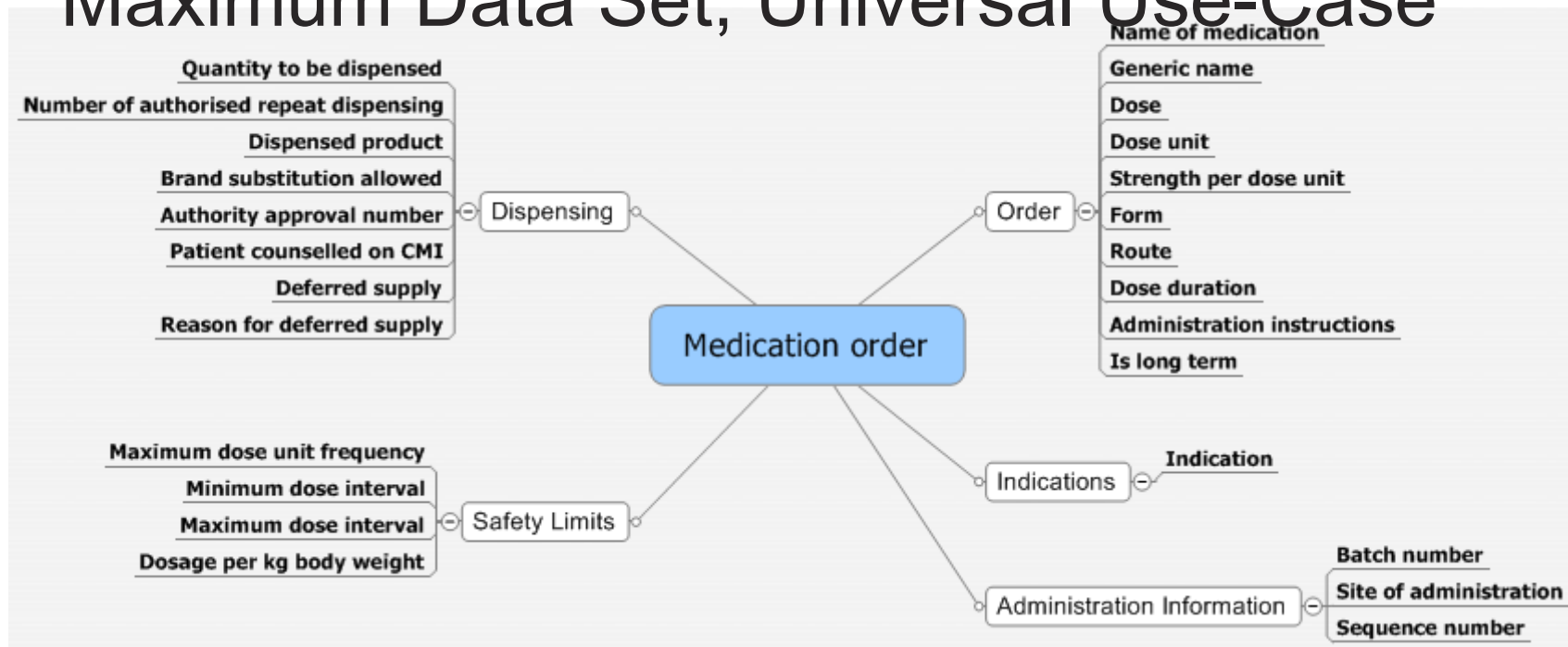
- Clusters

# ENTRY: Features

<i>Feature</i>	<i>Eval</i>	<i>Obs</i>	<i>Inst</i>	<i>Act</i>
Protocol – how and basis for recording	✓	✓	✓	✓
History – allows time-series and aggregates		✓		
State – records patient states that may influence interpretation		✓		
Pathway – work flow steps and states				✓

# Designing an archetype

Clinician involvement required →  
Maximum Data Set; Universal Use-Case





Archetype file name:

**openEHR-EHR-ACTION.medication.v3**



Protocol

Ordered openEHR-EHR-ITEM\_TREE.medication.v2

- T** Name of medication
- T** Administration instructions
- Strength per dose unit
- T** Dose unit
- T** Form
- Dose
- Q** Dose frequency
- Q** Dose duration
- T** Route
- Is long term
- Indications
- T** Generic name
- Safety limits
- Administration information
- Dispensing information
- T** Reason for commencement
- T** Reason for ceasing
- Own medication?
- T** Additional instructions

