

# HL7 CDA, Clinical Modelling and *openEHR*



Thomas Beale

NHS Scotland,  
February 2007



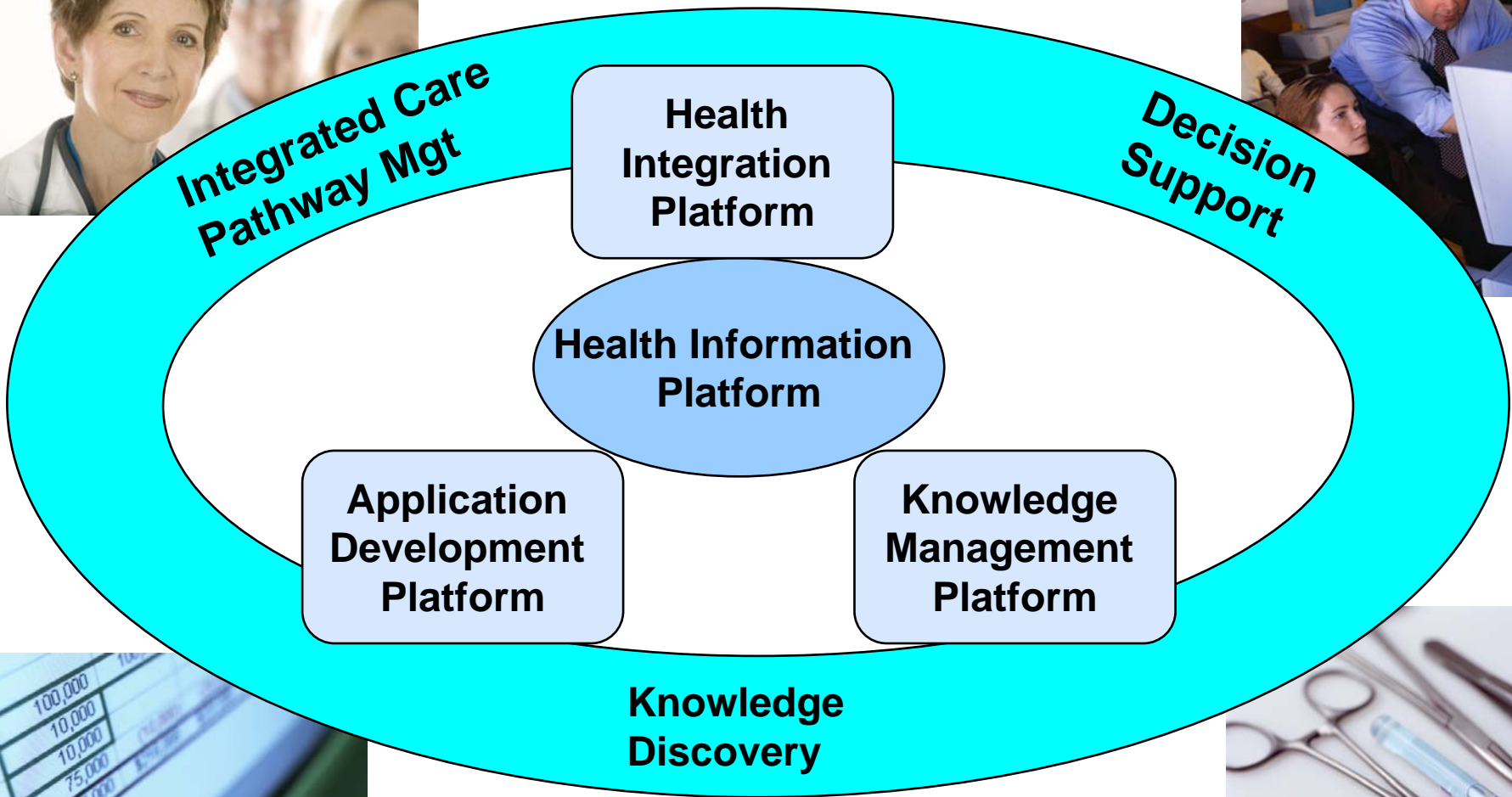
[openEHR.org](http://openEHR.org)

# Introductions

Thomas Beale

- Chief Technology Officer  
Ocean Informatics
- Senior Researcher, Centre for Health Informatics, UCL
- Chair ARB *openEHR* Foundation
- 5 years' int'l standards work
- 20 years' experience in software engineering
- 12 years working with clinical people

