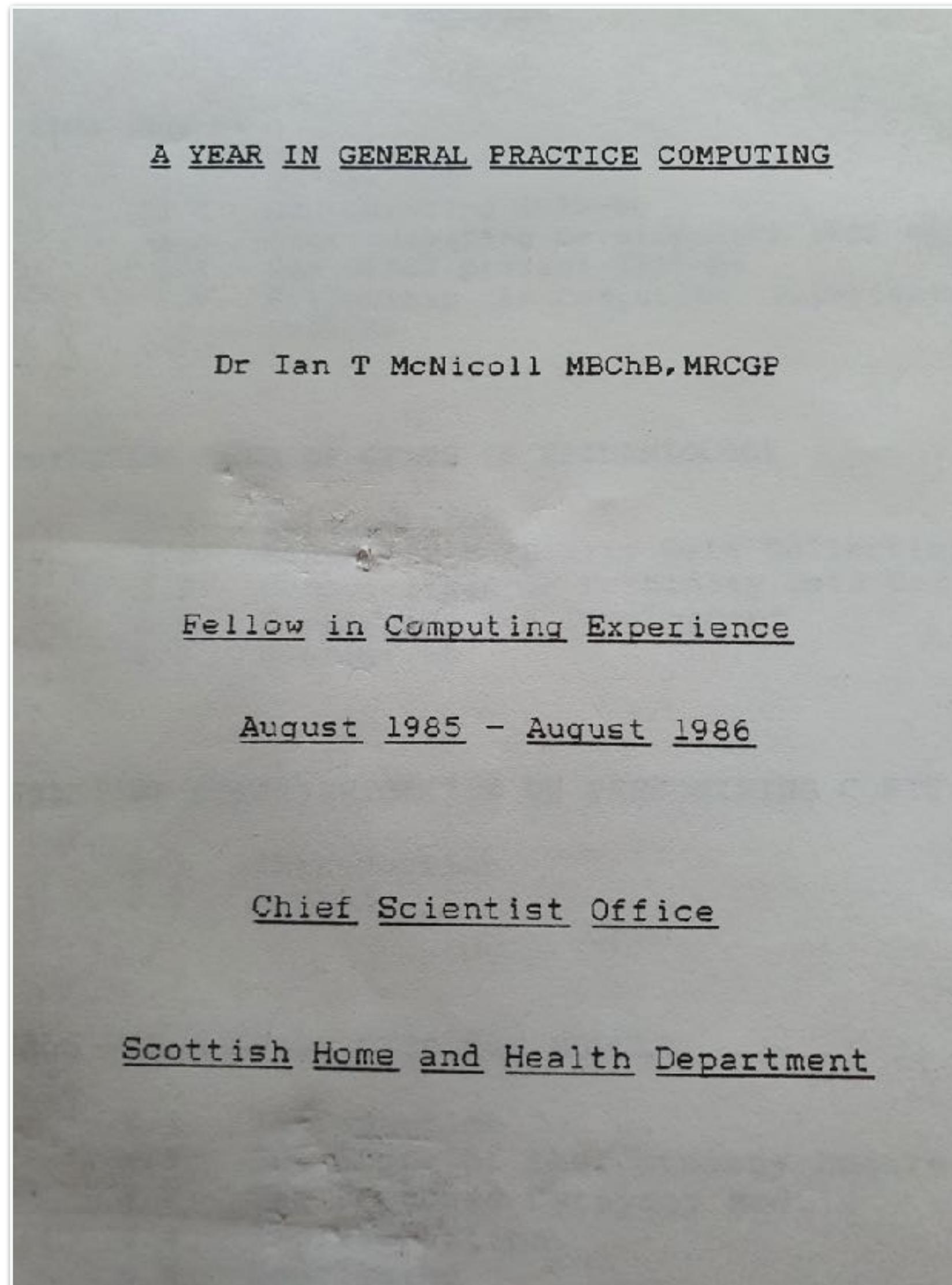
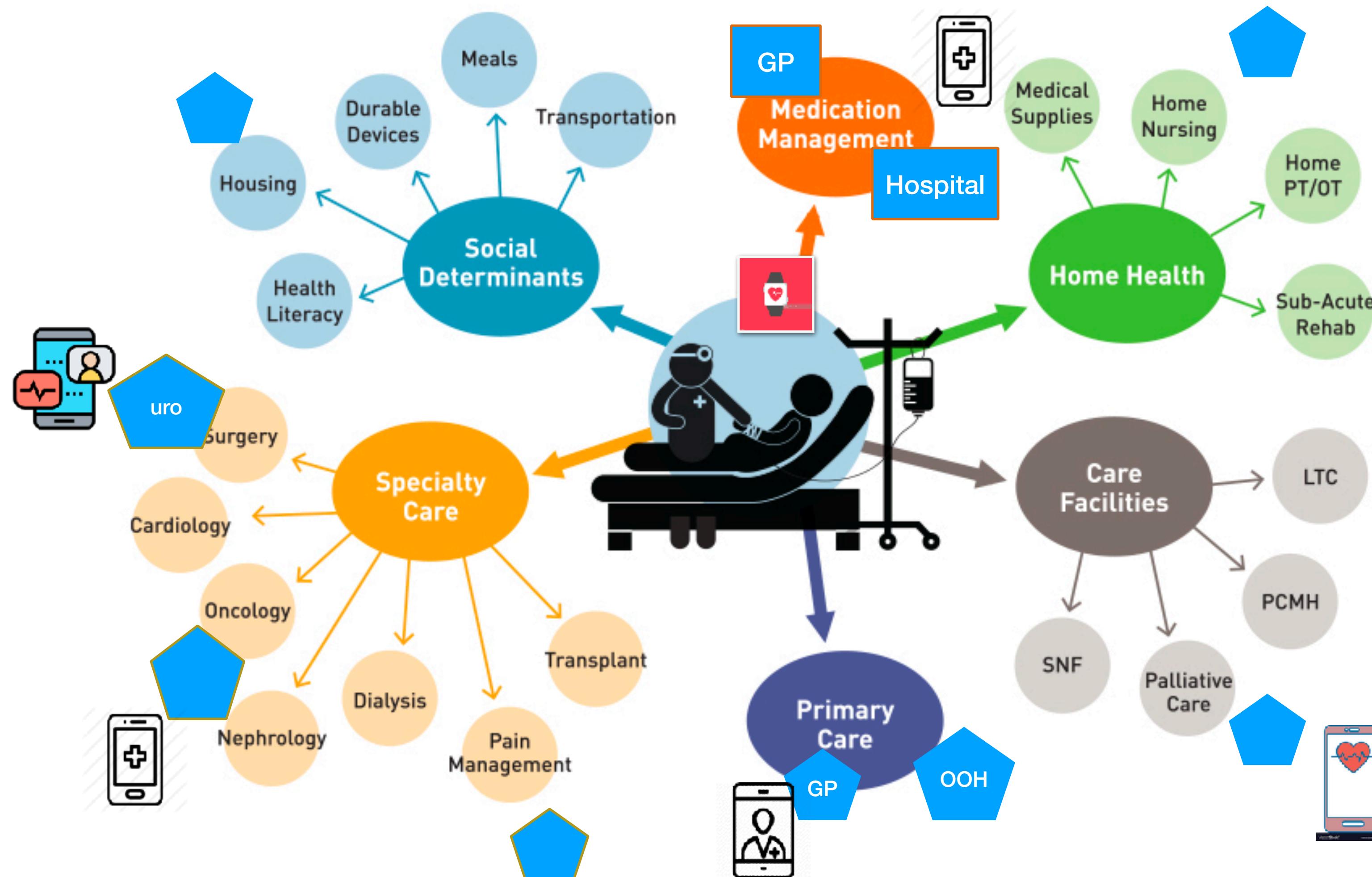


# What is openEHR: Towards a coherent patient-centric digital healthcare ecosystem



# What do we actually want ? A patient-centred coherent information system?

openEHR



← → ⌛ 🔒 chemphildi.wordpress.com

My Site Reader Write

## MDT: Multi-Disciplinary Team or Might Delay Things?



A lot of care pathways involve a multi-disciplinary team at various points, and cancer care pathways are no exception. In fact most key decisions about treatment choices after diagnosis and treatment changes following further investigations are made by the multi-disciplinary team.