Occurrences

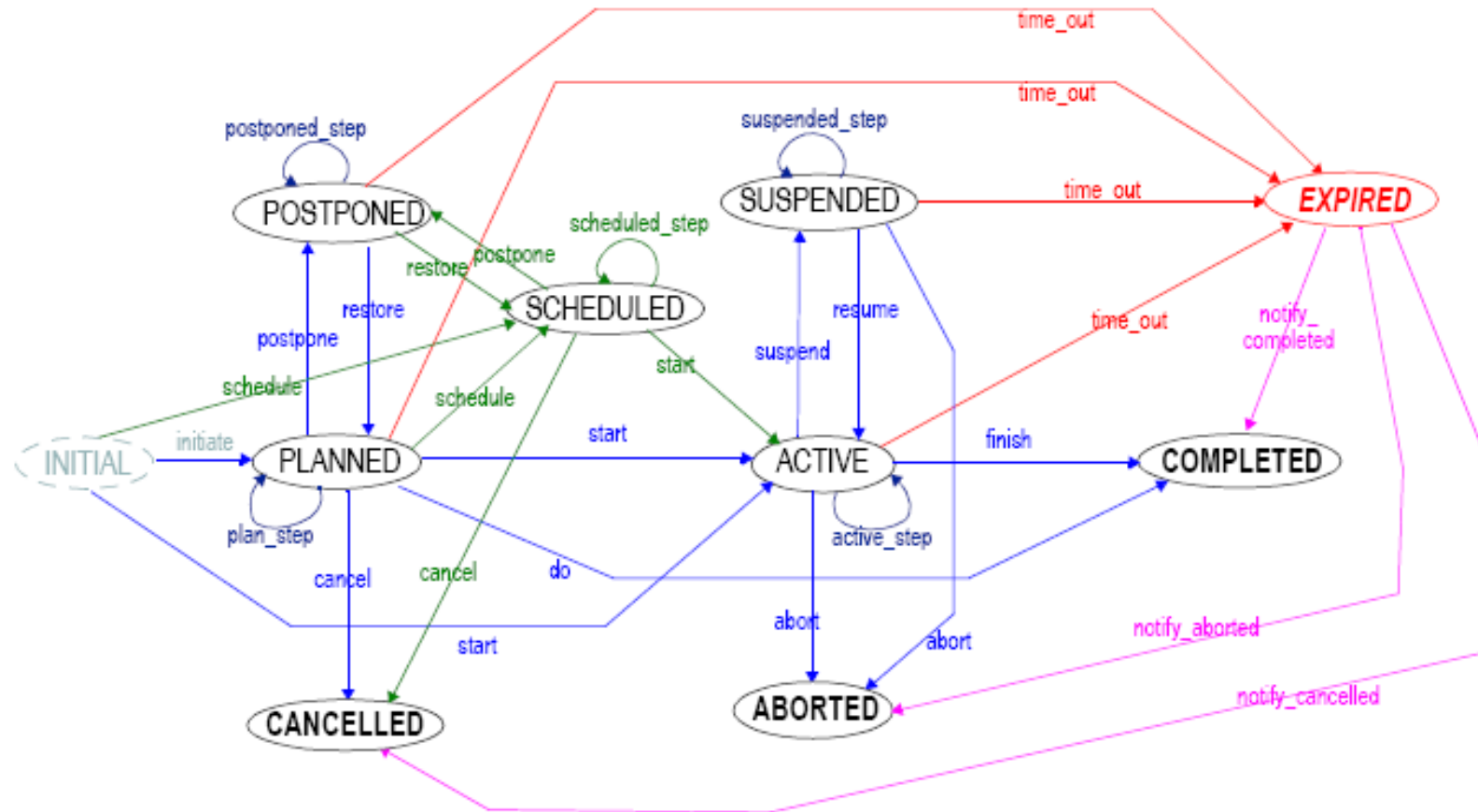
Min:  Max:   Unbounded

Description:

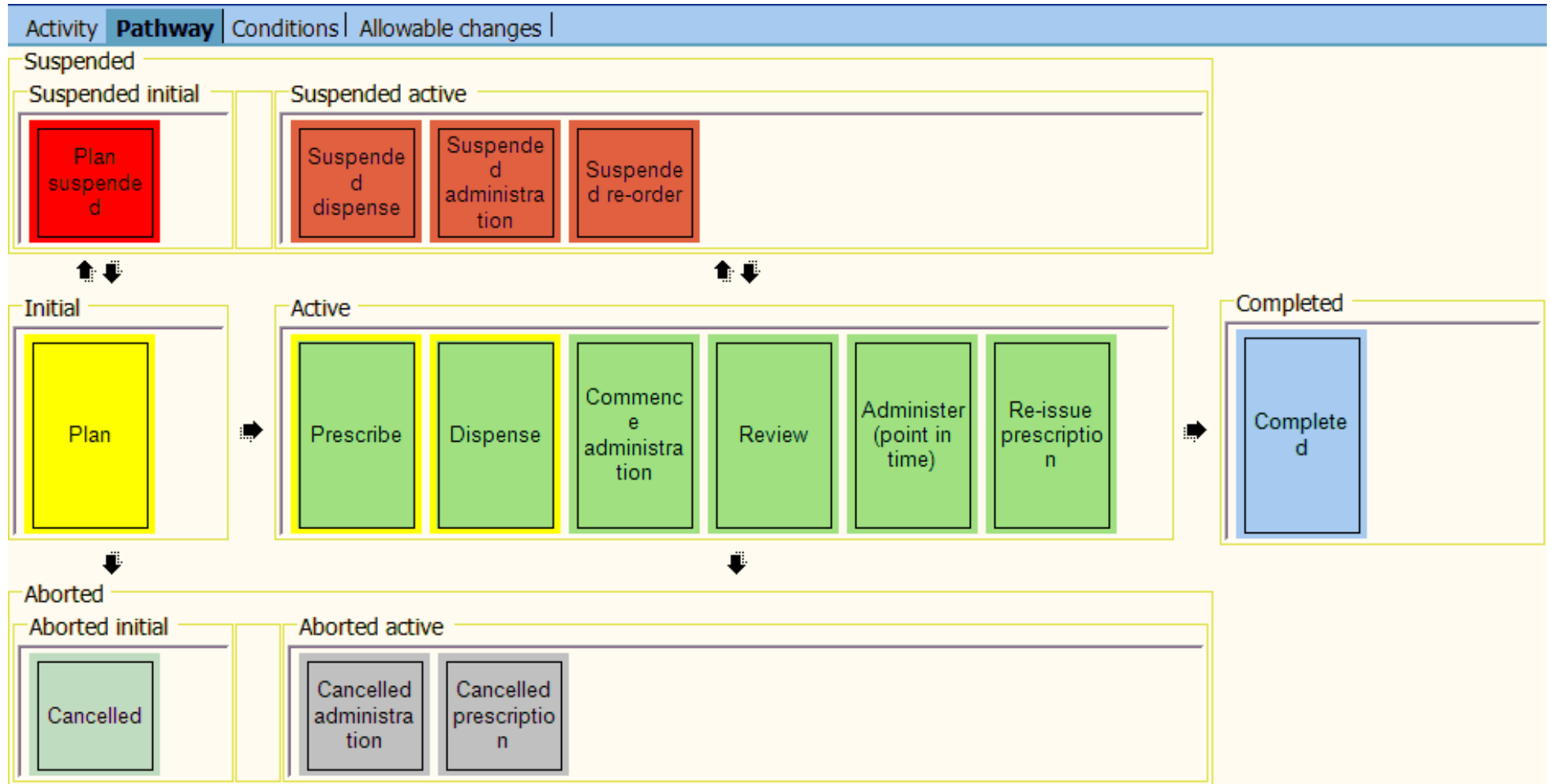
Runtime name constraint:

- Free text or coded
  Internal codes
  Terminology

# Action State Model



# Medication Order : Pathways



# Multilingual Archetypes

Each archetype is translated once

No language of primacy

- ≡ English
- ≡ Japanese
- ≡ German
- ≡ Dutch
- ≡ Spanish
- ≡ Portugese
- ≡ Danish
- ≡ Swedish
- ≡ Turkish
- ≡ Farsi