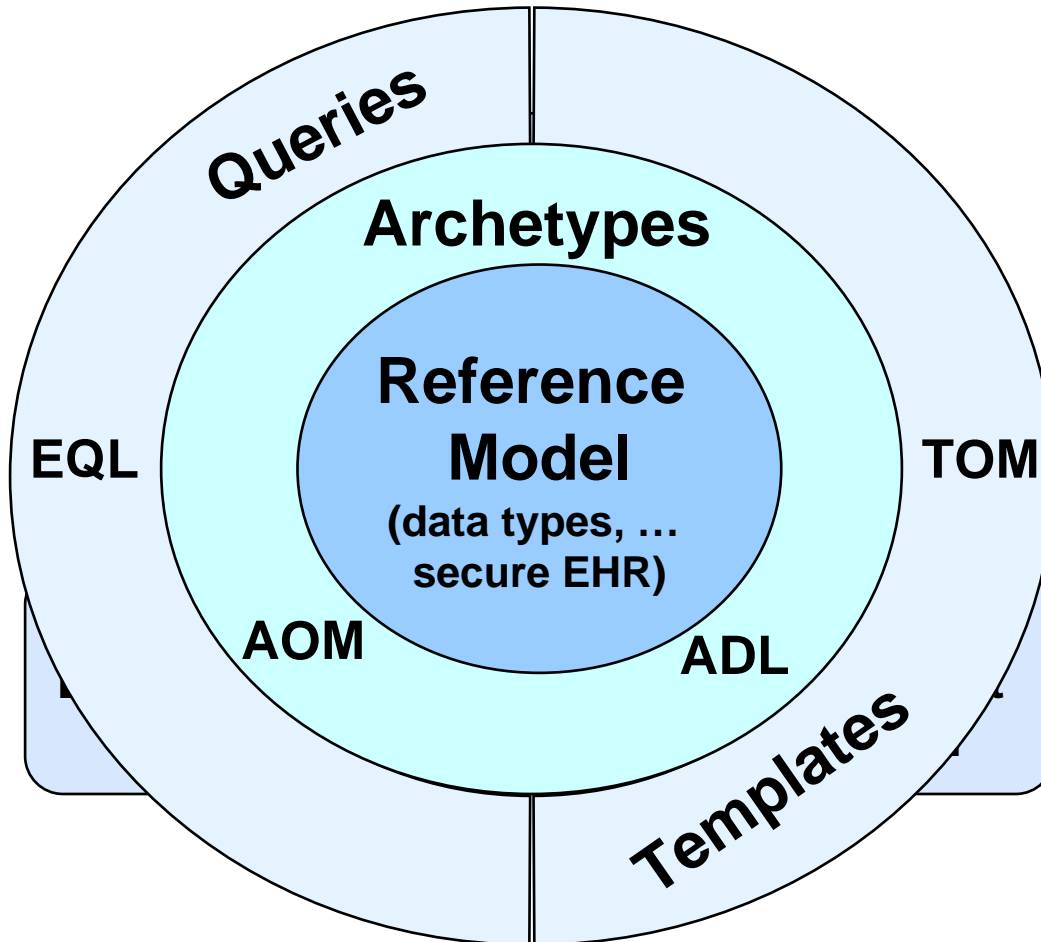
# openEHR Health Computing Platform



# openEHR Health Information Platform



Data Retrieval

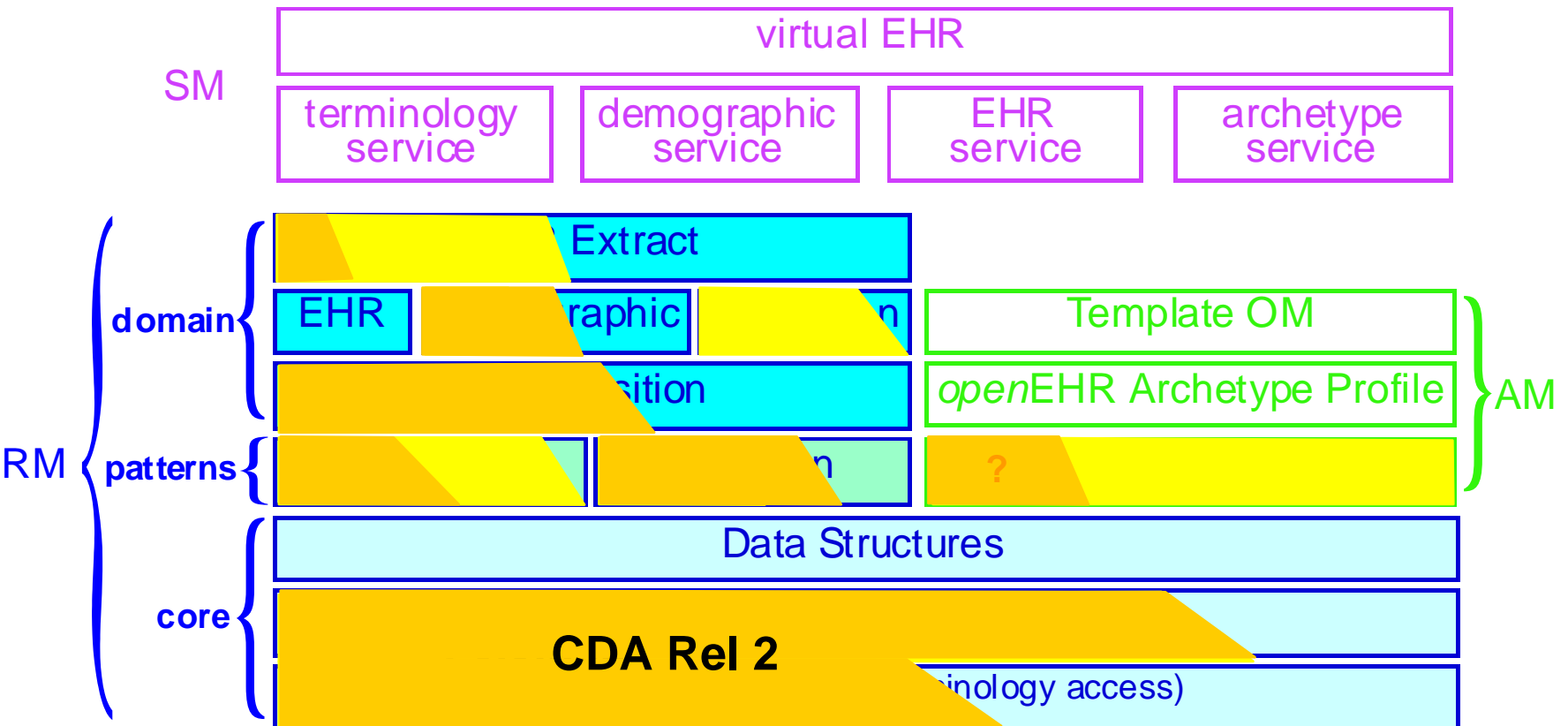


Data Entry & validation



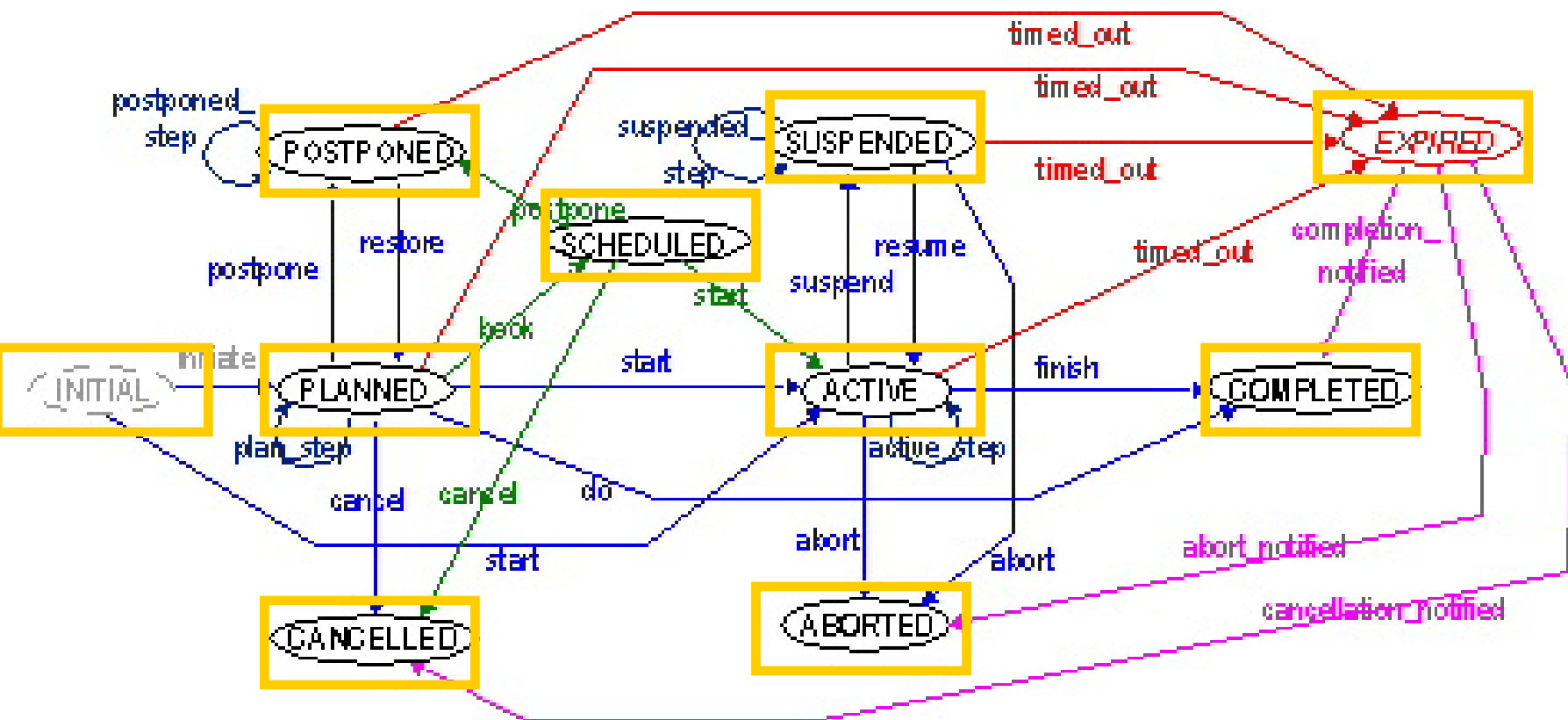