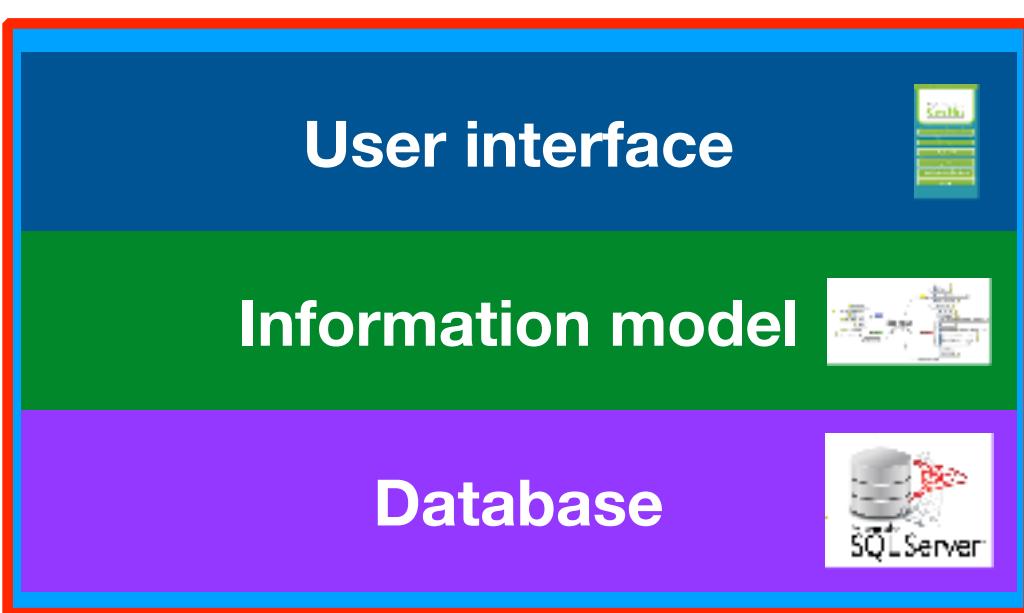
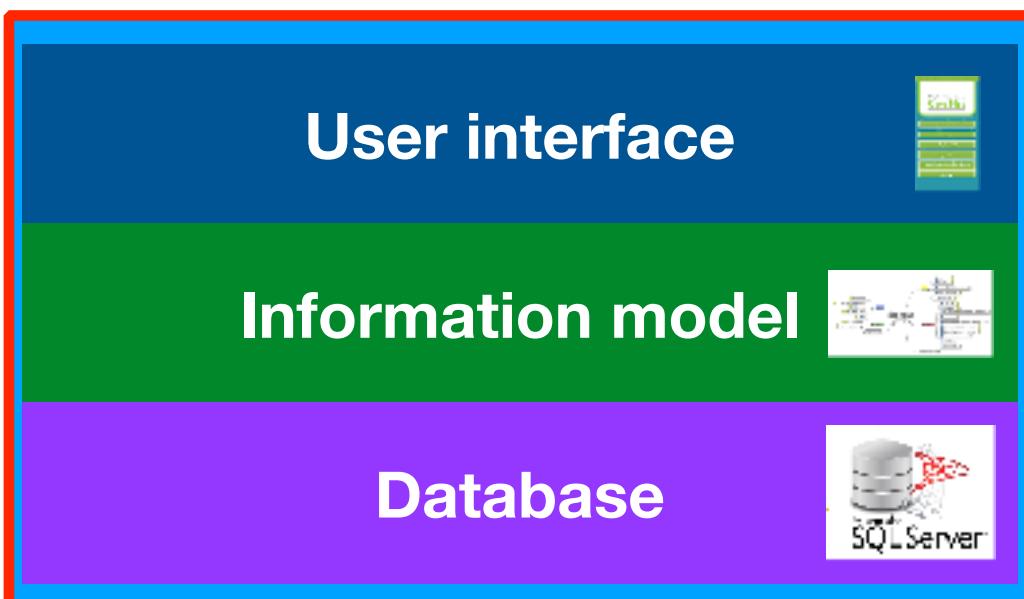
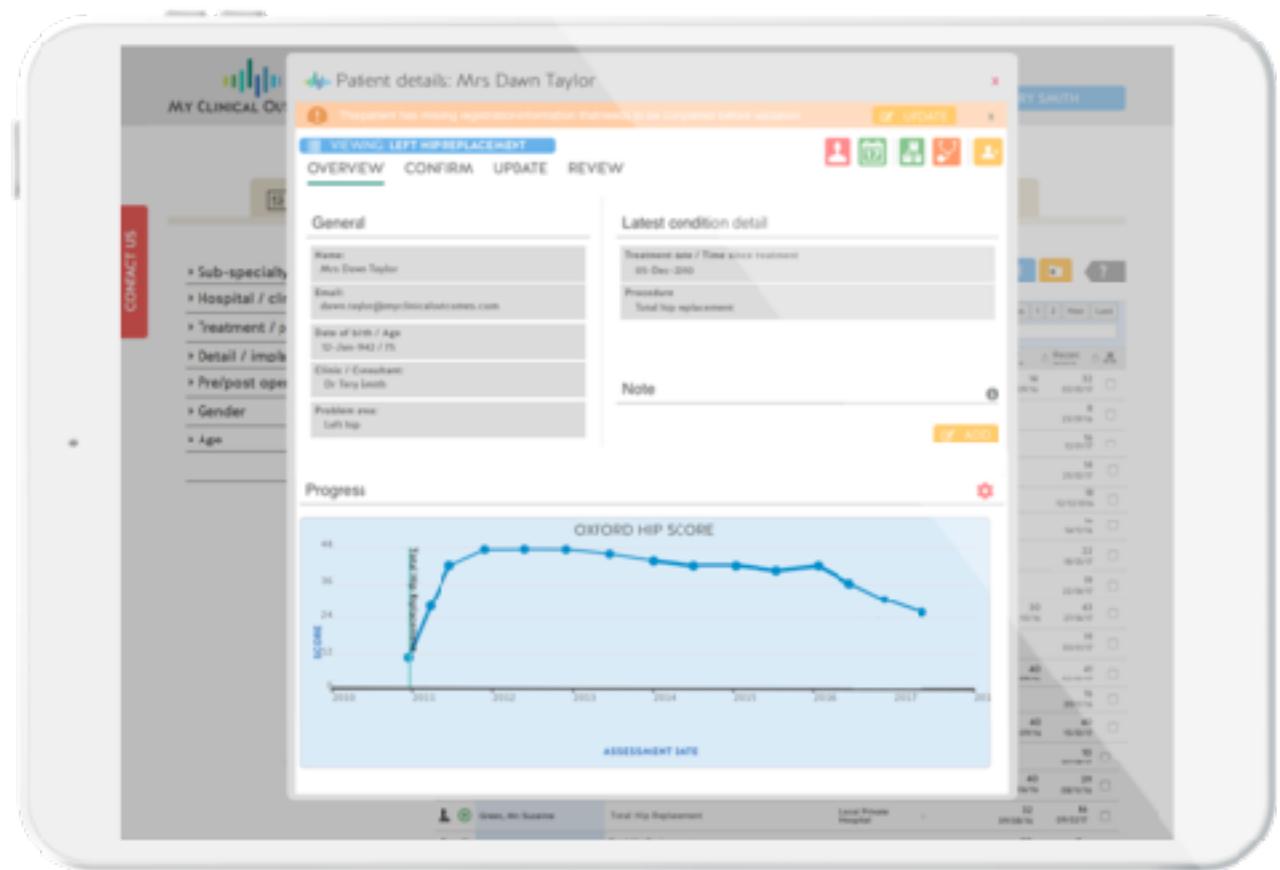
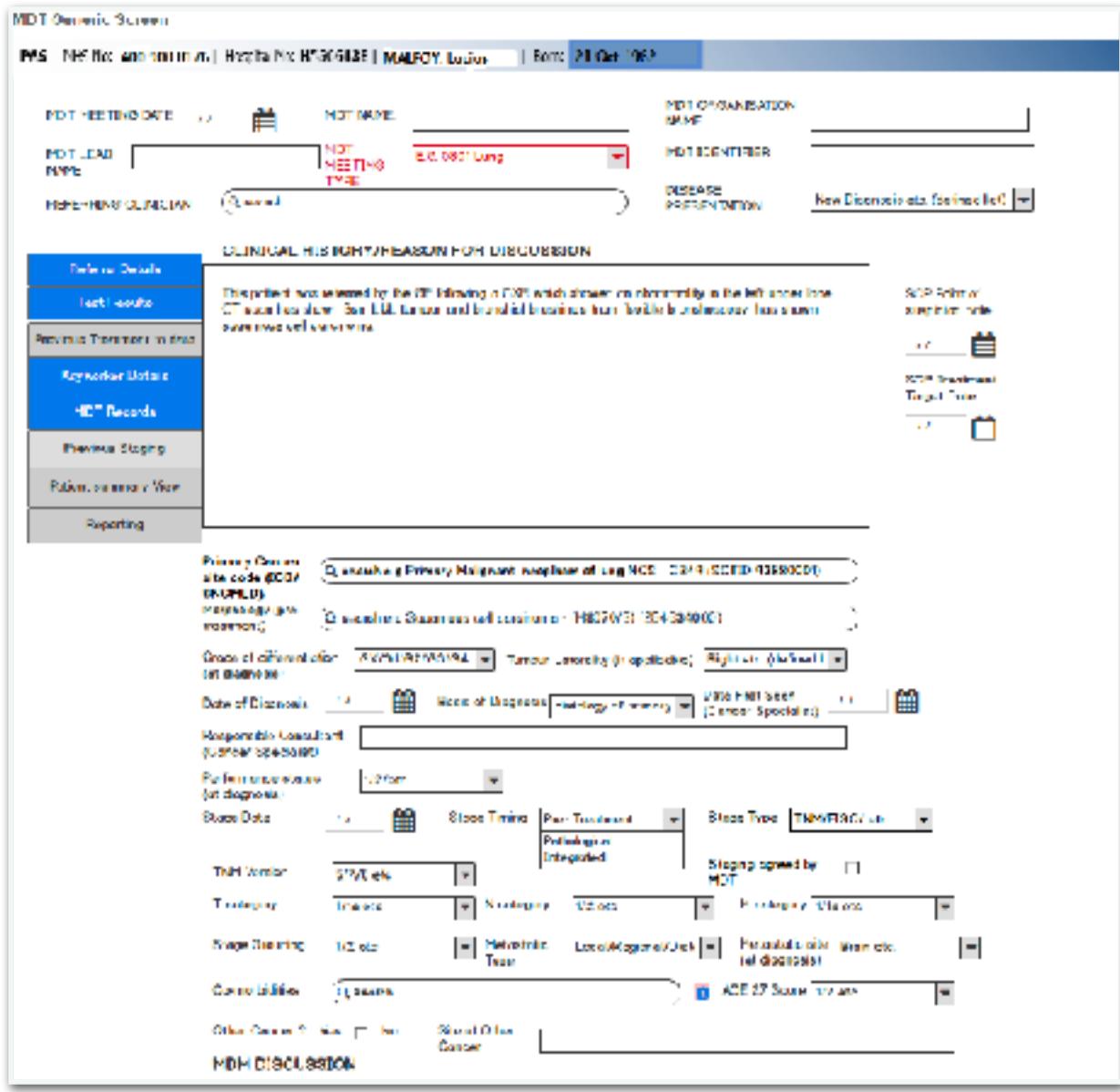
**Recent Posts**