# OpenEHR archetypes

## OBSERVATION

- Cardiac Enzymes
- C-Reactive protein
- Drug Screen
- Blood glucose
- Haemoglobin A 1c
- Lipid studies
- Liver function tests
- Thyroid function tests
- Urea and electrolytes
- Laboratory result
- Liver stigmata
- Menstrual History
- Menstruation
- Microbiology laboratory observations
- MST Findings for Colon
- Operation Record
- Oximetry
- Person Status
- Personal and Social History
- Postural oedema
- Pre-operative record
- Pre-operative record
- Pupils
- Respirations
- Story or history
- Straight leg raising
- Substance use
  - Alcohol consumption
  - Caffeine consumption
  - Tobacco use
- Symptom checklist
- Tendon and Babinski reflexes
- Urinalysis
- Urine output
- Uterine contractions
- Visual acuity
- Waist and hip circumference
- Disposition
- Follow up instruction
- Imaging request
- Intravenous fluid order
- Laboratory request
- Medication order
- Monitoring
- Non-drug therapy
- Patient designation

## INSTRUCTION

## STRUCTURE

- Reason for encounter
- Review of systems
- Screening
- SOAP
- Summary
- Vital signs
- disposition
- Follow up details
- Gas administration
- Imaging data
- Intravenous fluids
- Laboratory test request
- Medication description
  - Medication description involving a vaccine description
- Gas therapy
- Patient designation
- Patient information
- Procedure
  - Procedural analgesia
- Referral data
- Auscultation
  - Auscultation of the chest
- Balance
- Change
- Coordination
- Cranial Nerves
- Delivery of infant
- Dimensions
  - Circumference
- Examination
  - Examination of the abdomen
  - Examination of the chest
  - Examination of the fetus
  - Examination of a named body part
  - Examination of nervous system
  - Examination of the cervix
  - Examination of the uterus
- Body fluid or secretion
- Gait
- Health event
  - Poisoning or overdose
- Inspection
  - Inspection of nails
  - Inspection of skin
- Issue presented by a person
- Menstrual cycle
- Movement of a joint

## CLUSTER



# openEHR Templates

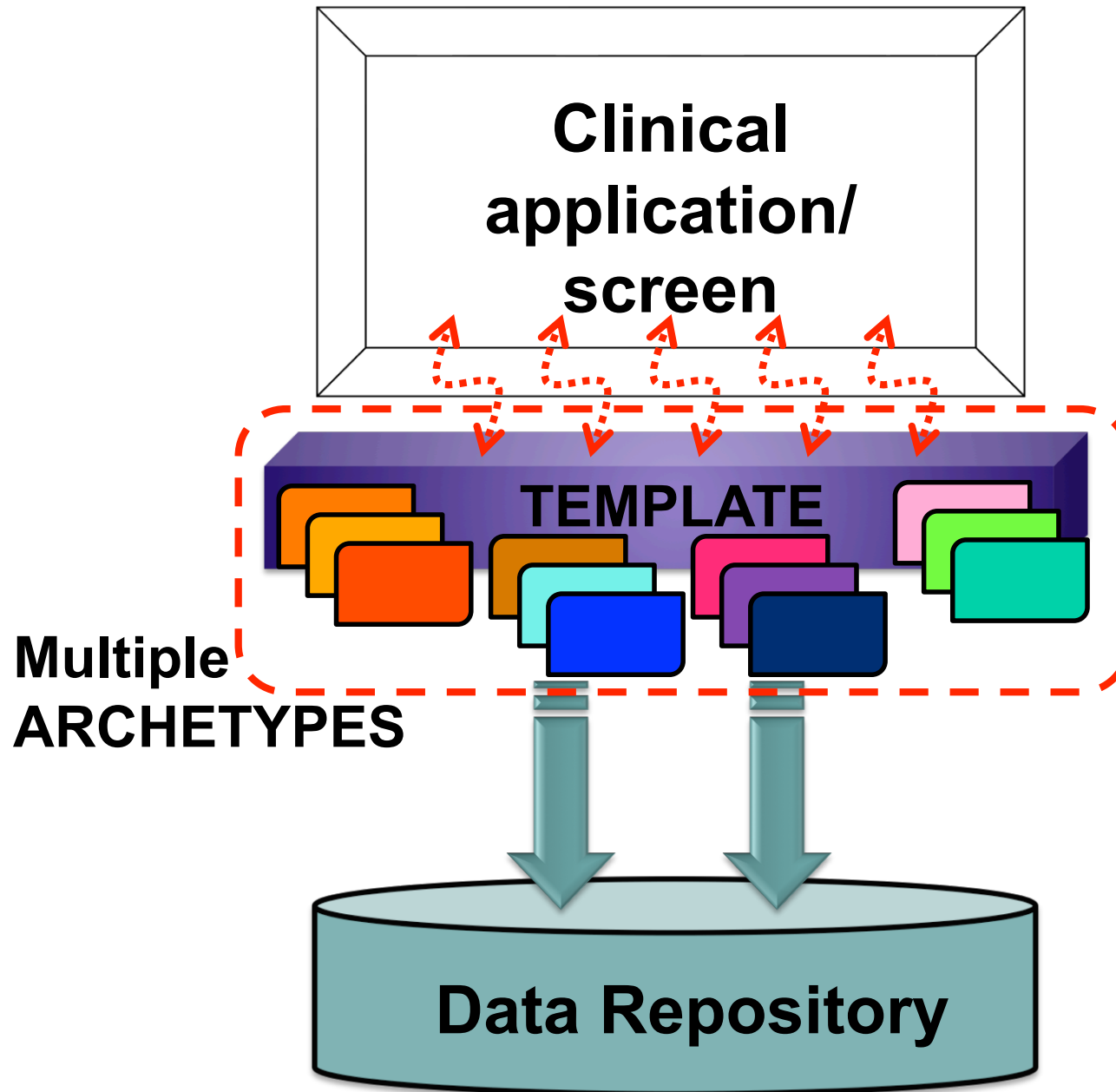
Templates are formal specifications defining a particular aggregation of archetypes

- Context, purpose, clinical domain or location.
- Constrain the component archetypes to make them 'fit for purpose', including
  - addition of mandatory items;
  - specifying terminology subsets for real-time usage;
  - assigning default values.

In practice...

→ combining archetypes

→ data entry defs, reports, or messages.