Data Viewing

# Health Information Platform





# Standard state machine

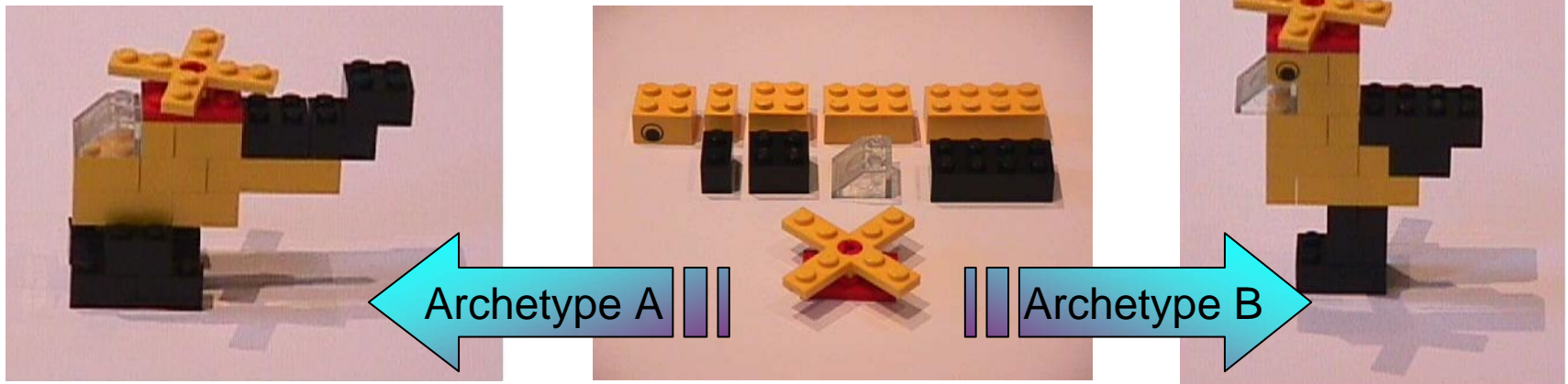


# Archetypes

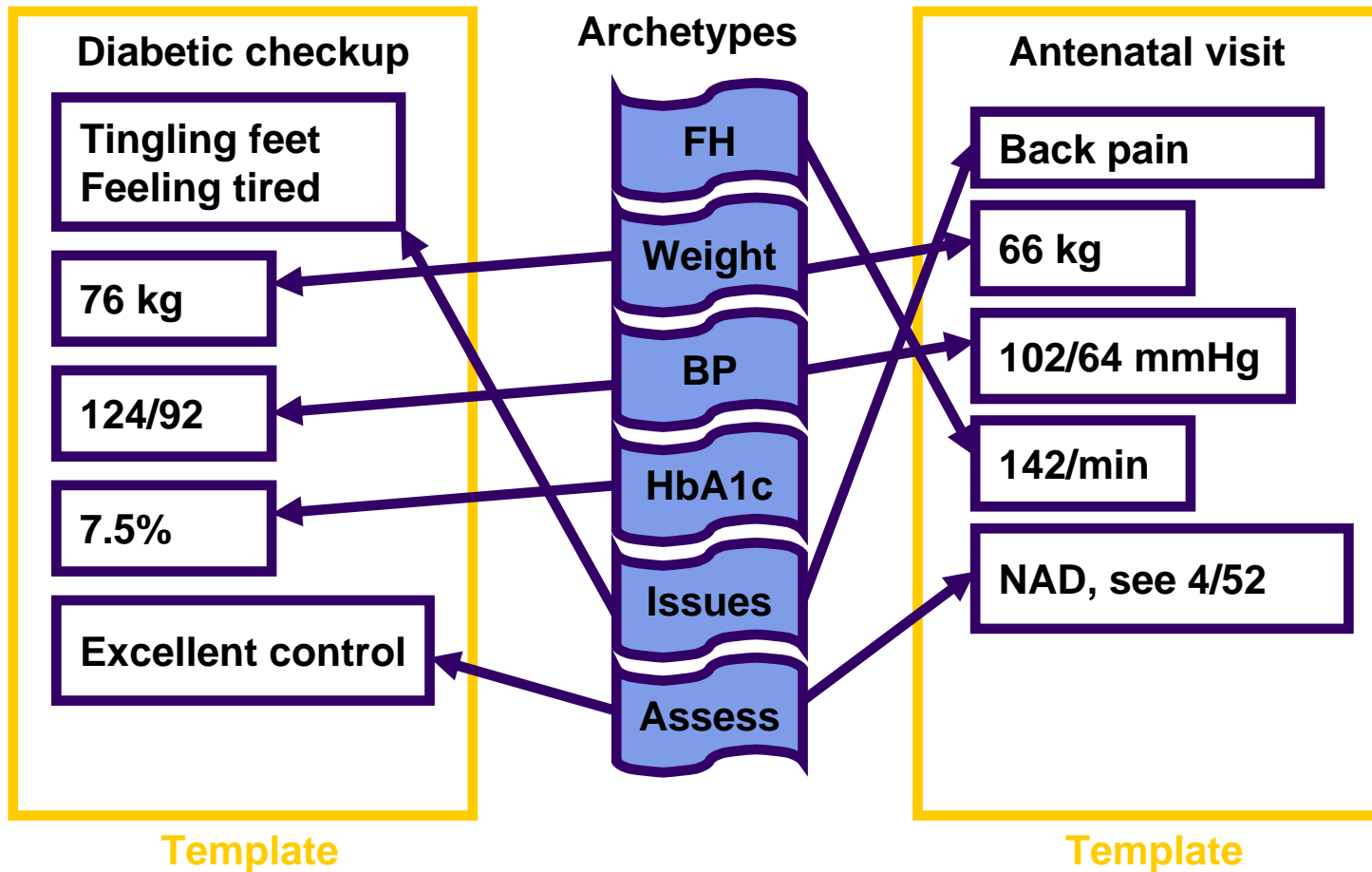
The components of the Reference Model are like LEGO brick specifications