- MDT: Multi-Disciplinary Team or Might Delay Things?**  
24-August-18
- A prickly tale of hospital notes**  
17-August-18
- Chemo Buddies**  
4-August-18
- The empowered patient?**  
26-July-18
- The aborted PICC Line**  
25-July-18
- The extra mile**  
20-July-18
- The long road to getting my prescription**  
18-July-18
- The New Normal**  
15-July-18



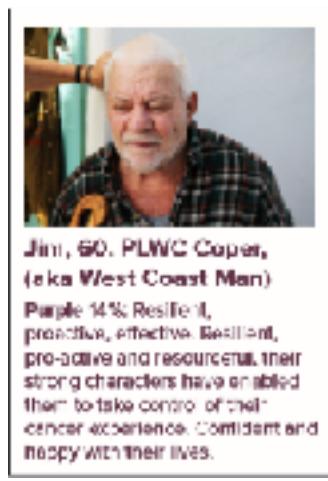
# What is an ‘IT system’?

**openEHR**



# Cancer journey

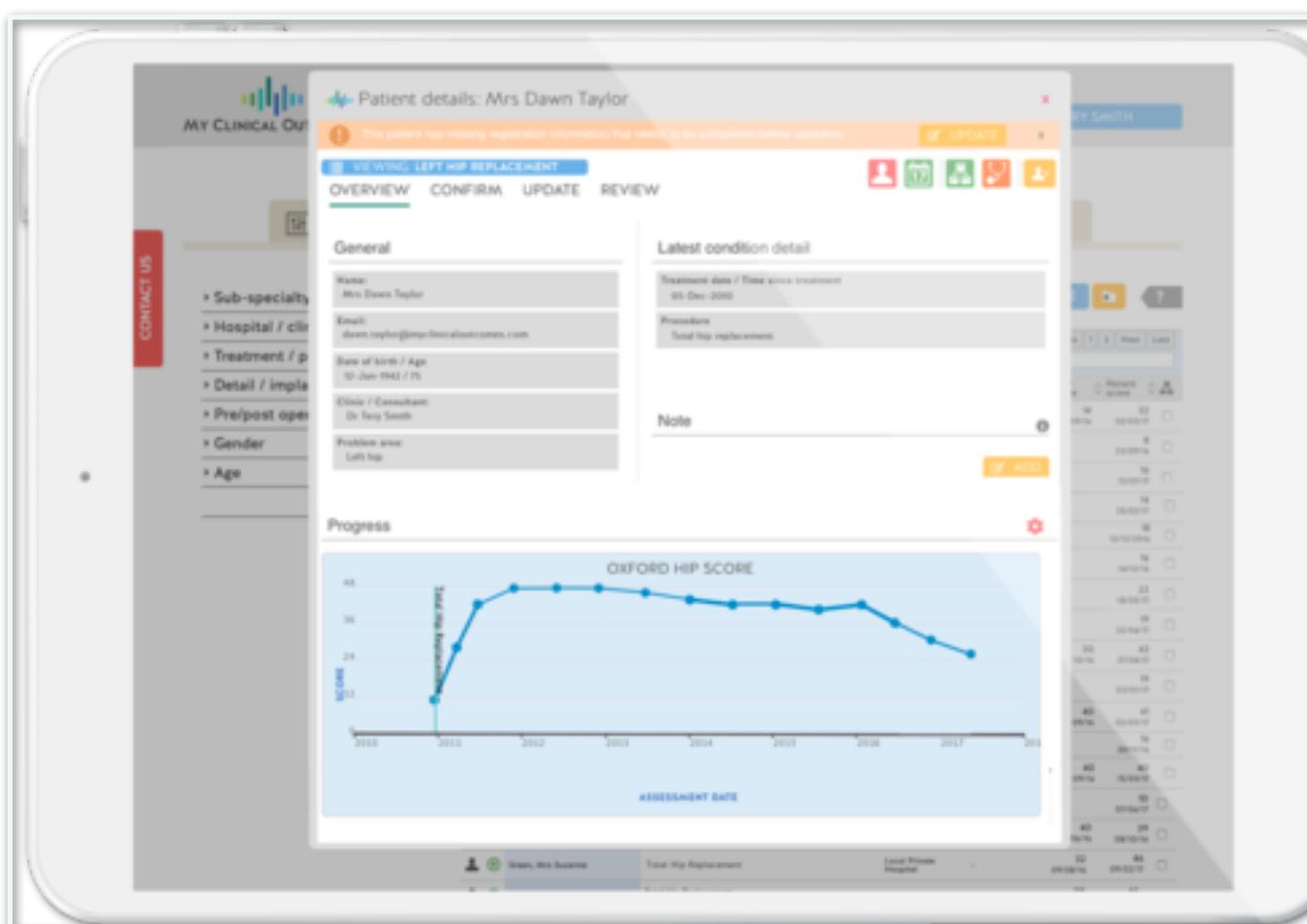
openEHR



**MDT Genetic Screen**

PMS - MDT Genetic screen | Health At Home | MADOF\_Laura | Item: 20 Oct 2010

PAT-HEARING DATE	PAT-NAME	PAT-ORGANISATION NAME
PAT-LEAD NAME	PAT-HEARING TYPE	PAT-IDENTIFIER
PAT-HEARING SOURCE		
PRESERVE INFORMATION		
New Disease state Test results		
CLINICAL HISTORY/REASON FOR DISCUSSION		
The patient has returned to the MDT having a CSH and answer questions on chemotherapy in the left side from CHS (see above). See LHS, LHS and Hospital Trust. Available to answer further questions on chemotherapy.		
GP Referral information		
GP Referral Date		
GP Referral Target Date		
Referrals Details		
Left knee		
Review Treatment status		
Re-referral status		
ICR™ Records		
Previous stages		
Patient contact history		
Reporting		
Primary Care		
Primary Care code (ICD-10)		
ICD-10		
Prescription		
ICR™ Record		
Gross of clinical operation		
Date of diagnosis		
Responsible consultant		
Performance status (at diagnosis)		
Blood Data		
THB		
Transfusion		
Stage		
Stage		
Cancer status		
Other details		
MDH DISCUSSION		