Ocean Template Designer - Version 2.2 Beta

File View Help

[SCIMP Cardiology1.oet]

Archetype Repository

Archetypes Concept

- Postural oedema (v1)
- Pregnancy test (v1)
- Pulse (v1)
- Respirations (v1)
- Speech (v1)
- Story or history (v1)
- Substance use (v1)
- Tendon and Babinski reflexes (v1)
- Tobacco use (v1)
- Tympanogram (v1)
- Urinalysis (v1)
- Urine output (v1)
- Uterine contractions (v1)
- Warble Tones Hearing Test (v1)
- Word List Hearing Test (v1)
- evaluation
- instruction

Template Node Properties

Occurrences	mandatory, not repeating [1..1]
<b>Information</b>	
Annotation	
Description	*

**Annotation**  
Information about this node

content

- Pulse
  - data
    - Any event
      - data
        - Normal statements
          - Present
        - Findings
          - Description
          - Rate
          - Rhythm
          - Volume
          - Character
            - Number of missed beats per minute
          - Pulse deficit
    - protocol
      - Device
      - Location of measurement
  - Blood Pressure
    - data
      - any event
        - data
          - Systolic
          - Diastolic
          - Mean Arterial Pressure
          - Pulse Pressure
          - Comment
        - state
      - Baseline reading

Observations: History  
Symptom   
Clinical description

Fetal movements  
Presence

BP  
systolic  mm[Hg]  
diastolic  mm[Hg]

Weight  kg

FH  
Rate  /min  Present

Examination of the uterus  
Normal statements   
Clinical description   
Size  
Fundal height  cm Weeks  
Assessment of liquor volume   
Number of fetuses

### openEHR-EHR-OBSERVATION.blood\_pressure

Header	Definition	Terminology	Display	Interface	Description
<input checked="" type="checkbox"/> Protocol					
<input type="checkbox"/> Participation					