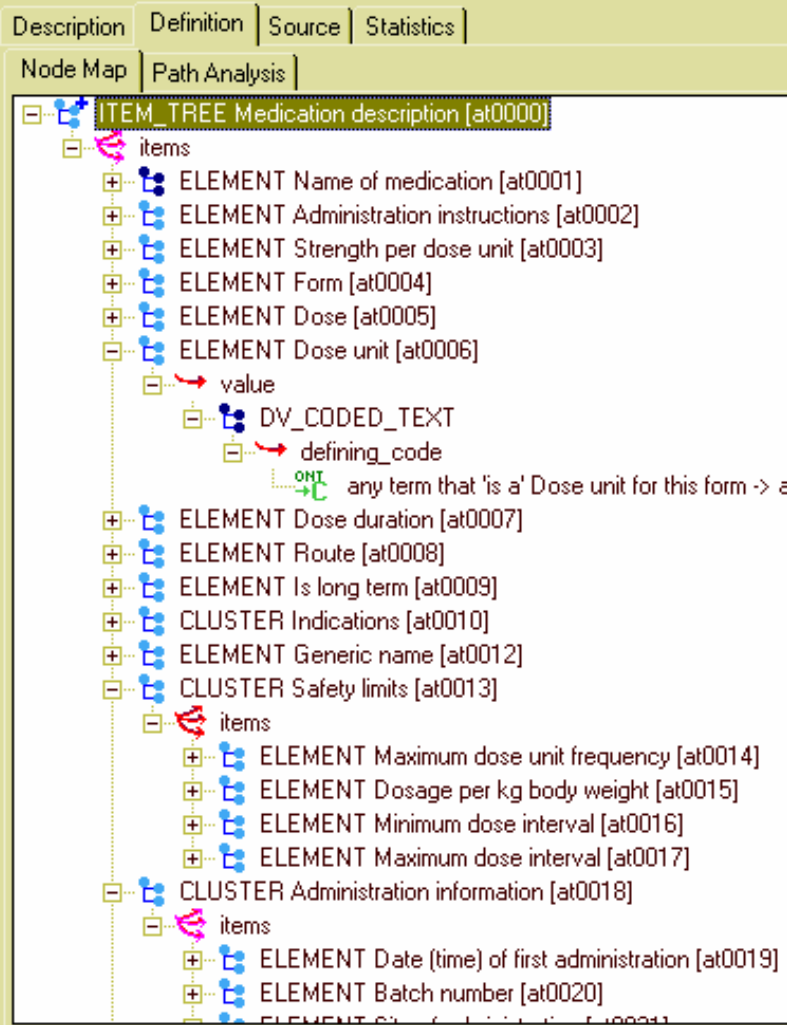
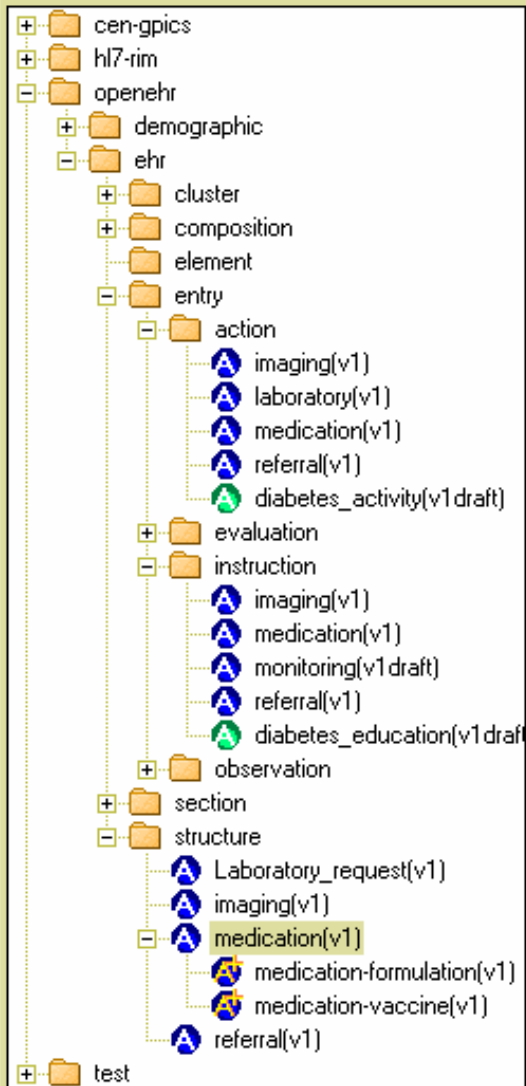
Archetypes = instructions/designs constraining the use of LEGO pieces to create meaningful structures