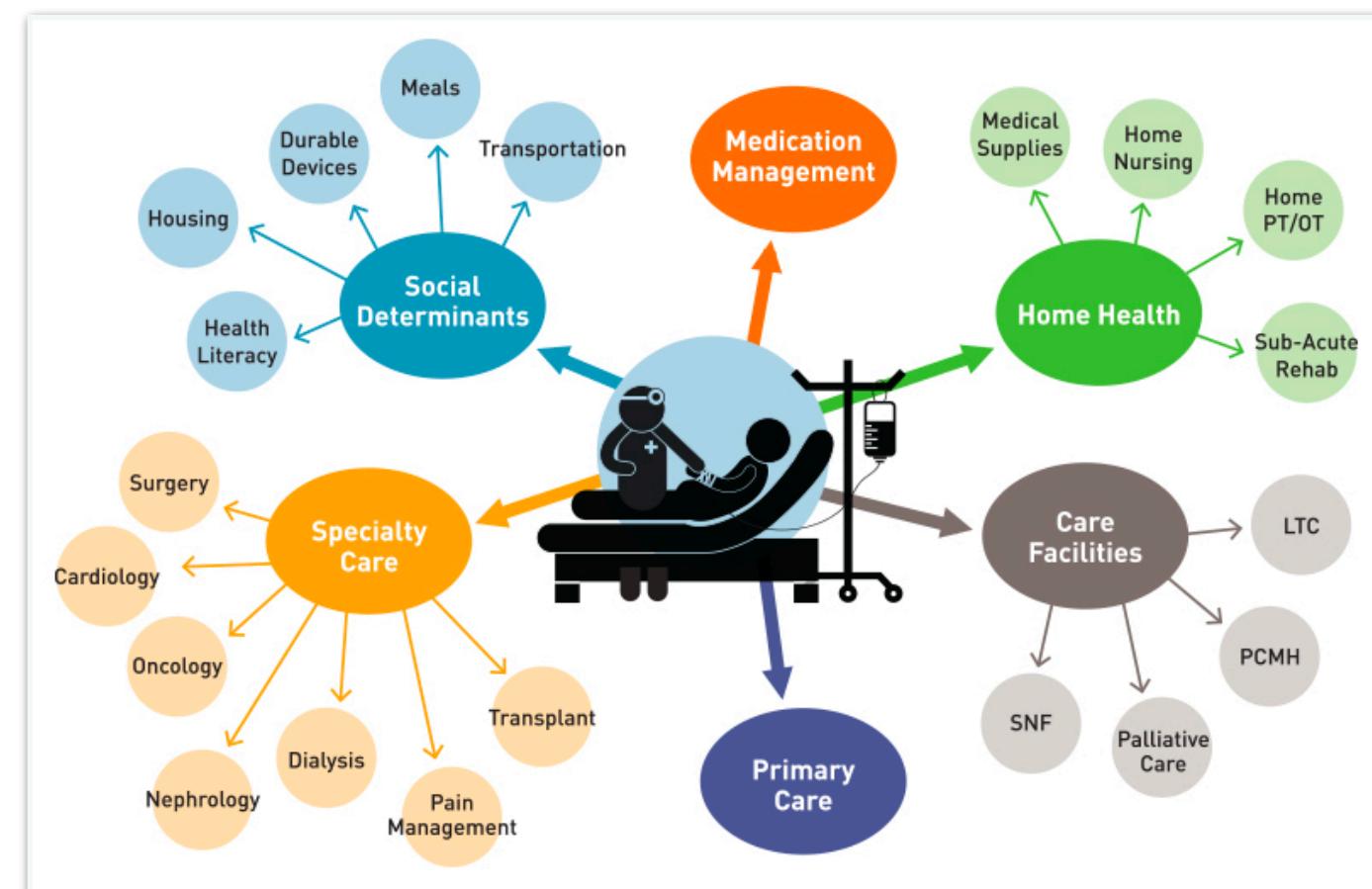


**Treatment Summary**

Please take this document with you to your GP practice appointment where your diagnosis and cancer care will be reviewed with you.

Please complete this form using BLOCK CAPITALS and black ink.

Patient's name: John Smith	GP contact details: Dr Jones						
Date of birth: 10-10-10	Record number:						
Address: 3 Park Road	Hospital trust:						
Donor car DNA DEF							
Your patient has had the following diagnosis and treatment for cancer and received a summary and ongoing management plan as outlined below. They may have not received a copy of this summary. (Delete as applicable)							
<table border="1"> <thead> <tr> <th>Diagnosis</th> <th>Date of diagnosis</th> <th>Stage</th> </tr> </thead> <tbody> <tr> <td>Ovarian cancer</td> <td>10-02-10</td> <td>DStage T2</td> </tr> </tbody> </table> <p>Summary of treatment and relevant dates: Surgery - Removal of ovaries and reversal of uterus (Sept 10) Radiotherapy - May-June 2010 Possible treatment toxicities and late effects: Chemotherapy following pelvic radiotherapy</p>		Diagnosis	Date of diagnosis	Stage	Ovarian cancer	10-02-10	DStage T2
Diagnosis	Date of diagnosis	Stage					
Ovarian cancer	10-02-10	DStage T2					
<p>Treatment aim:</p> <p>Cure</p> <p>Possible treatment toxicities and/or late effects: Surgery - Removal of ovaries (Sept 10) and reversal of uterus (Sept 10) Radiotherapy - May-June 2010 Possible treatment toxicities and late effects: Chemotherapy following pelvic radiotherapy</p> <p>Add to entry onto primary care palliative/supportive care register: No DS 1500 application completed No Prescription charge exemption agreed: Yes</p>							
<p>Alert symptoms that require referral back to specialist team: Decrease in more than two weeks not relieved by symptomatic measures Blood or mucus per rectum Further change in bowel function Astomach pain that persists for longer than four weeks and does not respond to simple remedies</p> <p>Contacts for re-referrals or queries: In hours: 01234 987650 (CHS team) Out of hours: 01234 987654 (oncology ward)</p>							
<p>Secondary care ongoing management plan: (tests, appointments etc)</p> <p>Last CTP Review - Jan 2011 CEA next due 10 Jan 2011 then annually until 2015 CT scan (abdomen and chest) next due Sept 2011 Colonoscopy repeat next due Sept 2015</p> <p>Other service referrals made: (delete or add)</p> <p>Diabetic Foot Clinic Service</p>							
<p>Recommended GP actions in addition to GP Cancer Care Review: Please review dose of Xanax in two months if symptoms of Xanax required reduce to 4mg daily</p> <p>Summary of information given to the patient about their cancer and future prognosis: John Smith and his wife have been informed that the cancer in his colon was non-invasive and that he has received surgery and chemotherapy with curative intent. He is aware however that there is some risk in the future and we have briefly discussed that further investigations would be required if he developed any new symptoms or if his symptoms of recurrence were to worsen.</p> <p>Additional information including issues relating to lifestyle and support needs: I have advised him to quit smoking and referred to smoking cessation clinic.</p> <p>He is known to join local oncological support group and plans to attend next session in November.</p>							
<p>Completing Clinician: Charles Goodenough      Signature:      Date: 20.10.10</p> <p>You can order Treatment Summary flipchart pack through <a href="http://www.mco.org.uk">mco.org.uk</a></p>							



## RESPECT Recommended Summary Plan for Emergency Care and Treatment

### 1. This plan belongs to:

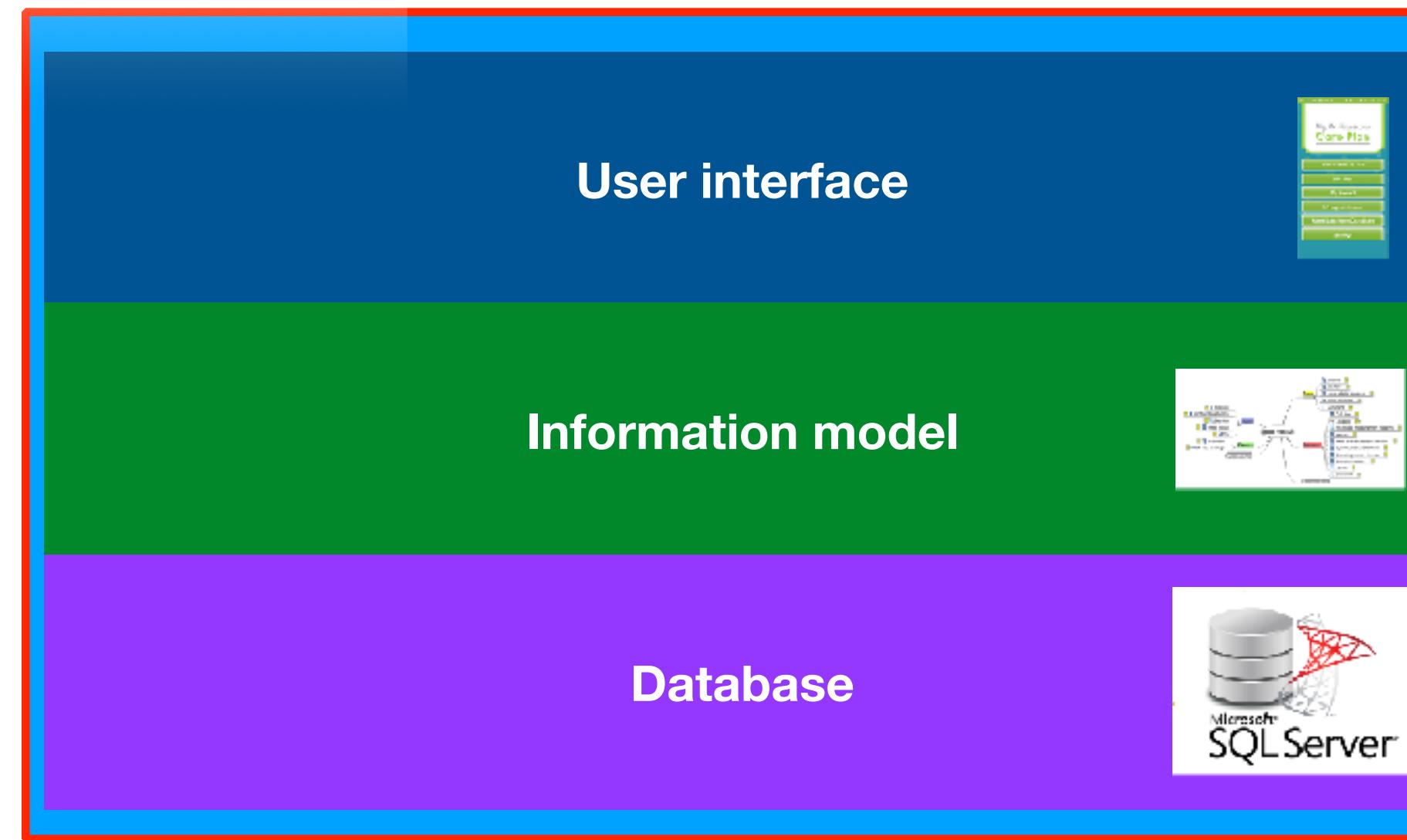
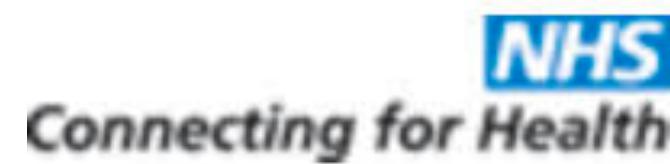
Preferred name