**Data** | Protocol |

List | Events | Person State |

Ordered

Assessment  
  
Rationale

Urinalysis

Glucose

Bilirubin

Ketones

Specific gravity

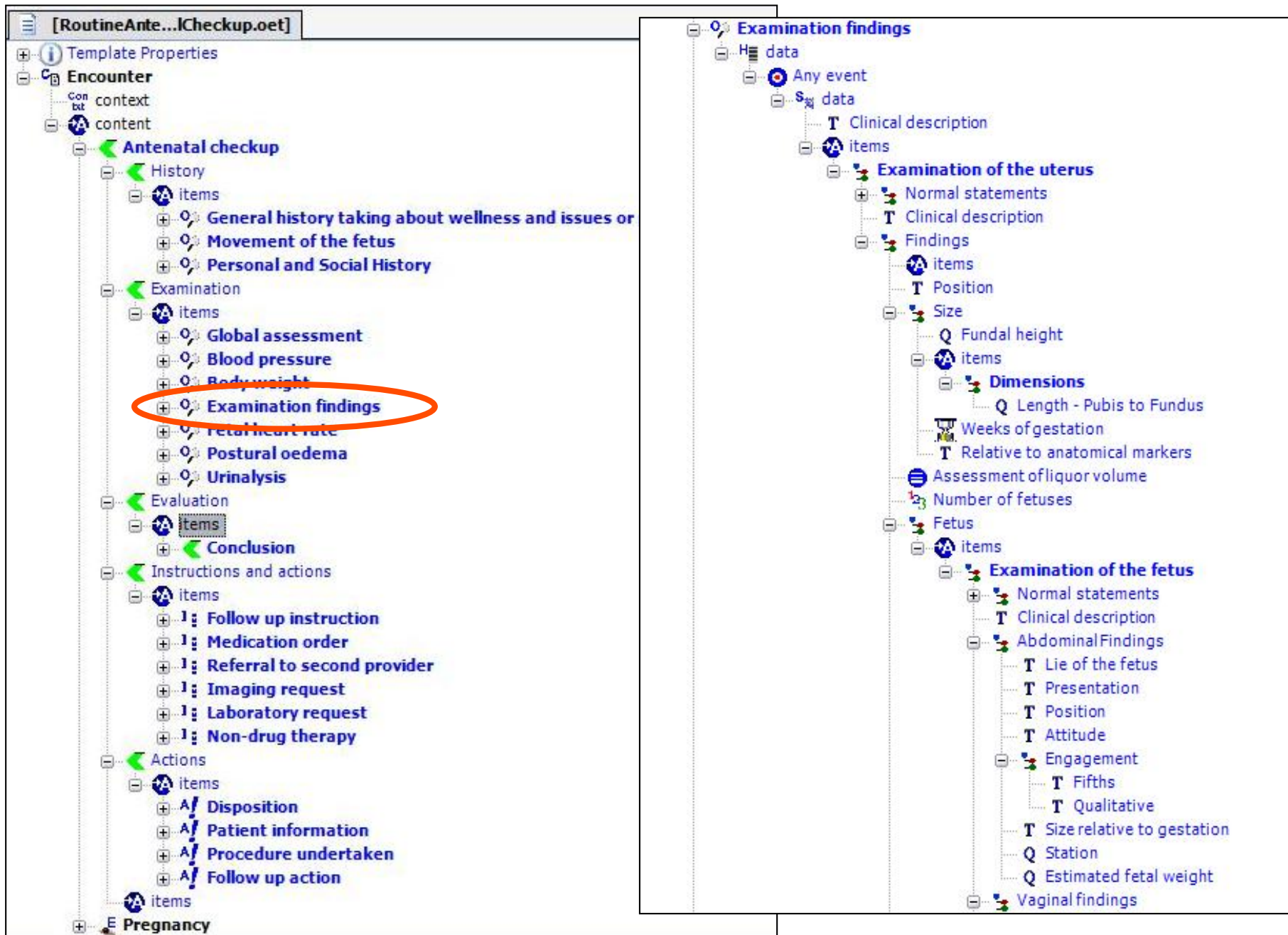
Blood

pH

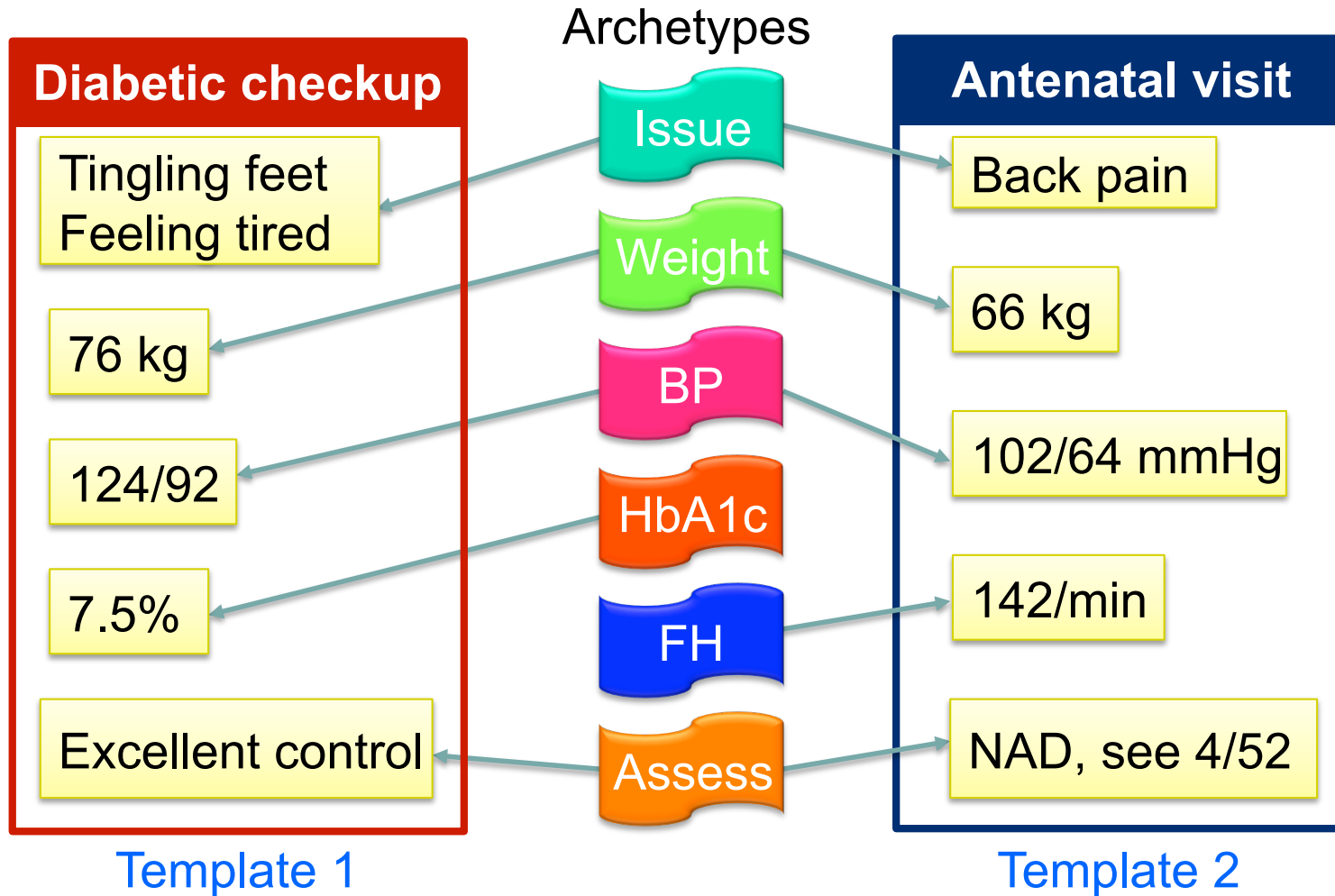
Protein

- Systolic
- Diastolic
- Mean Arterial Pressure
- Pulse Pressure
- Comment

- List | Events | **Person State** |
- Ordered
- Position
  - Exercise
  - Activity
  - Exertion level
  - Tilt



# Archetypes Re-use



# 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 stage labour record	First stage labour assessment	Newborn assessment (Maternity-New)	Partogram	Postnatal assessment of	Pregnancy ultrasound	Second stage	Third stage	Er		
	1030	52	15	28	31	41	45	55	38	71	51	44	51	48	41	26	23	12	42	56	5	17	6	25		
inspection-skin.v1draft	5							1		1	1															
inspection.v1draft	3			1		1					1															
issue.v1draft	12	1			1		1				1			1	1					4					1	
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			1	
symptom.v1	32	1	1		1	1	1	2		2	1	2	1	1	1					4					1	
discharge.v1draft	1								1																	
encounter.v1draft	19	1	1		1	1	1	1		1	1	1	1	1	1	1	1			1		1	1	1	1	

# Templates - the openEHR 'workhorse'?

## Archetypes get the glory

- but templates deliver the content.

Most demand for archetyped content will originate as requests for datasets

- Diabetes shared care
- e-Referral
- Data entry forms
- Clinicians can and do engage with archetype development
  - But many others will want to focus solely on their own dataset focused requirements



# Terminology bindings

## One to one term-bindings

- Terminology agnostic
- Generally at archetype level

## Constraint / 'termset' bindings

- Terminology agnostic
- Abstract definitions “Any Orthopaedic diagnosis”
- Generally at template level