Information model  
Instances



# Archetypes and Templates





**ACTION**  
resume

**ACTION**  
Δ freq

**ADMIN**  
charge

Patient

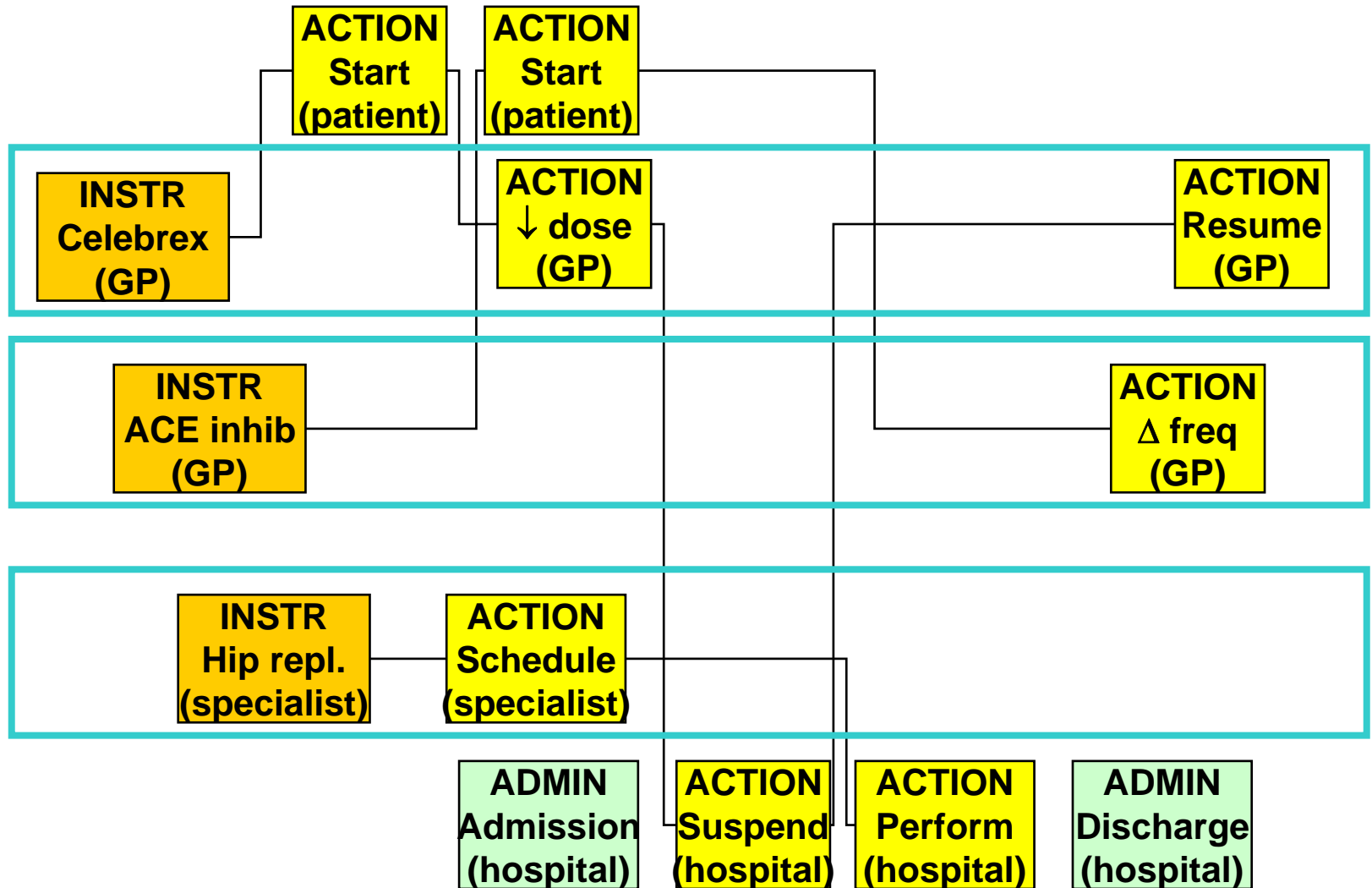
GP

Specialis

Hospital



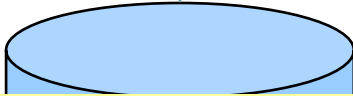
# Reporting on Instructions



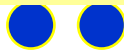
# The *openEHR* EHR



Archetypes  
Templates  
Queries



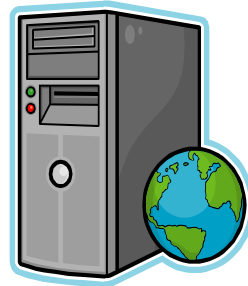
Comprehensive Entry model  
LINKing  
Distributed Versioning  
State model of Instruction & Actions  
Archetype-based Querying  
Formal Terminology integration  
openPGP digital signing



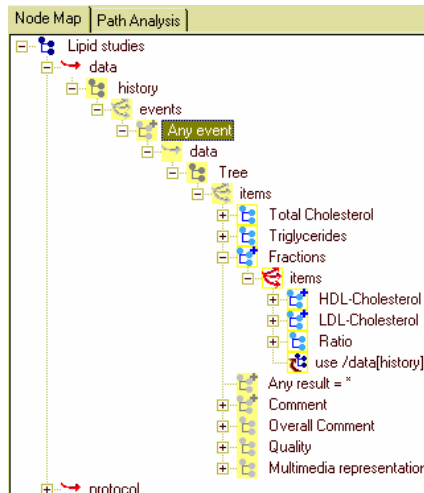
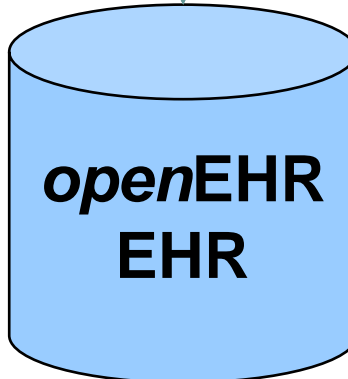
Virtual EHR  
web service