Date completed

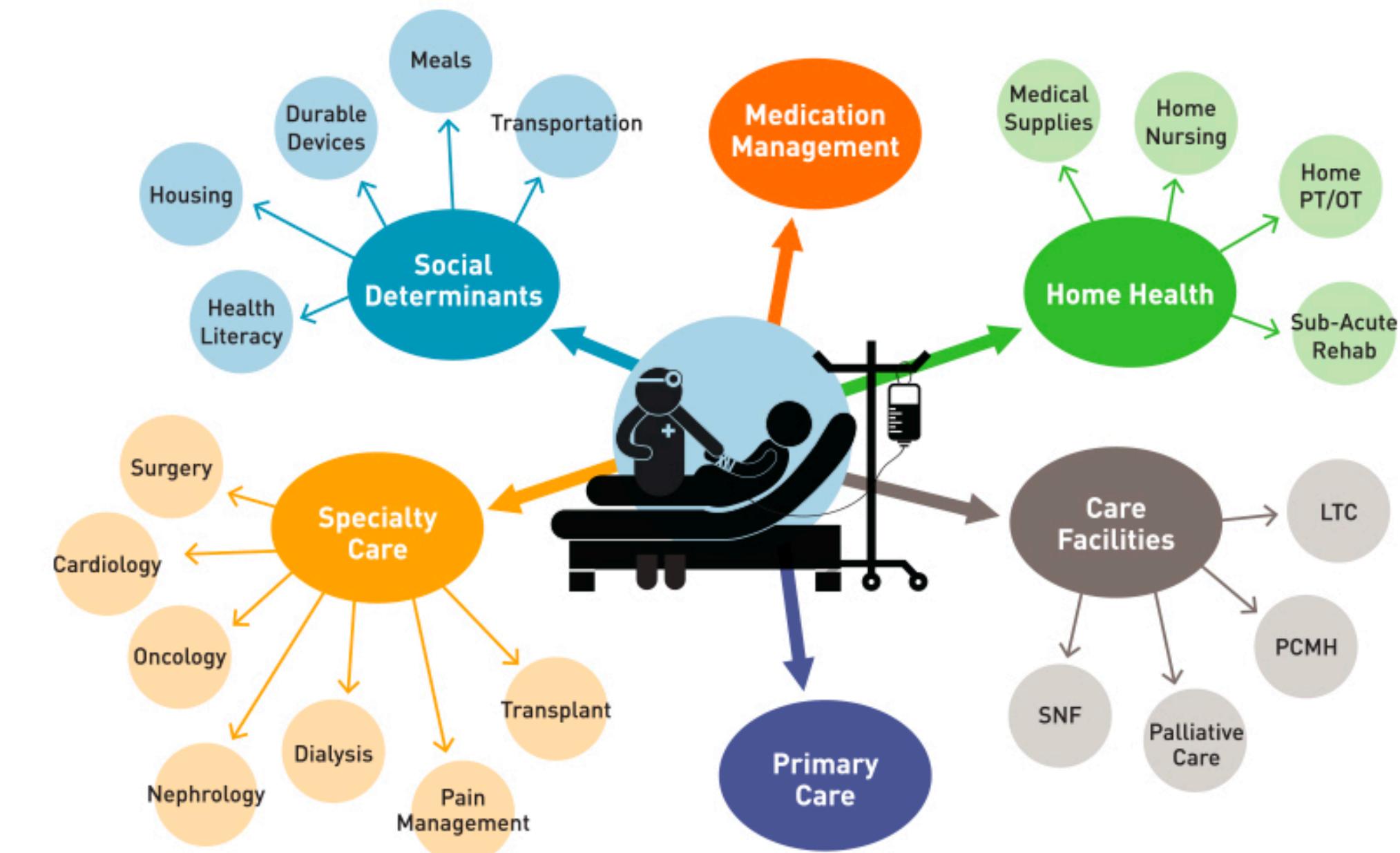
# A. One system to rule them all?

