# Motivation

- EHR structured data
  - compute health information
    - Clinical Decision Support
    - Patient Safety
    - Registries
    - Population Health
    - Business intelligence for payers
    - Medical research
    - Personalized-medicine
  - historically heated debate (data standards problem)
    - HL7 RIMv3, ISO13606, OpenEHR
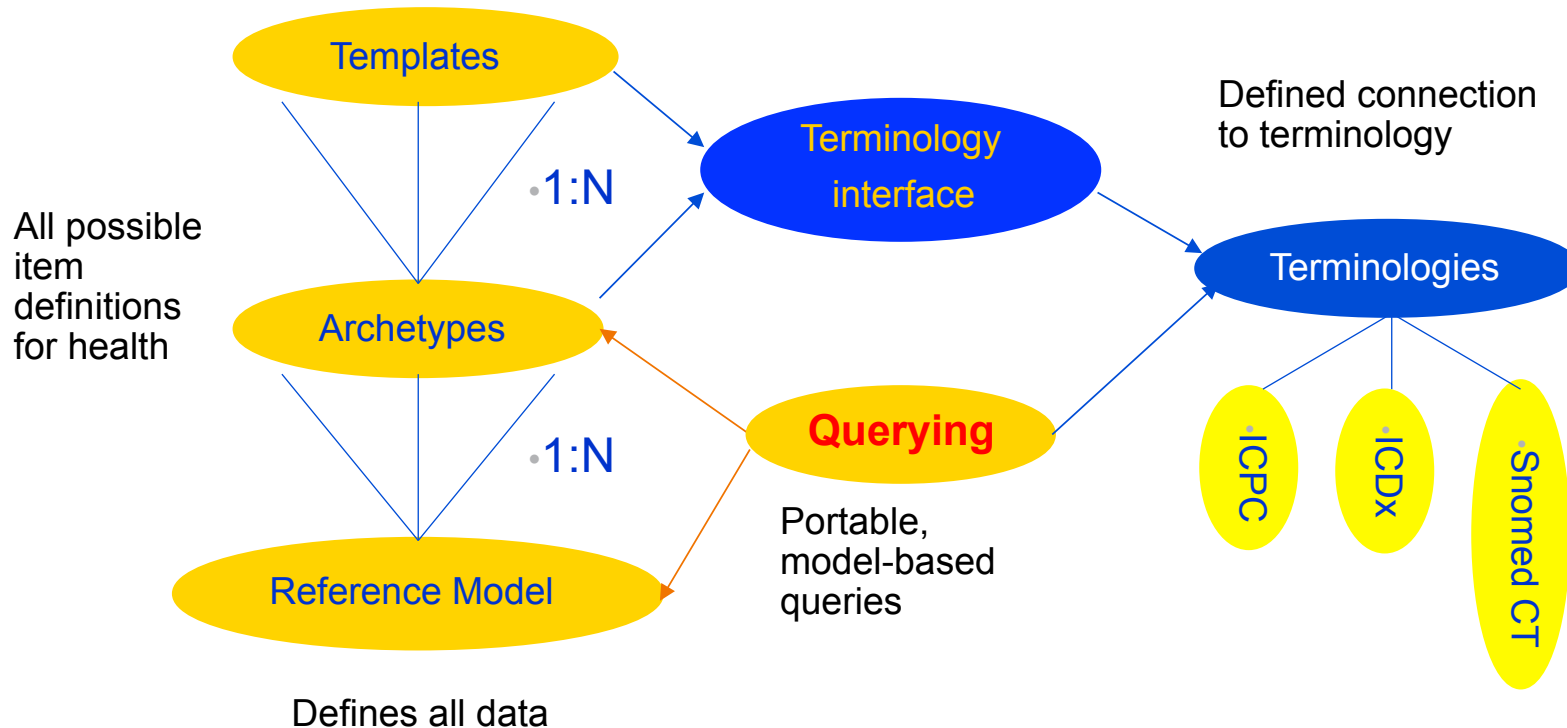    - Data normalization

# Simple question...

- What is the percentage of patients with high BMI?

- How many diabetes patients are controlling their sugar?