# Queries from Archetypes



**Archetype-path  
Based Queries**



Node Map	Path Analysis
Machine	<pre> /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.3]/value /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.4]/value /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.5]/value /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.5]/value /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.5]/value /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.5]/value /data[at0001]/events[at0002]/data[at0003]/items[at0011.1]/items[at0013.5]/value /data[at0001]/events[at0002]/data[at0003]/items[at0013.1]/value /data[at0001]/events[at0002]/data[at0003]/items[at0013.2]/value /data[at0001]/events[at0002]/data[at0003]/items[at0013.3]/value /data[at0001]/events[at0002]/data[at0003]/items[at0013.4]/value /data[at0001]/events[at0002]/data[at0003]/items[at0015]/value /data[at0001]/events[at0002]/data[at0003]/items[at0017]/value /data[at0001]/events[at0002]/data[at0003]/items[at0017]/value /data[at0001]/events[at0002]/data[at0003]/items[at0018]/items[at0019]/items[at0019] /data[at0001]/events[at0002]/data[at0003]/items[at0018]/items[at0019]/items[at0019] /data[at0001]/events[at0002]/data[at0003]/items[at0018]/items[at0026]/items[at0026] /data[at0001]/events[at0002]/data[at0003]/items[at0018]/items[at0032]/value /data[at0001]/events[at0002]/data[at0003]/items[at0037]/value/media_type /protocol[at0033]/items[at0034]/items[at0035]/value /protocol[at0033]/items[at0034]/items[at0036]/value /protocol[at0033]/items[at0039]/items[at0040]/value/value /protocol[at0033]/items[at0039]/items[at0041]/value/value /protocol[at0033]/items[at0042]/items[at0038]/value                     </pre>

# Queries

SELECT

o/data[at0001]/events[at0002]/time,  
o/data[at0001]/events[at0002]/data[at0003]/items  
[at0013.1]/value

FROM

Ehr[uid=@EhrUid] CONTAINS Composition  
c[openEHR-EHR-COMPOSITION.encounter.v1]  
CONTAINS Observation o[openEHR-EHR-  
OBSERVATION.laboratory-lipids.v1]

# openEHR Application Development Platform

Query Builder

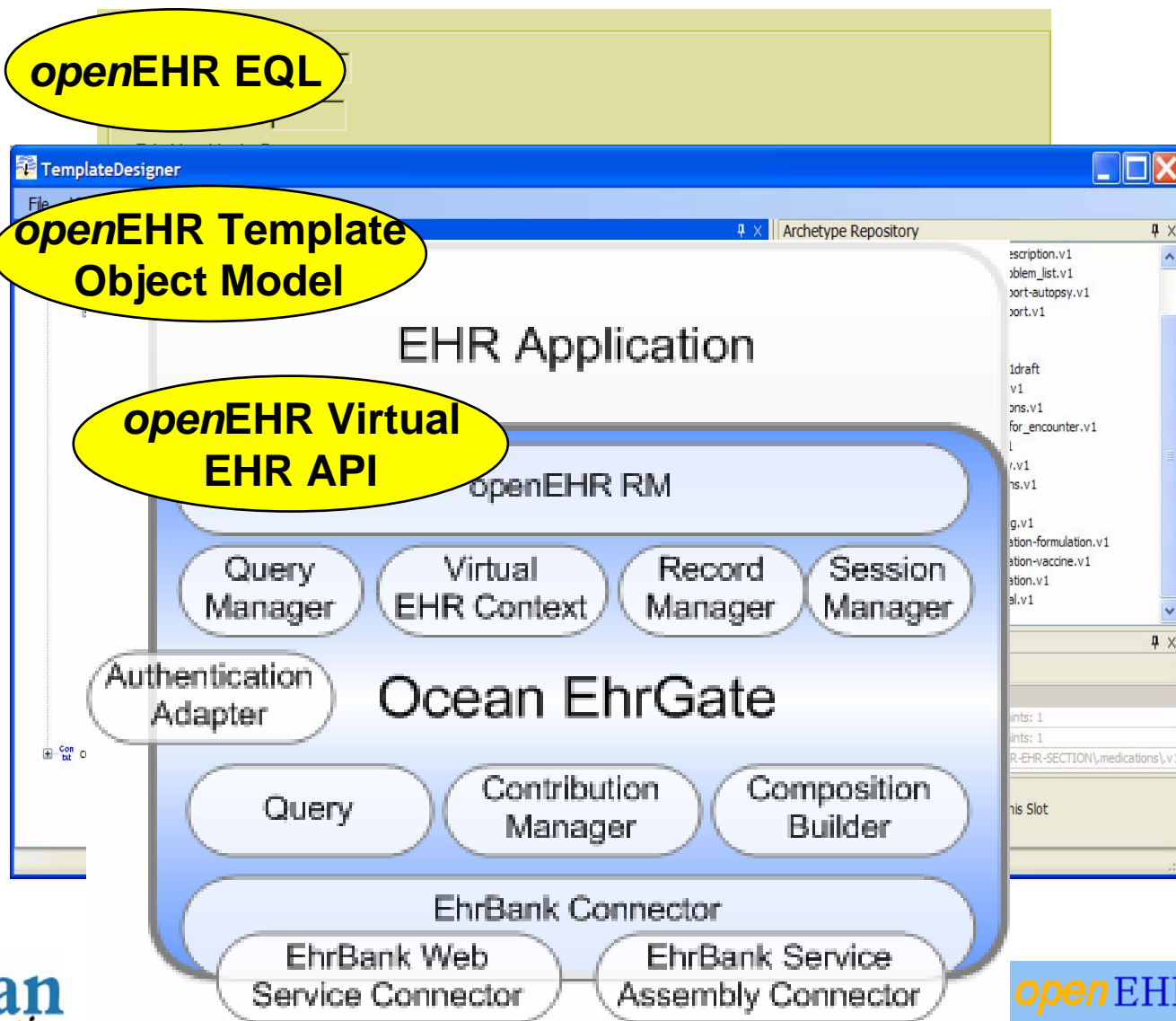
openEHR EQL

Template Designer

openEHR Template Object Model

Virtual EHR API

openEHR Virtual EHR API



# openEHR Knowledge Management Platform

Archetype Editor

openEHR ADL (CEN, ISO)