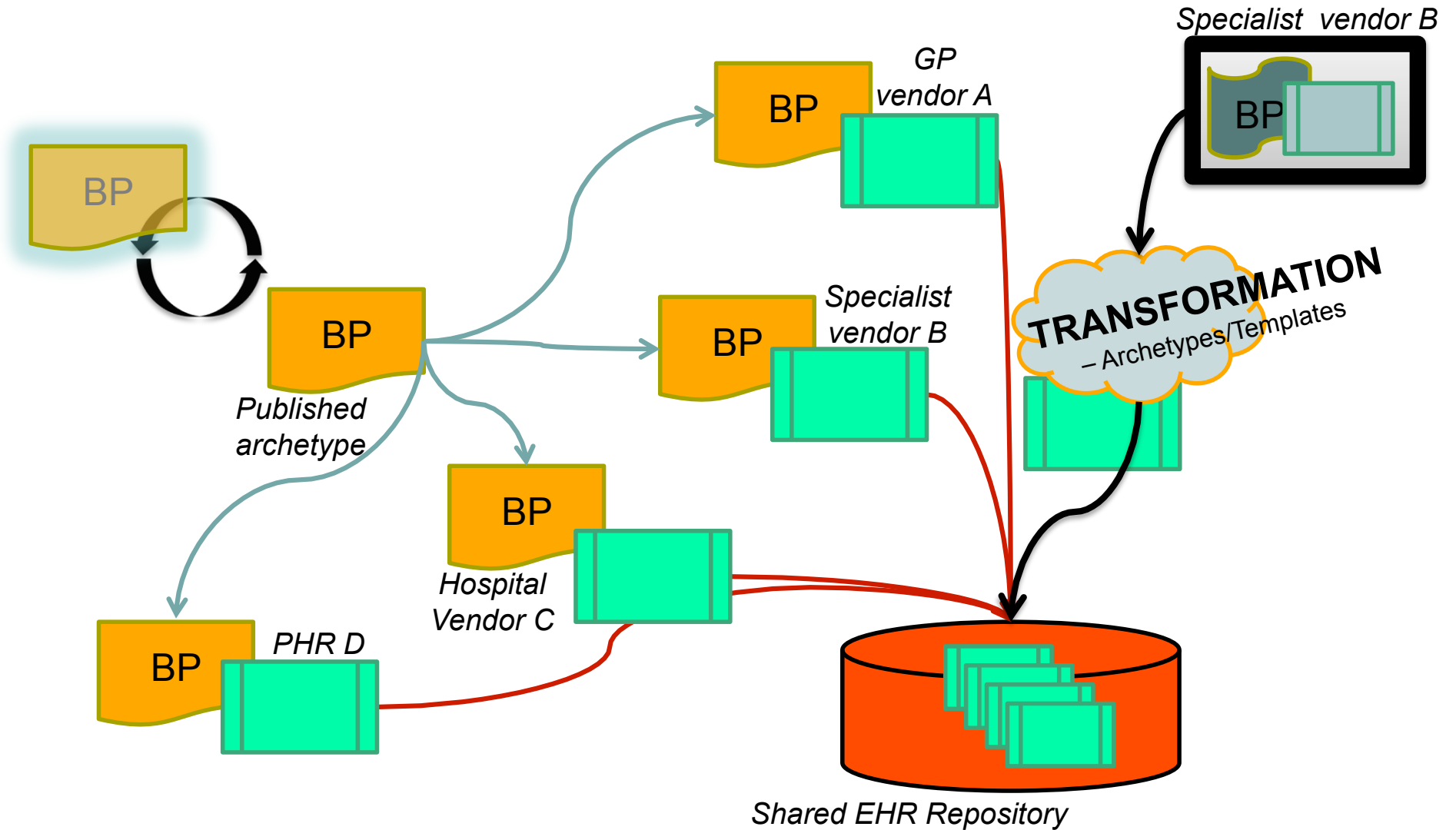
# Record of BP 120/78, Sitting, large cuff

## Term bindings:

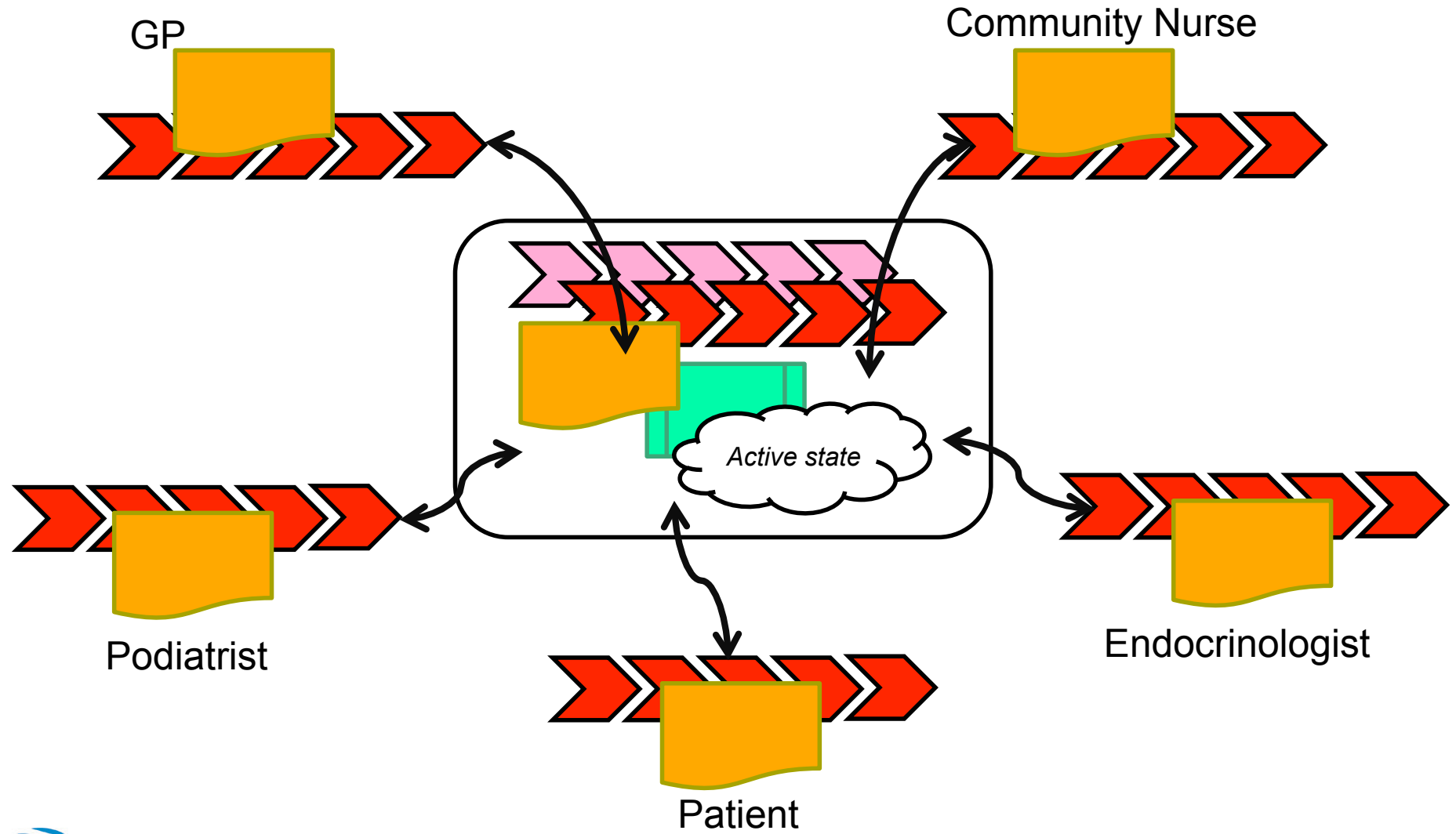
- Blood pressure finding - ... (finding) – 392570002
- Sitting blood pressure - ... (observable entity) – 163035008
- Blood pressure - ... (observable entity) – 75367002
- Blood pressure taking - ... (procedure) – 46973005
- Diastolic blood pressure - ... (observable entity) – 271650006
- O/E - blood pressure reading - On examination - blood pressure reading (finding) – 163020007
- Blood pressure cuff - ..., device (physical object) – 70665002