openEHR

EMIS Health CEO talks the age of X  
and putting patients in the centre

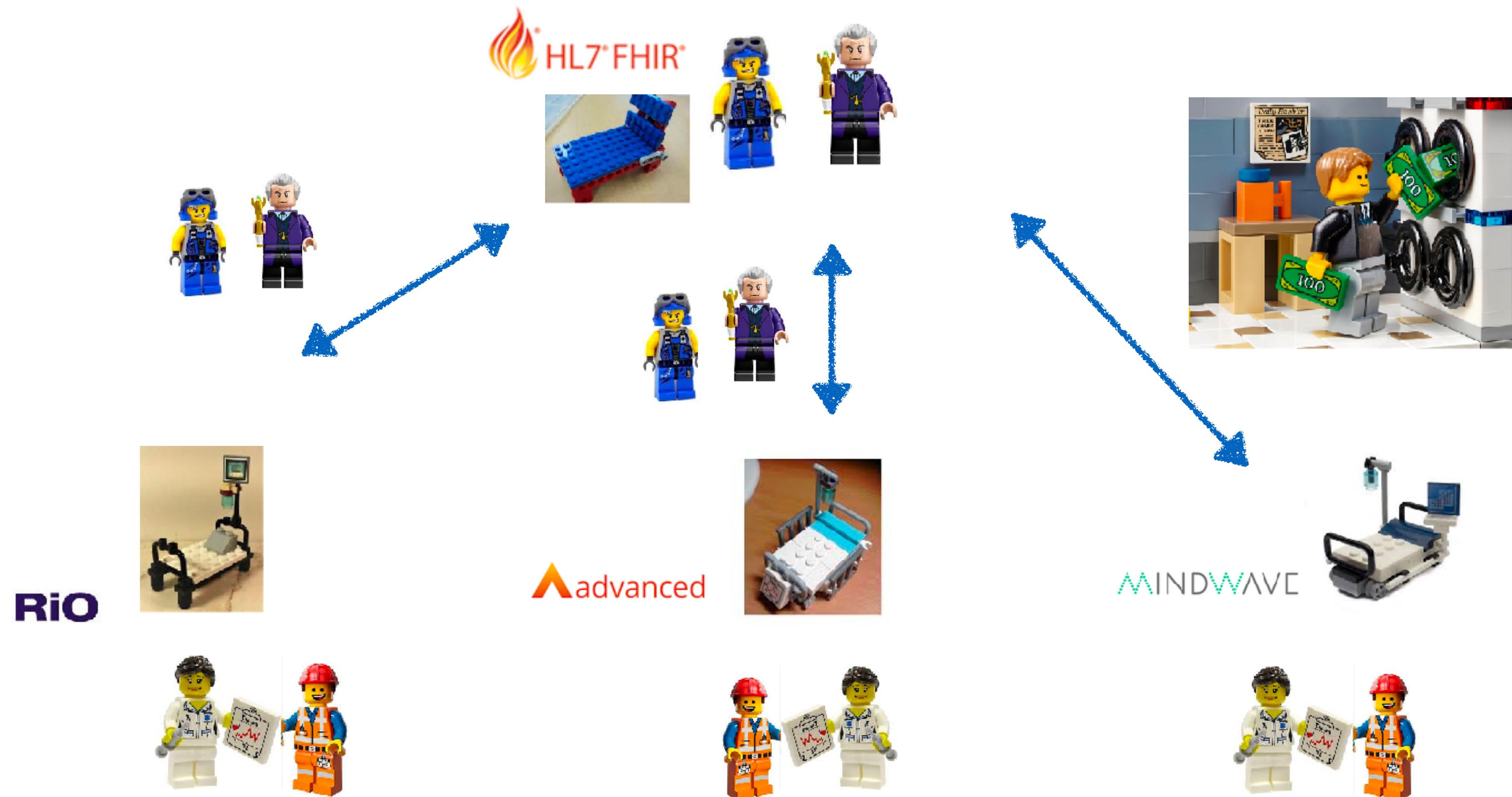


with the patient at the heart



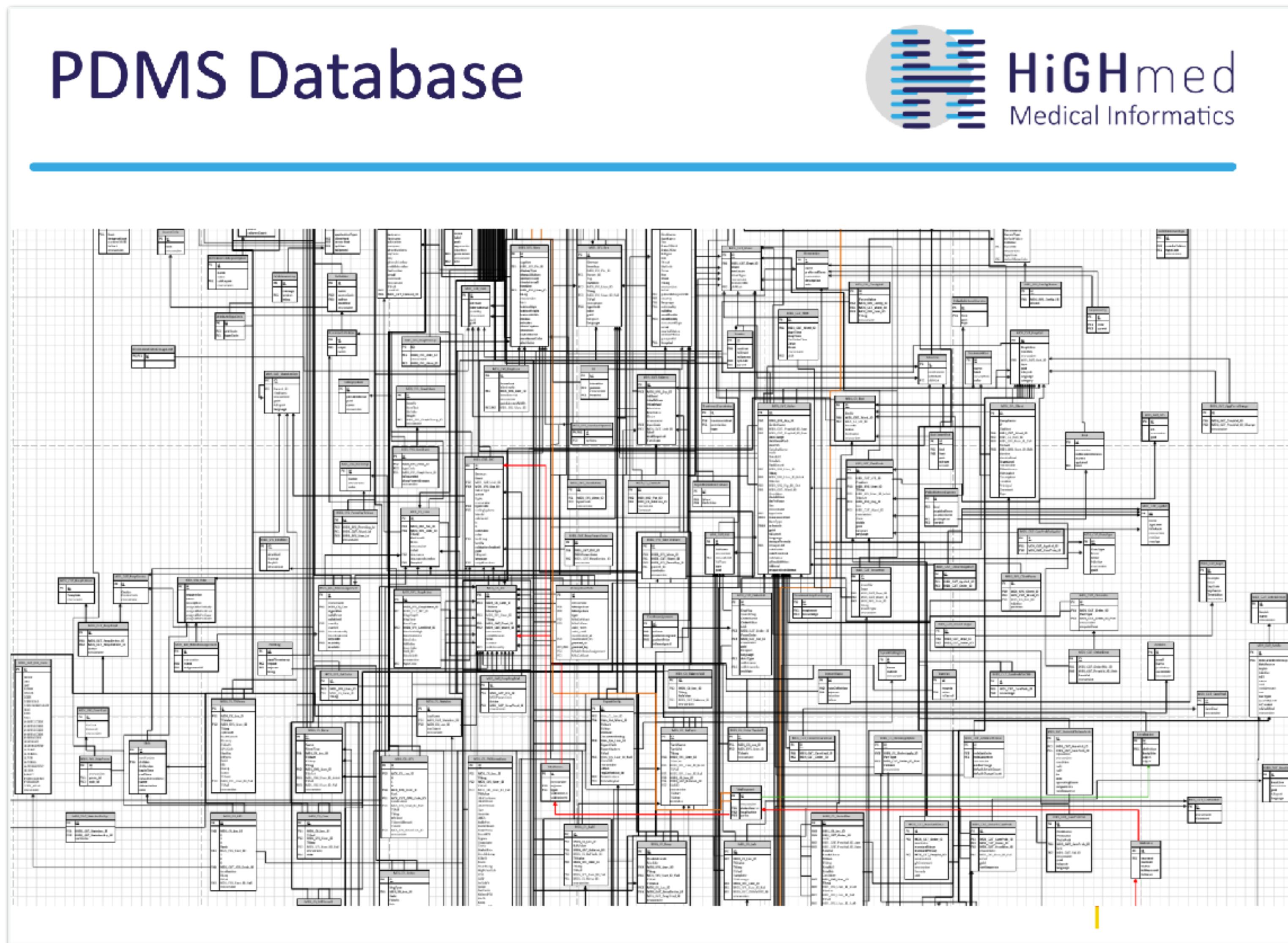
# B. Best of Breed - ‘interoperability’

*open*EHR



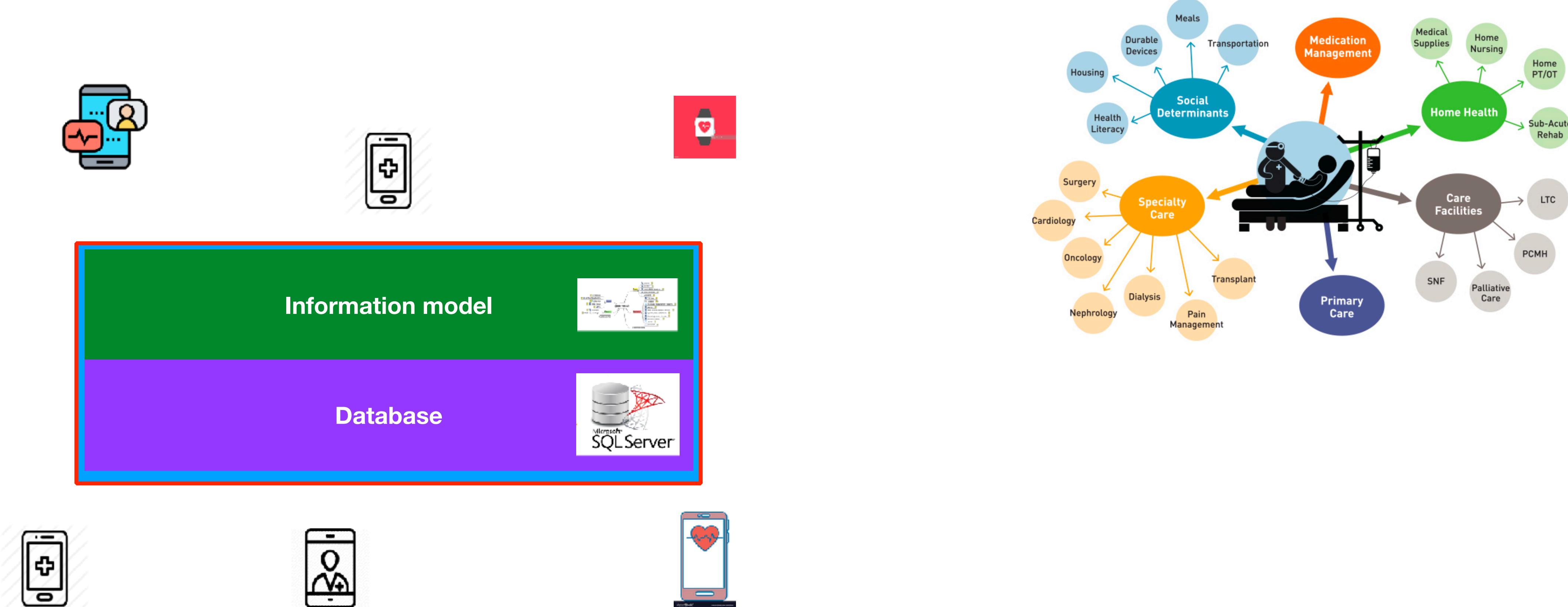
# RDBMS - 'so 20th century'?