Terminology Subsetting tool

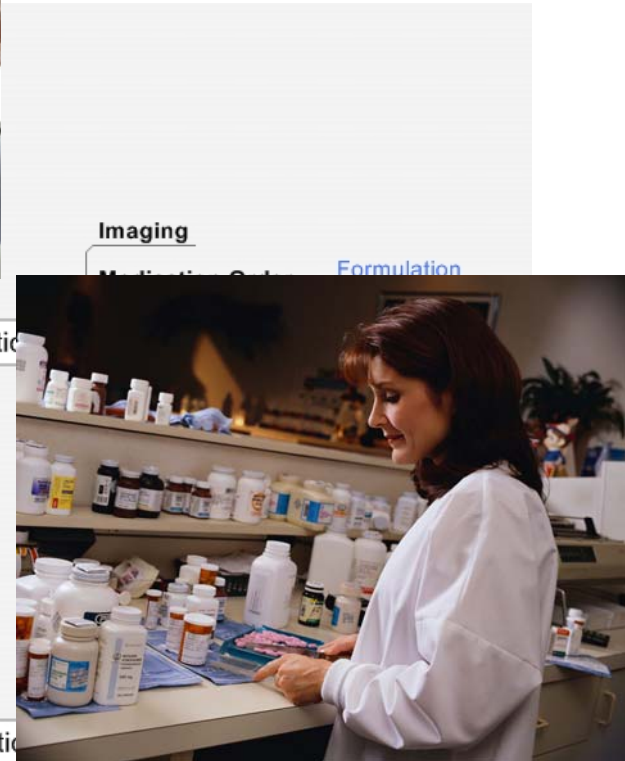
Terminology Subsetting Language

Archetype Repository

Application Development Platform

The screenshot displays the openEHR Knowledge Management Platform interface. At the top, there is a window titled "Microbiology laboratory observations" with a menu bar (File, Edit, Help) and a toolbar. Below it is a window titled "Ocean OTS Query Editor: http://150.101.50.100/OTS/OTSService.aspx" with a menu bar (File, Tools, Help) and a toolbar. The main content area shows a "Query Editor" with a tree view of concepts: "AllInfectiousAgents", "Infectious agent, Select", "Iterator: Max Depth Unlimited", and "Related Concepts: -Is a, Select". To the right, there are "Query Details" with fields for "Query Name" (AllInfectiousAgents), "Terminology" (Snomed), and "Language" (en-GB). Below the query editor is a "Find Archetypes" section with a search bar and a list of archetypes. The search results show "Infectious agent" and "Infectious agent" with a tree view of related concepts: "Aged care", "Allied Health", "Occupational therapy", "Physiotherapy", and "Consumer health". To the right of the search results is a "Purpose:" section with a list of checkboxes: "Chronic disease management", "Statements of exclusion", "Physical examination finding", "Investigation", "Imaging investigation", "Laboratory investigation", and "Medication management". At the bottom, there is a "Connect search items using:" section with radio buttons for "or" and "and". There are "Search" and "Reset" buttons. At the very bottom, there is a footer with the text: "Supported by the General Practice Computing Group of Australia through funding from the Australian Government. Developed in cooperation with Health Informatics, Central Queensland University."