- How many patients have been diagnosed with Crohn's disease last year?
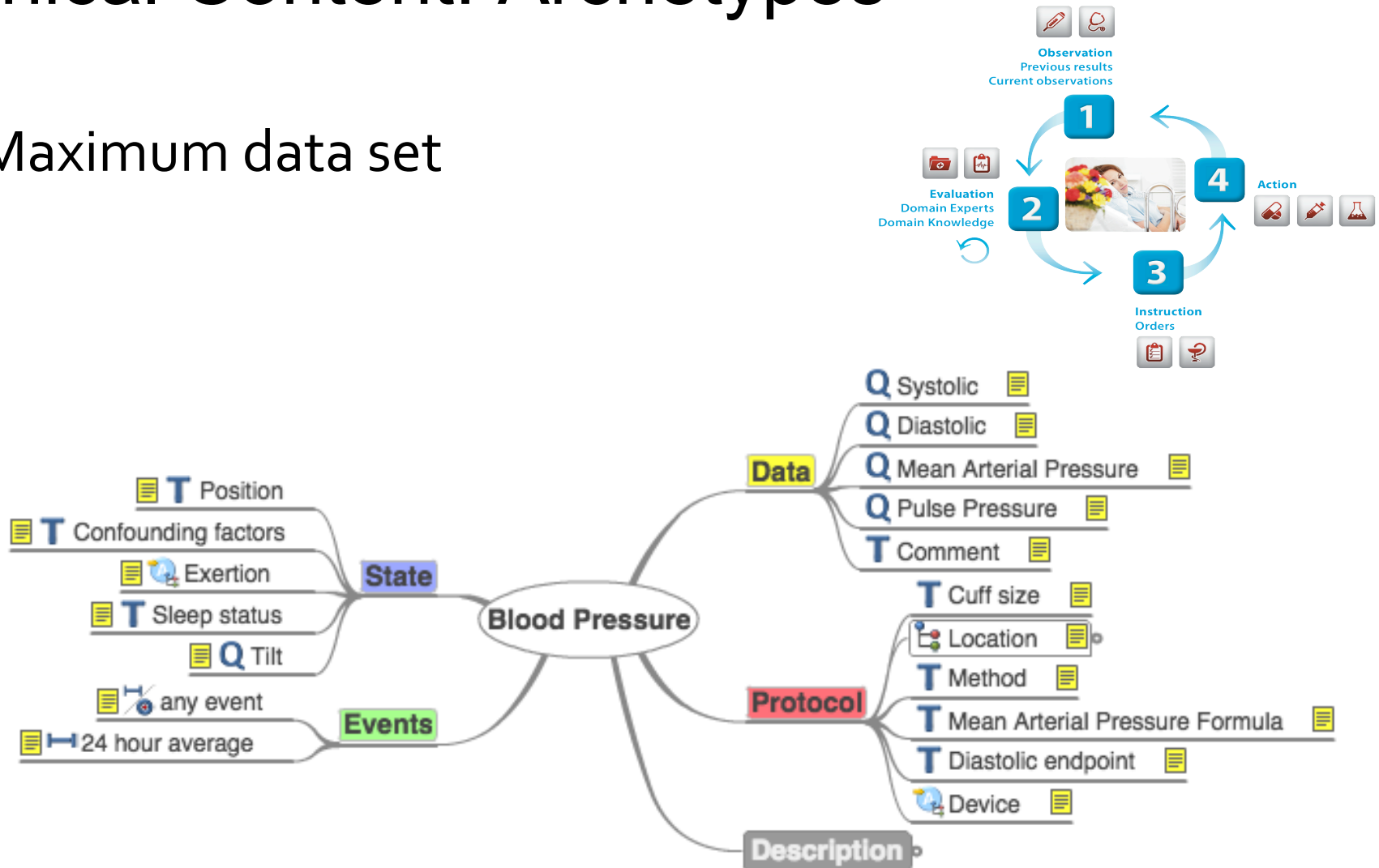
# Semantic underpinning