*open*EHR



# Coherent Platform - single ‘system’/ ‘multiple apps’

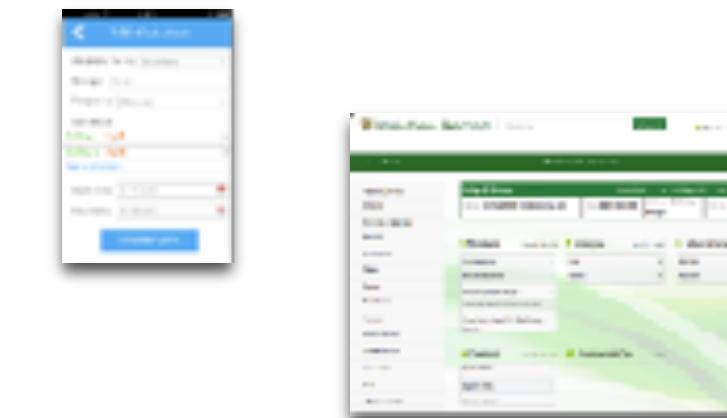
**openEHR**



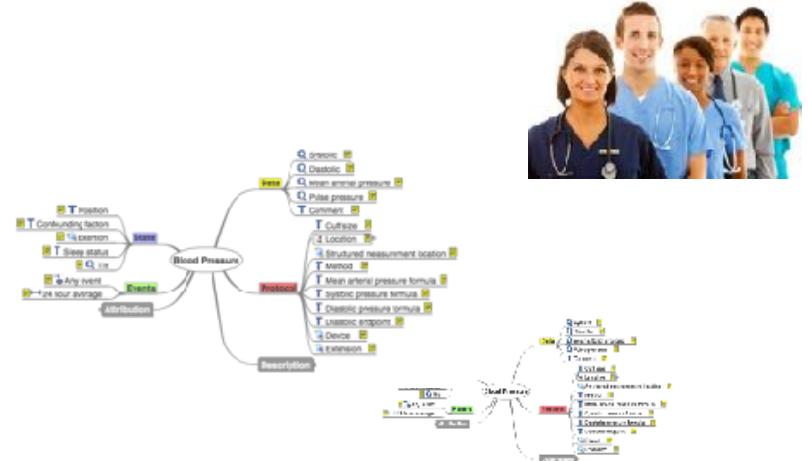
# open Platform - vendor-neutral

# *open*EHR

# Apps

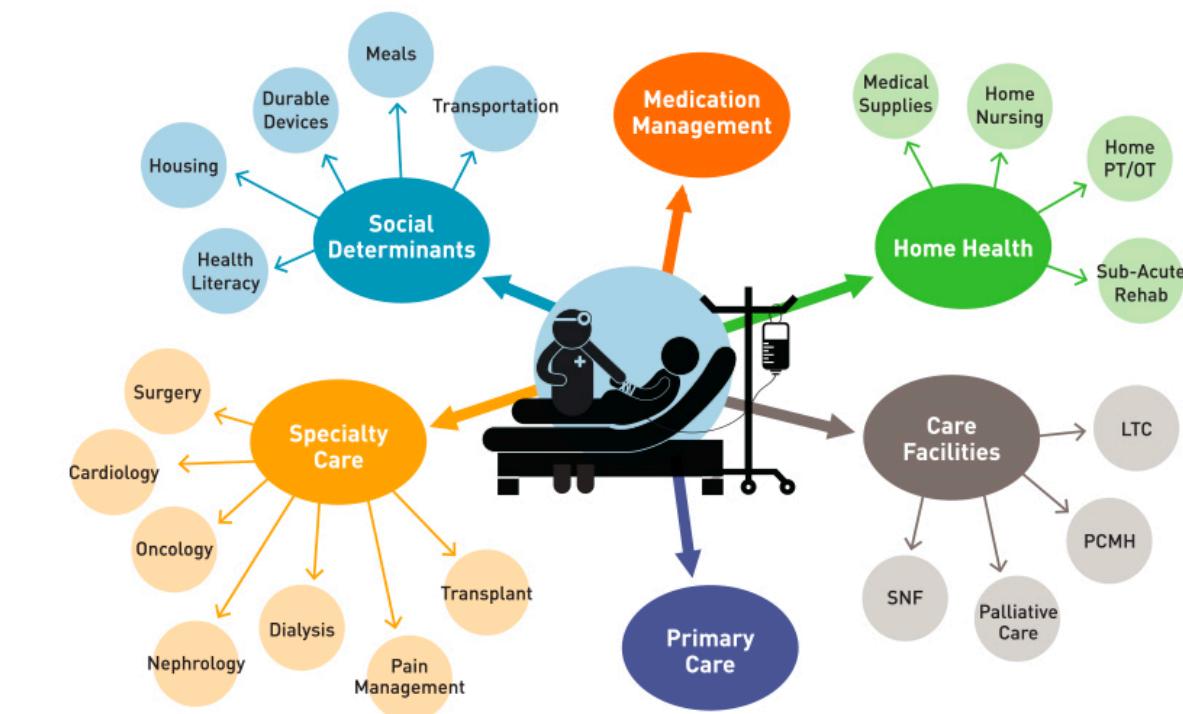


# Vendor-neutral Information model



*open*EHR

# Technology-neutral datastore (CDR)



# What is openEHR?

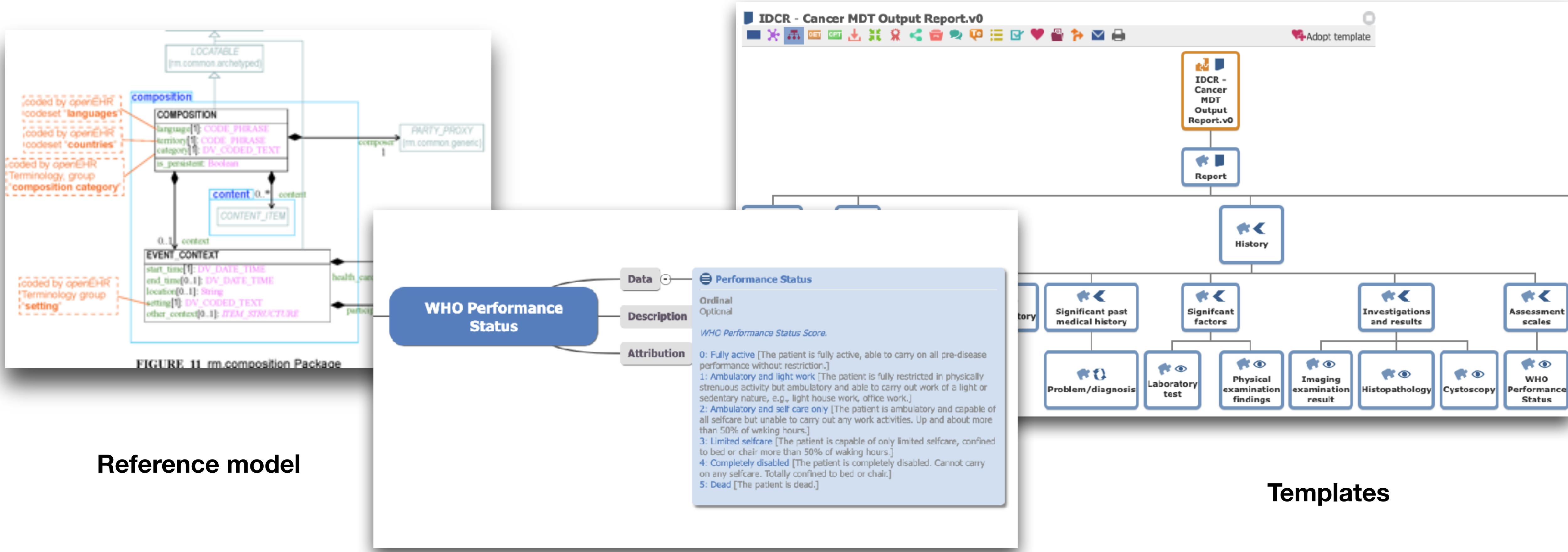
openEHR

- open specification for a health ‘information model’
  - supporting an open platform ecosystem
  - vendor /technology/license neutral
- Non-profit ‘industry / clinical/ health organisation’ collaborative
  - openEHR International
  - [openehr.org](http://openehr.org)
  - [specifications.openehr.org](http://specifications.openehr.org) -specifications
  - [ckm.openehr.org](http://ckm.openehr.org) - clinical models

The image shows two screenshots of the openEHR platform. The top screenshot is the openEHR website homepage, featuring a navigation bar with links like 'About', 'Governance', 'Programs', 'Community', 'openEHR in USA', 'Products & Tools', and 'Resources'. Below the navigation is a diagram titled 'Multi-level Modelling' showing the flow from 'domain experts' through 'Archetype', 'Template', 'openEHR Platform', 'EHR', and 'Software development environment' to 'app UI codes' and 'src code'. To the right of the diagram is a sidebar for 'accenda' with options for 'Membership', 'Industry | Organisations', 'Professionals | Individuals', and 'Join Us'. The bottom screenshot is the 'Clinical Knowledge Manager' interface, showing a search results page for 'heart'. The search bar indicates 'Search results for heart within the main elements of archetypes, templates and termsets that are active. All projects/incubators.' It shows 26 archetypes, 9 templates, and 0 termsets found. A detailed list of archetypes is provided, including 'HEART score', 'Heart failure symptom questionnaire', 'New York Heart Association functional classification', 'Pulse/Heart beat', and 'Examination of the heart'.

# openEHR - vendor-neutral information model for persistence

**open**EHR



Reference model

Archetypes

Templates

# openEHR tooling

openEHR

Archetype Designer   Repositories   Save   Export   Import

Covfefe   NDS - SBAR\_Care\_Home.v0.0

NDS - SBAR\_Care\_Home.v0.0 (openEHR-EHR-COMPOSITION.encounter.v1)

en

Definition   Description   Analytics

atCode at0054.1

Occurrences 0..\*

Type TEXT

Free text

Nasal prongs

Mask

Nebuliser

NIV

Limit to list

Default value

Value

Archetypes

- Physical activity (v0)
- Physical examination findings
- PCEM score (v0)
- Pregnancy status (v0)
- Pregnancy test result (v0)
- Procedure screening question
- Progress note (v1)
- PROMIS (v0)
- Pulmonary function test result
- Pulse deficit (v0)
- Pulse oximetry (v1)
- Pulse/Heart beat (v2)
- qSOFA score (v1)
- Refraction assessment (v0)
- Respiration (v2)
- Richmond agitation sedation
- Rinne and Weber test results
- SAFAS Score (v0)
- SARA ataxia scale (v0)
- SCORAD index (v0)
- Skeletal age (v0)
- Social context screening ques
- SCoPA score (v0)