openEHR OWL Archetype Ontology



**Available Archetypes**

Observation

Instruction

Evaluation

Action

**Visual Acuity**

**Chest Measurement**

Glucose

HBA1c

Liver Function

Lipids

Thyroid

Urea and Electrolytes

**Laboratory**

**Subtopic**

**Autopsy**

**Barthel**

**Blood Film**

**Blood Gases**

**Blood Pressure**

**Body Mass Index**

**Body Weight**

**Heart Rate**

**Height**

**Histology**

**Imaging**

**Issue**

**Prescription**

Autopsy Report

Composition

**Imaging**

Formulation

**Injury**

**Problem**

Diagnosis

Histological

Genetic

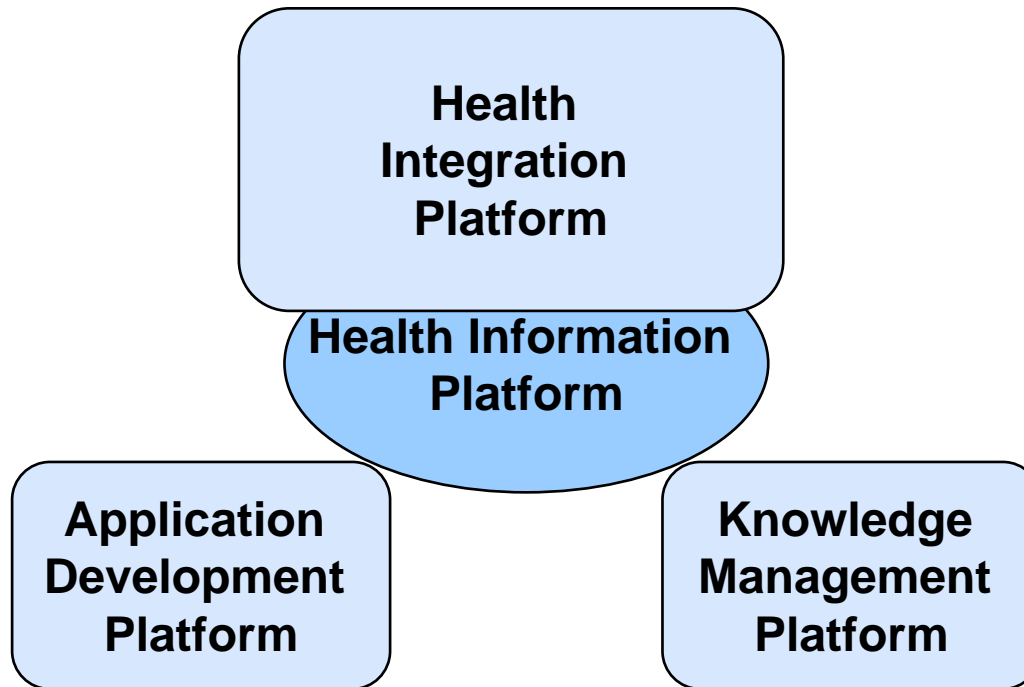
**Risk**

Family History

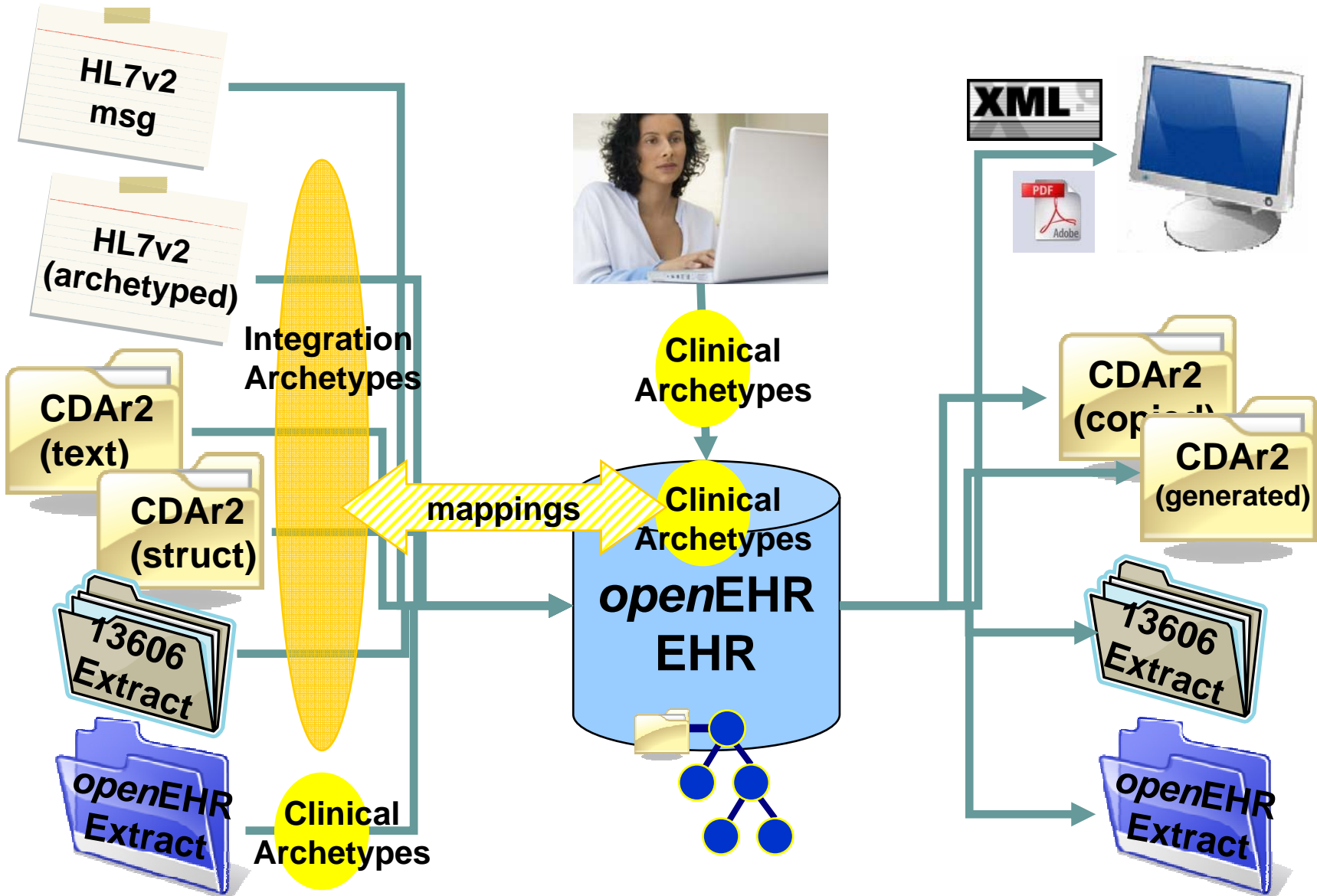
**Medications**

Reason for Encounter

# *open*EHR Health Integration Platform



# A Universal EHR



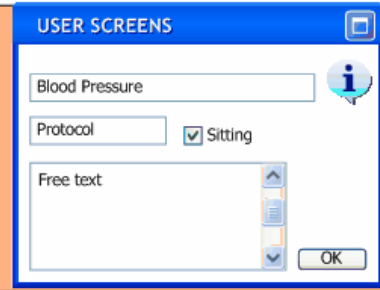
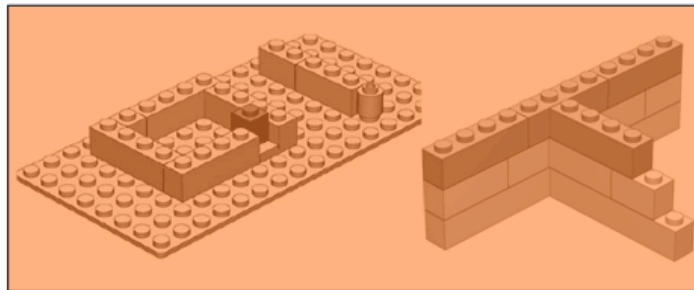
# Conclusions

- *openEHR* is a fully integrated, knowledge-enabled platform, EN13606-capable
- Can accommodate textual and structural CDA documents
- Archetypes and templates provide control over data entry, querying and terminology binding

# ONTOLOGIES

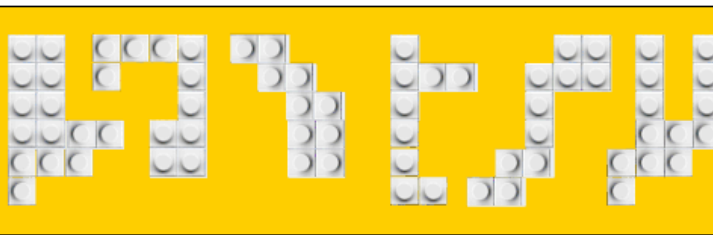
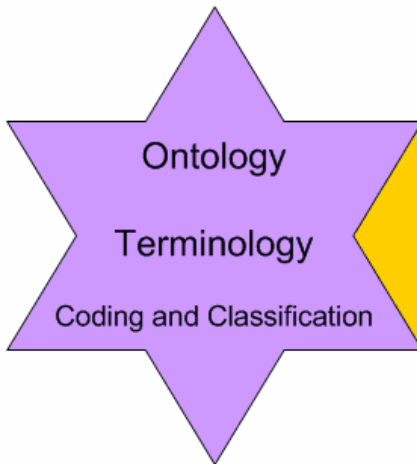
# MODELS

# SYSTEMS



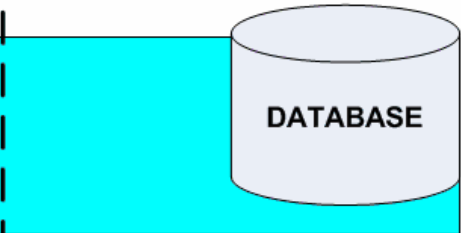
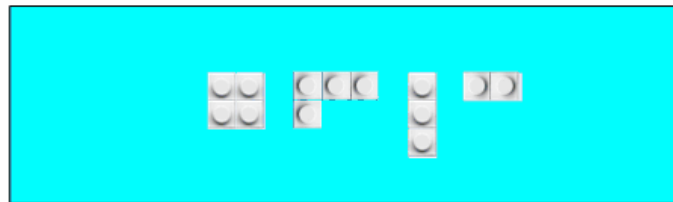
TEMPLATES

Presentation/GUI



ARCHETYPES

Business Logic



REFERENCE MODEL

Persistence

Figure – © 2006 Koray Atalag

# Questions

<http://www.openEHR.org>



## Release 1.0.1 – March 2007