the openEHR ‘open platform: Viva la rEvolution

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What is openEHR?

- An open specification for a health ‘information model’
- capable of supporting an open platform ecosystem
  - vendor neutral
  - technology neutral
- licensed to allow open and closed source business models
- Non-Profit ‘industry / clinical/ health organisation’ collaborative
  - openEHR International/ openEHR Foundation

[openehr.org](http://openehr.org)
the ‘information model’?

- Any definition of the structure and content of information that should be collected or shared
  - A ‘minimal dataset’
  - A message or interface definition
  - Internally every application has some kind of information model

- Sharing information requires developing shared information models
Mismatched clinical information models
How ‘systems’ work now…
Apperta ‘open Platform’

- Be Open Standards Based
- Share Common Information Models
- Support Application Portability
- Be Federatable
- Be Vendor and Technology Neutral
- Support Open Data
- Provide Open APIs

https://apperta.org/openplatforms
open Platform:
The ‘system’ is the data, not the app

Apps

Vendor-neutral Information model

Technology-neutral datastore (CDR)
The open platform ..how things **should** work …
openEHR: Archetypes

- open source computable models of discrete clinical concepts
- Familiar components of a health record
  - Blood pressure, Body weight
  - Medication order, Family history
  - Urea, Creatinine results
- ‘Maximal dataset’
  - Capture as many clinical perspectives as possible
openEHR: Templates

- Templates deliver the datasets by aggregating archetypes together
- Key clinical endpoint and start point for generation of technical artefacts
- i.e. openEHR archetypes and templates can be used directly
  - Class libraries, Message schema
  - GUI skeletons, API Profiles
openEHR archetype/template tooling

**LinkEHR Interoperability Platform**

LinkEHR Interoperability Platform helps you in the integration, normalization and semantic interoperability of clinical data. It is composed of LinkEHR Integration, LinkEHR Studio and LinkEHR Model Manager, which can be used all together or independently, upon your needs.
Archetype re-use

Template underpinning application

Archetypes used in template

Cardiology Clinic

Issue: High Blood Pressure
Weight: 66kg
Blood Pressure: 192/114 mmHg
Pulse Pressure: 78 mmHg
spO2: 92%
Assessment: NAD, see 4/52

ISSUE
Tingling feet, feeling tired

WEIGHT
76kg

Blood Pressure
124/92

HbA1c
7.5%

Assessment
Excellent control

openEHR
CKM: Social media ‘standardisation’
Evolutionary standardisation ‘distributed Governance’

Implementers

Secondary endorsement

Blood pressure Archetype Editors

Archetype Reviewer

Clinical Knowledge Administrator

Opthalmology Project Editors

Visual fields archetype

Visual acuity archetype

Reviewer

Reviewer

PRSB

The Royal Eye doctors

INTEROPen

openEHR

inidus
openEHR: open-source collaborative clinical content factory
openEHR Clinical Data Repository

Apps

Vendor-neutral Information model

Technology-neutral datastore (CDR)
AQL: Information-model querying

- Information model querying, independent of the actual database querying
- Vendor/technology neutral querying

To query an openEHR system you only have to know which archetypes are in use.

```sql
SELECT v/uid/value as composition_id,
    obs/data/origin/value as measurement_time,
    obs/data/events/data/items[@0004]/value/magnitude as systolic,
    obs/data/events/data/items[@0005]/value/magnitude as diastolic,
    c/context/settings/value as composition_setting,
    c/name/value as composition_title,
    c/context/start_time/value as composition_start_time
FROM Ehr [uid=$current_ehr_uid]
CONTAINS VERSION v
CONTAINS COMPOSITION c[openEHR-EHR-COMPOSITION.encounter.v1]
CONTAINS OBSERVATION obs[openEHR-EHR-OBSERVATION.blood_pressure.v1]
WHERE obs/data/events/data/items[@0004]/value/magnitude > 185
ORDER BY c/context/start_time/value.
```
The good news…

- You do not have to build your own openEHR back-end ‘CDR’…
  - several providers of openEHR CDR services
  - the openEHR API is compact and easy to use
- open source CDRs
  - Ripple EtherCis
    - https://github.com/ethercis
  - Cabolabs EhrServer
    - https://github.com/ppazos/cabolabs-ehrserver
  - EhrBase …. coming soon
App development
Genomics England phenotypics

- 26 templates
  - 13 RD ‘output’
  - 11 Cancer ‘output’
  - 2 ‘input’
- 99 archetypes
  - 44 international
  - 27 localised
  - 28 purely local

http://ckm.apperta.org/ckm/#showProject_1051.61.28
Genomics England - 100,000 Genomes project

- Launched 2012 – kick start UK genomics industry
- Enable breakthroughs in medical research, diagnosis and treatment
- Sequence 100,000 genomes of patients with cancer and rare diseases
- Established Genomics England Limited
- 13 Genomics Medicine Centres (GMCs) collect gene samples and accompanying clinical data from participating NHS trusts
- North Thames responsible for over 25,000 Genomes
HiGHmed

Goals
- Establishing an interoperable and open health data platform
- Enabling data access, analytics and sharing
- Improved patient care and enhanced clinical research

Facts
- Covers ~¾ of the German university hospitals
- Project started on Januar 1st 2018.
- ~40 mio € funding until the end of 2021
- Competing with 3 other consortia
CSR4/Highmed Genomics archetypes
Phenopackets Schema

Purpose:
- phenotypic description of a patient/sample in the context of rare diagnosis
- provide sufficient and shareable information of the data outside of Health Record
- phenopacket is to be inter-operate with HL7

Example Fields:
Biosample:
Id; description; sampled_tissue; taxonomy; individual_age_at_collection; tumor...

Cancer Example:

https://github.com/phenopackets/phenopacket-schema
Apperta coPHR - the coProduced Health Record

- Patient has author rights controls access, distribution
- All data must be properly medico-legally handled
  - full audit/provenance
  - no retrospective access refusal
- Sees patient as a part of the professional team
- Great fit for openEHR platform
- https://apperta.org/coPHR/

A Blueprint for a Co-Produced Personal Health Record (CoPHR) Ecosystem

7.1 Core coPHR Schema
The core coPHR Schema is illustrated in the figure below.

Figure 2: Core coPHR Schema
Best of breed
- NHS Plymouth seeEHR portal
- NHS Taunton
- Marand ePrescribing + CDR

Bi-modal CDR
- NHS Salford GDE
- CDR alongside AllScripts

Research
- 100,000 Genomes project
- 17 live openEHR datastores
UK open platform II

- Person Held Record
  - Leeds City Council = HELM
  - using Ripple/Ethercis CDR

- NHS Scotland
  - National Digital Platform
  - using Ripple/Ethercis CDR
  - Cambio GDL - vendor-neutral

- Others
  - NHS Wales openEHR pilot
  - NHS Northern Ireland
NHS Scotland NDP apps
openEHR CDR and FHIR
Playing (nicely) with FHIR
Rewiring health IT?

- open Platform is not ‘more of the same’ - profound ‘re-wiring’ of health IT

- “Database-less” apps challenges long-held ‘truths’

- “Health data services as commodity” is commercially threatening