- ## OpenEHR framework

Use-case specific
data-set definitions

All possible
item
definitions
for health

Templates

1:N

Archetypes

1:N

Reference Model

Defines all data

Terminology
interface

Querying

Portable,
model-based
queries

Defined connection
to terminology
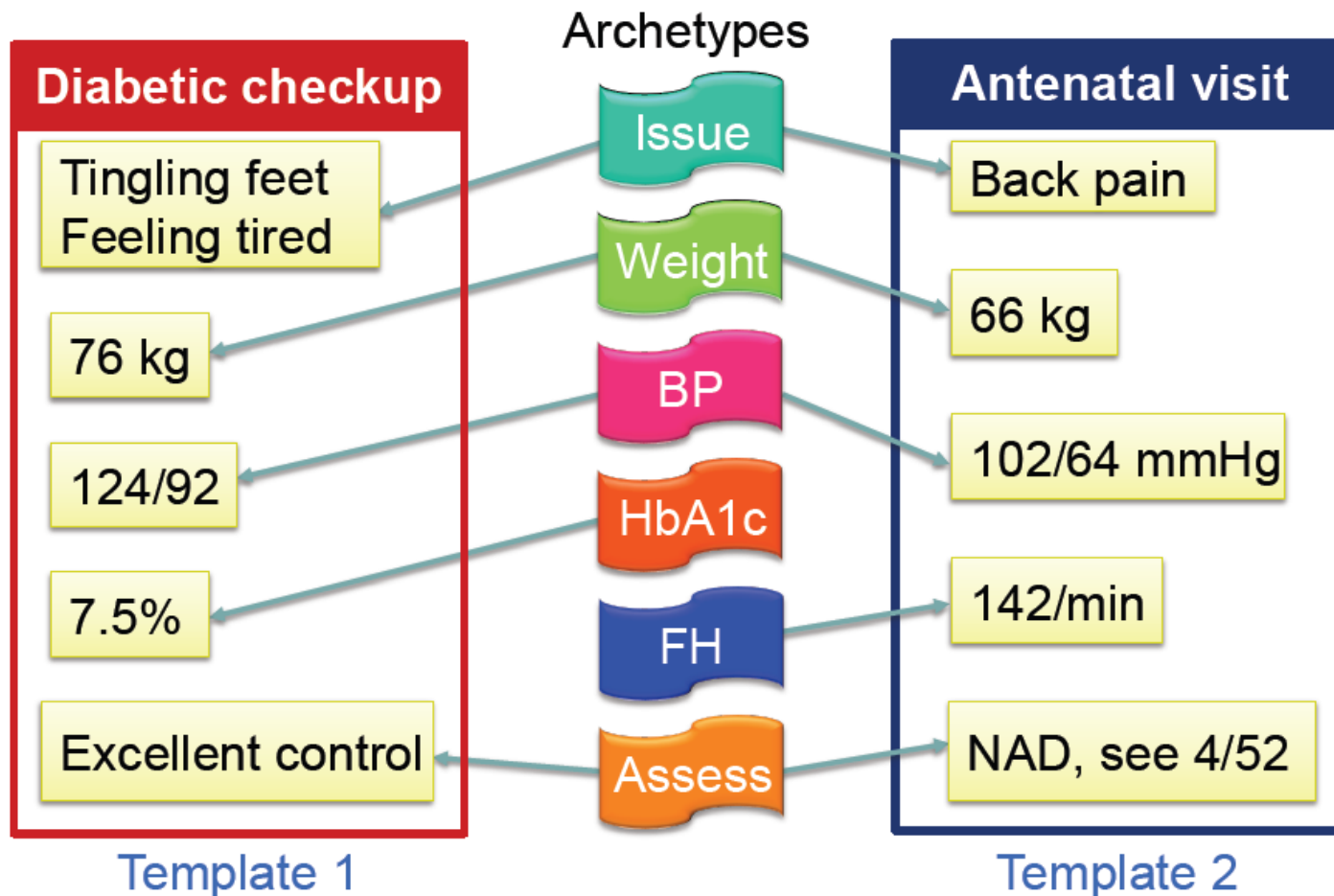
Terminologies