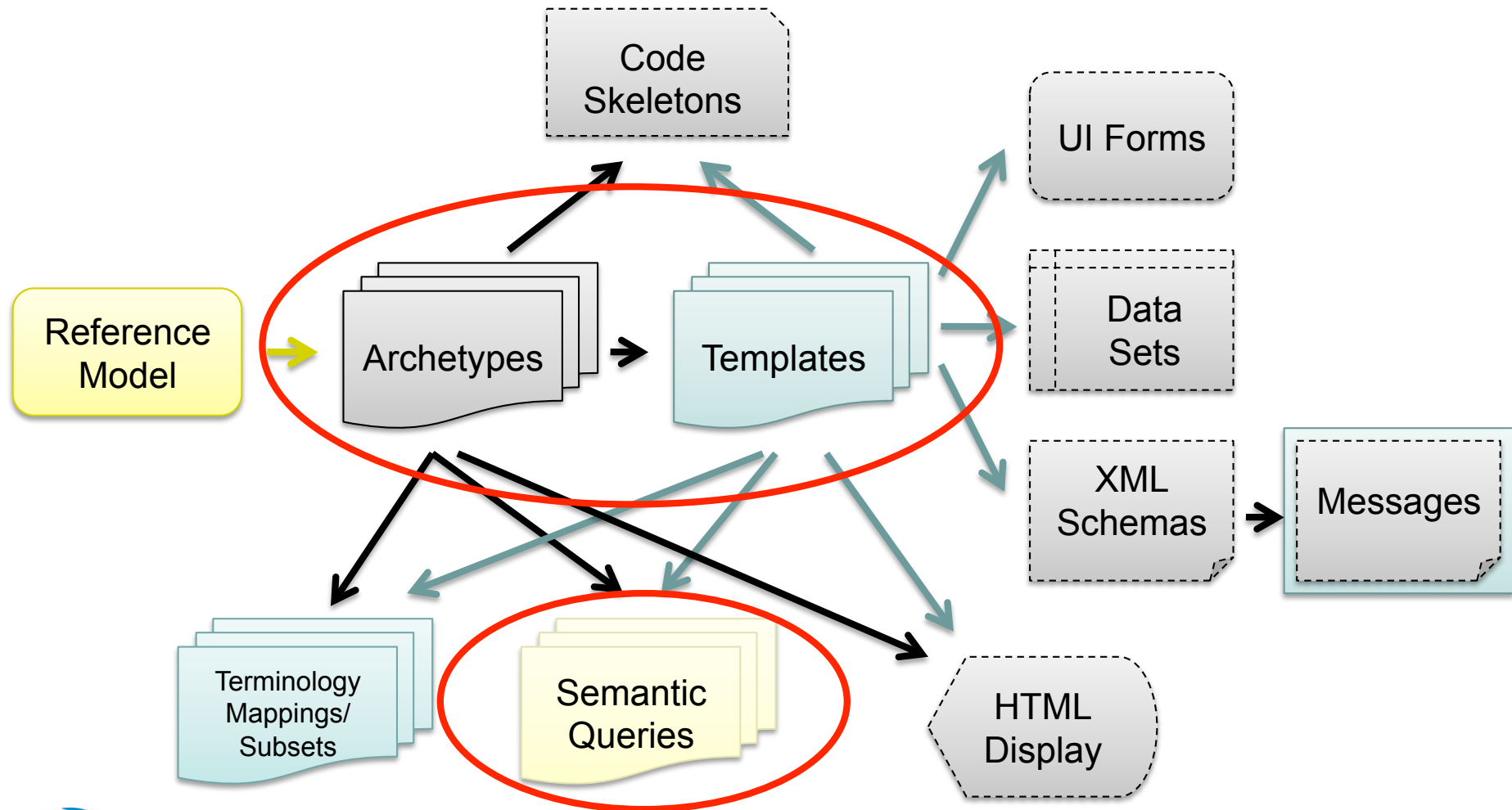
# Archetype-enabled system



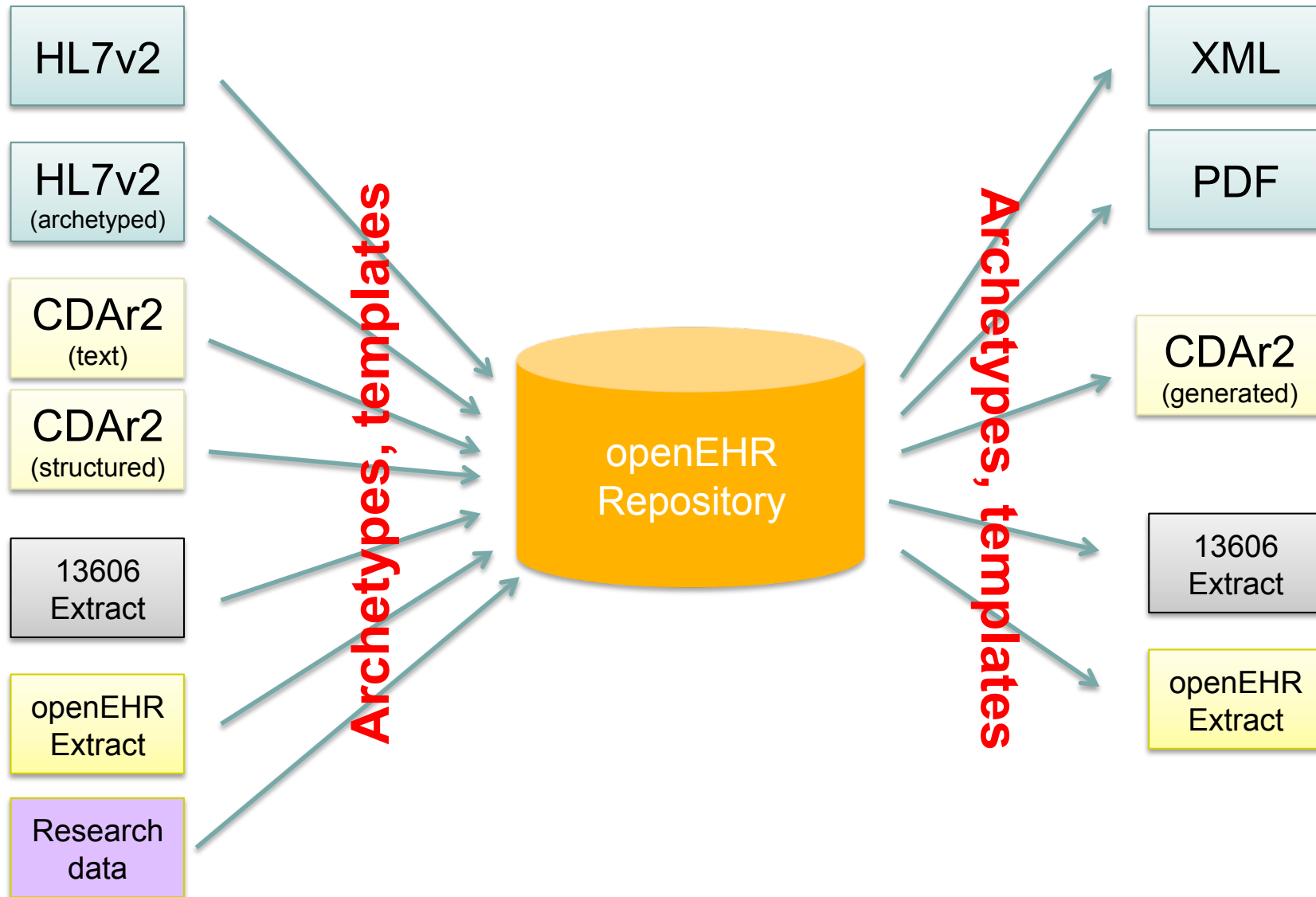
# Distributed care



# The openEHR artefact ecosystem