ICPC

ICDx

Snomed CT

# Clinical Content: Archetypes

- Maximum data set

# Use Case Specific: Templates

- Use case specific / based on archetypes

# Elements of EHR/Composition



openEHR Data Types
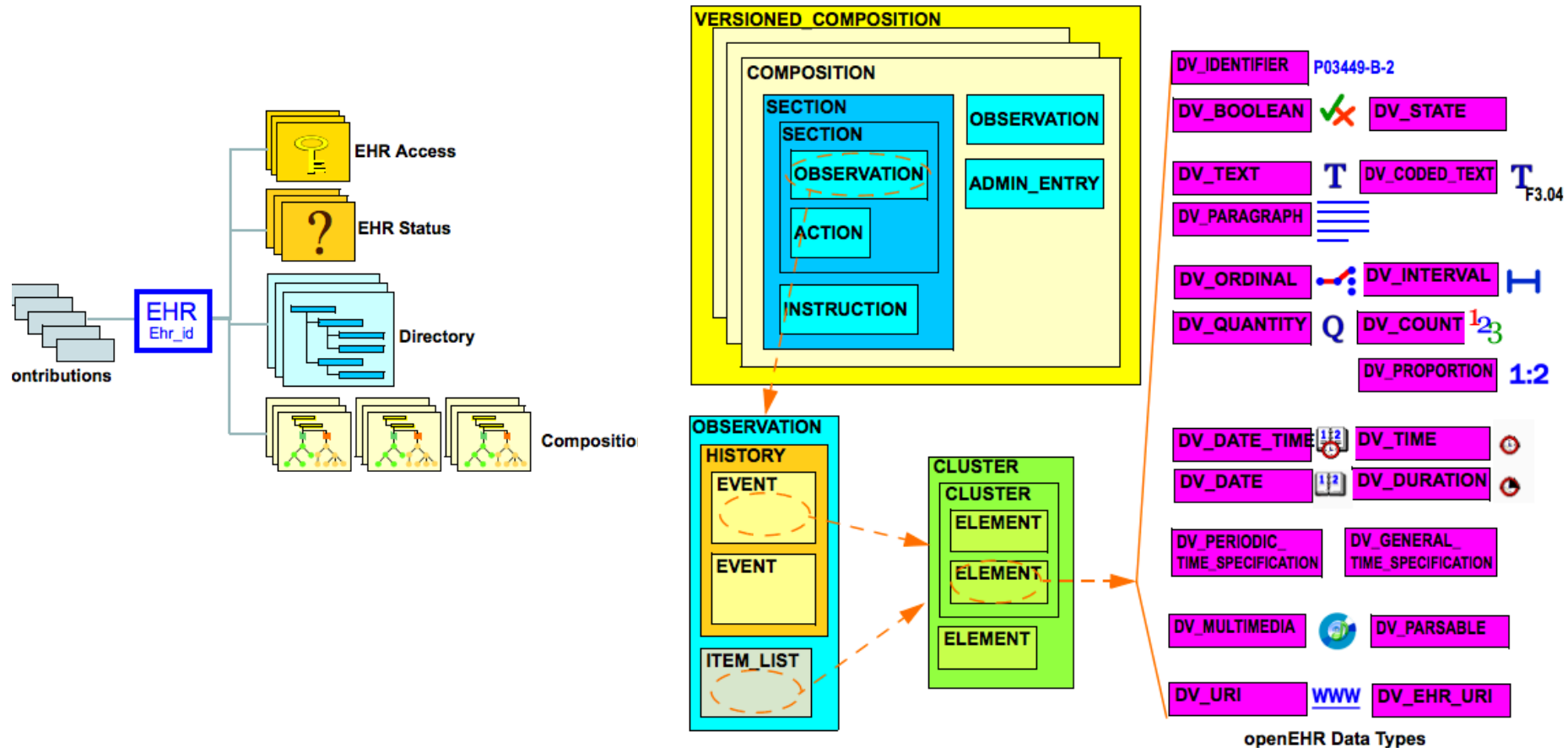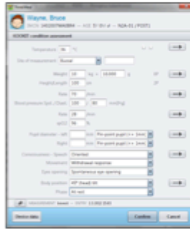
# Vertical semantic framework from GUI to Storage

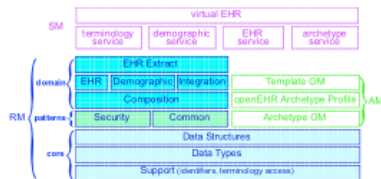Discharge summary UI form



Discharge summary content model



HbA1C, phys. exam, meds list, vital signs etc



Observation, Quantity, coded text etc



Concrete: GUI, messages, documents

1:N

Business-event specific data sets - Templates

1:N

Theme-based models of content - Archetypes

1:N

Data Representation and sharing - Reference Model

Terminology Interface

Querying

# Model-based querying

- The openEHR community has defined a query language spec based on archetypes called AQL – Archetype Query Language

- Compositions (records) are based on templated archetypes

- Archetypes are hierarchical in structure, and every node can be addressed by its path (locatable)

- Query based on clinical models, independent of persistence / storage model

# AQL in a nutshell

- SQL + path syntax to locate nodes or data values within archetypes

**SELECT**

data elements to be returned

**FROM**

query data source

**CONTAINS**

Containment (matches context)

**WHERE**

set filtering criteria on archetypes or any node within the archetypes

**ORDER BY**

result ordering

# AQL on the Battlefield

- Complete EMR
  - Part of University Medical Center Ljubljana
  - 10 **specialities**, including ICU and surgery
  - New, state-of-the-art facility
    - 200+ beds, 14 ICU, 4 OR, 5 Recovery
    - PCs, **Touchscreens**, iPads
    - New medical devices
  - Integrated barcode, **medical devices**
  - All **clinical** content in **archetypes**