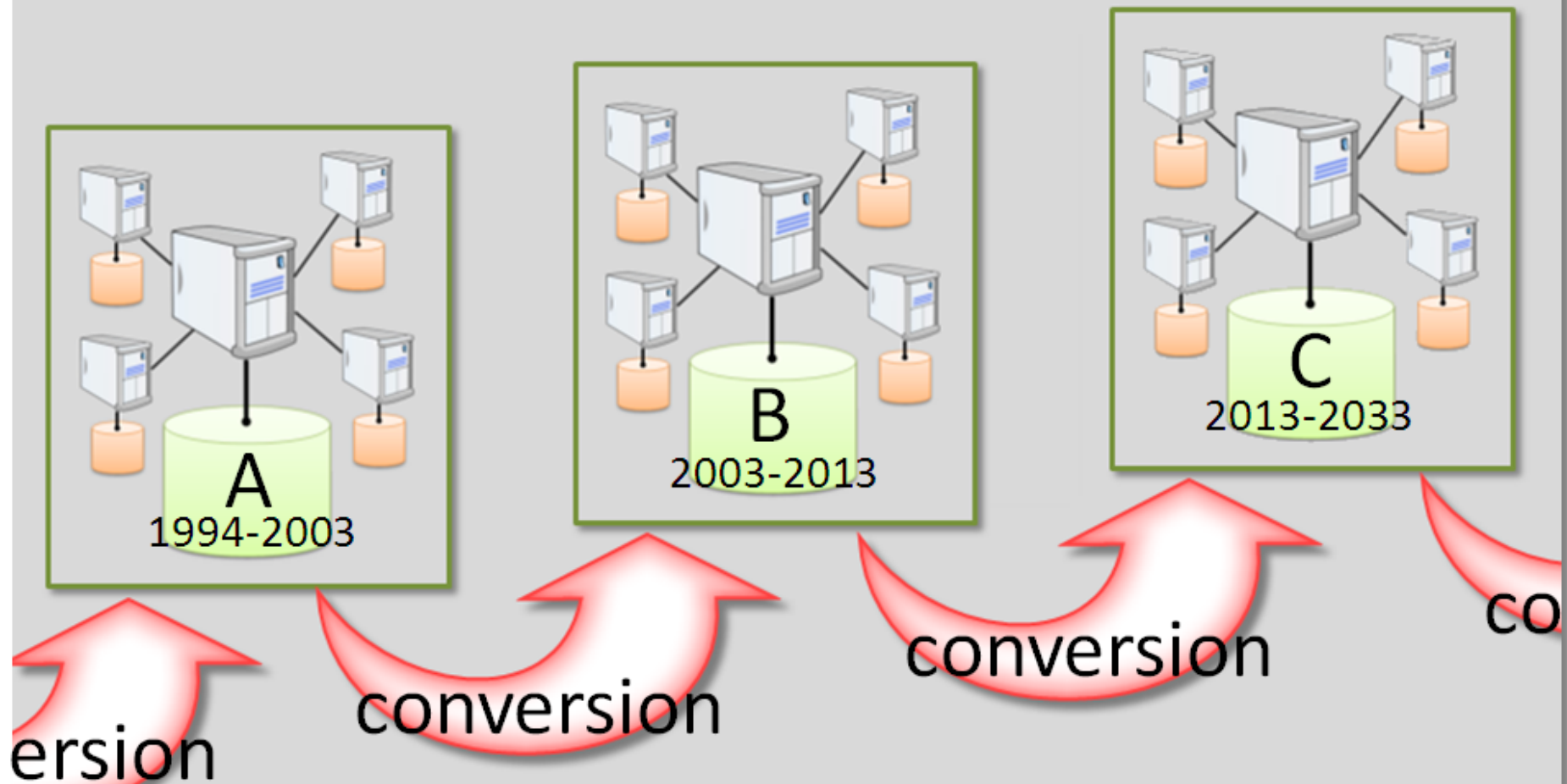


# Versatile health data



# Present situation:

Every 7-10 years a new HIS





# New situation:

One “life time” patient record