Projects & Incubators

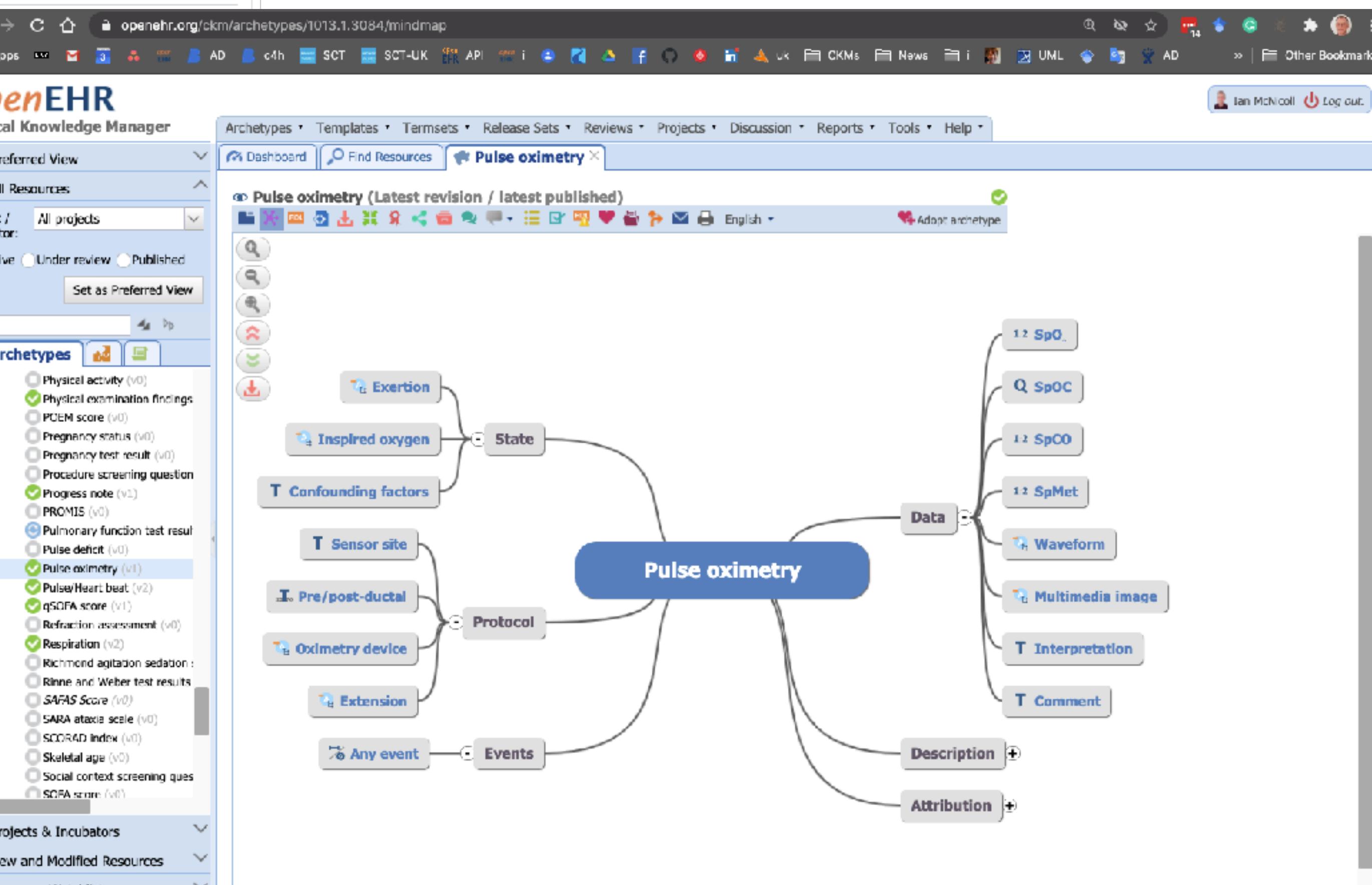
New and Modified Resources

CKMS News UML AD

Items > Pulse oximetry > data > Any event > state > Inspired oxygen > Inspired oxygen > Method of oxygen delivery

- CPR decision
- Significant comorbidities NAME (from: 'Condition screening questionnaire')
- Tobacco smoking summary NAME (from: 'Tobacco smoking summary NDS extension')
- Background notes NAME (from: 'Clinical synopsis')
- Allergies NAME (from: 'Ad hoc heading')
- Covid NAME (from: 'Ad hoc heading')
- Assessment NAME (from: 'Ad hoc heading')
- items
  - B - Breathing NAME (from: 'Ad hoc heading')
    - Respiration
    - Pulse oximetry
  - data
    - Any event [0..\*] to [0..1] Values changed
      - SpO<sub>2</sub>

<https://openehr.org/ckm>

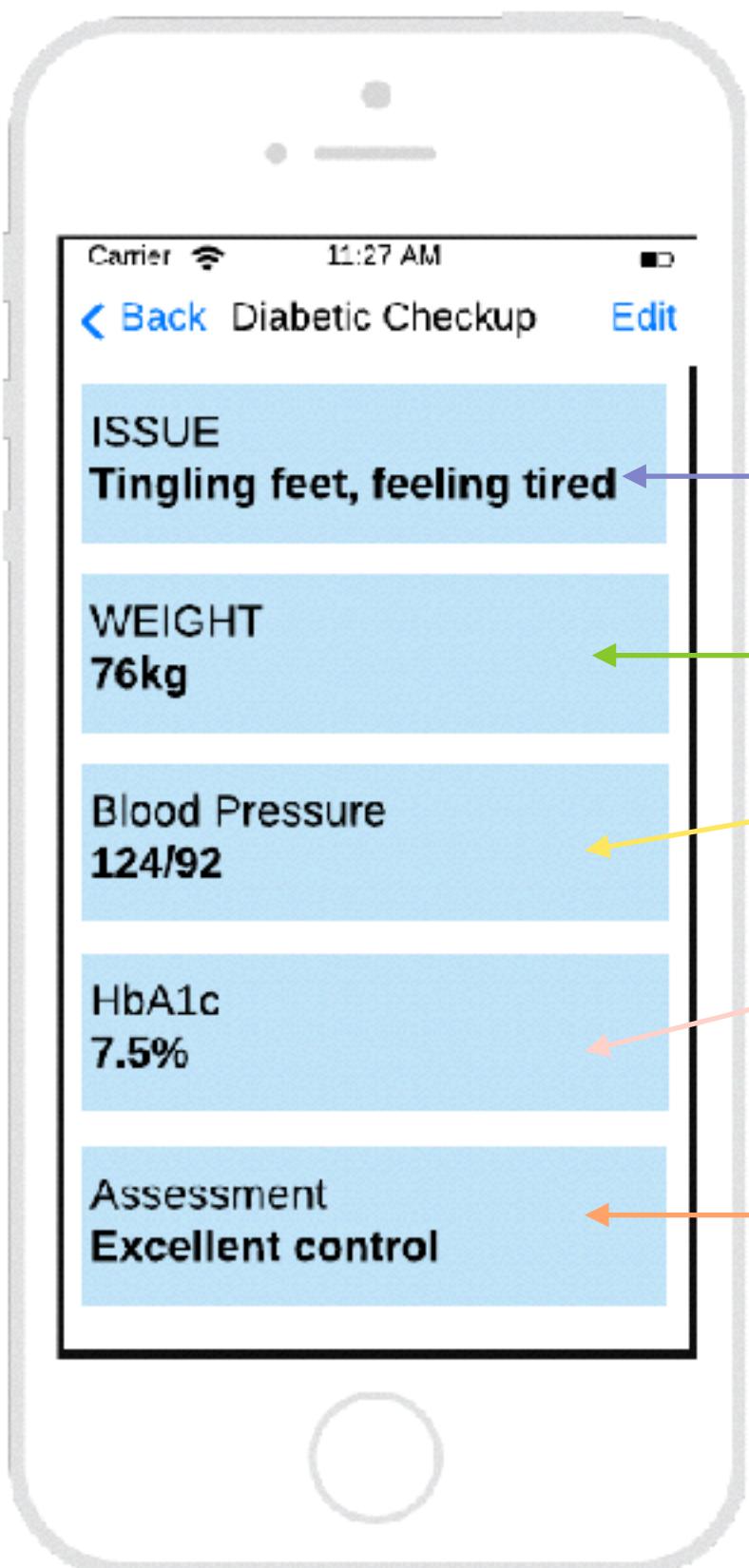


<https://tools.openehr.org/>

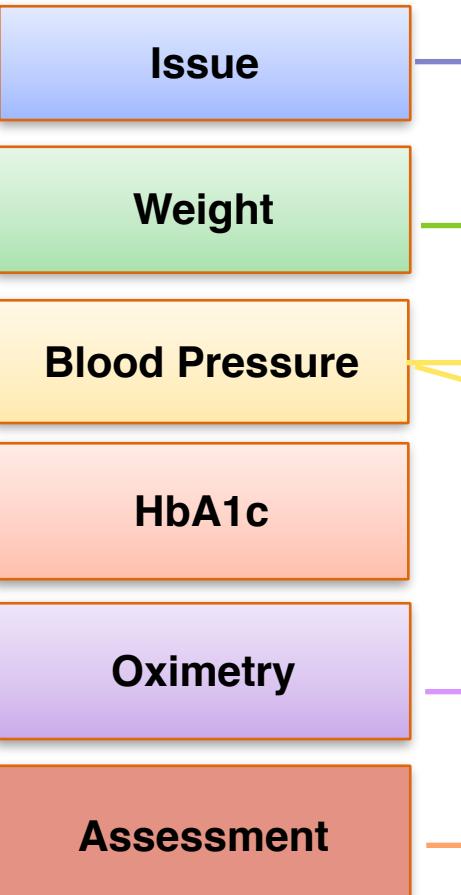
# Archetypes and templates

openEHR

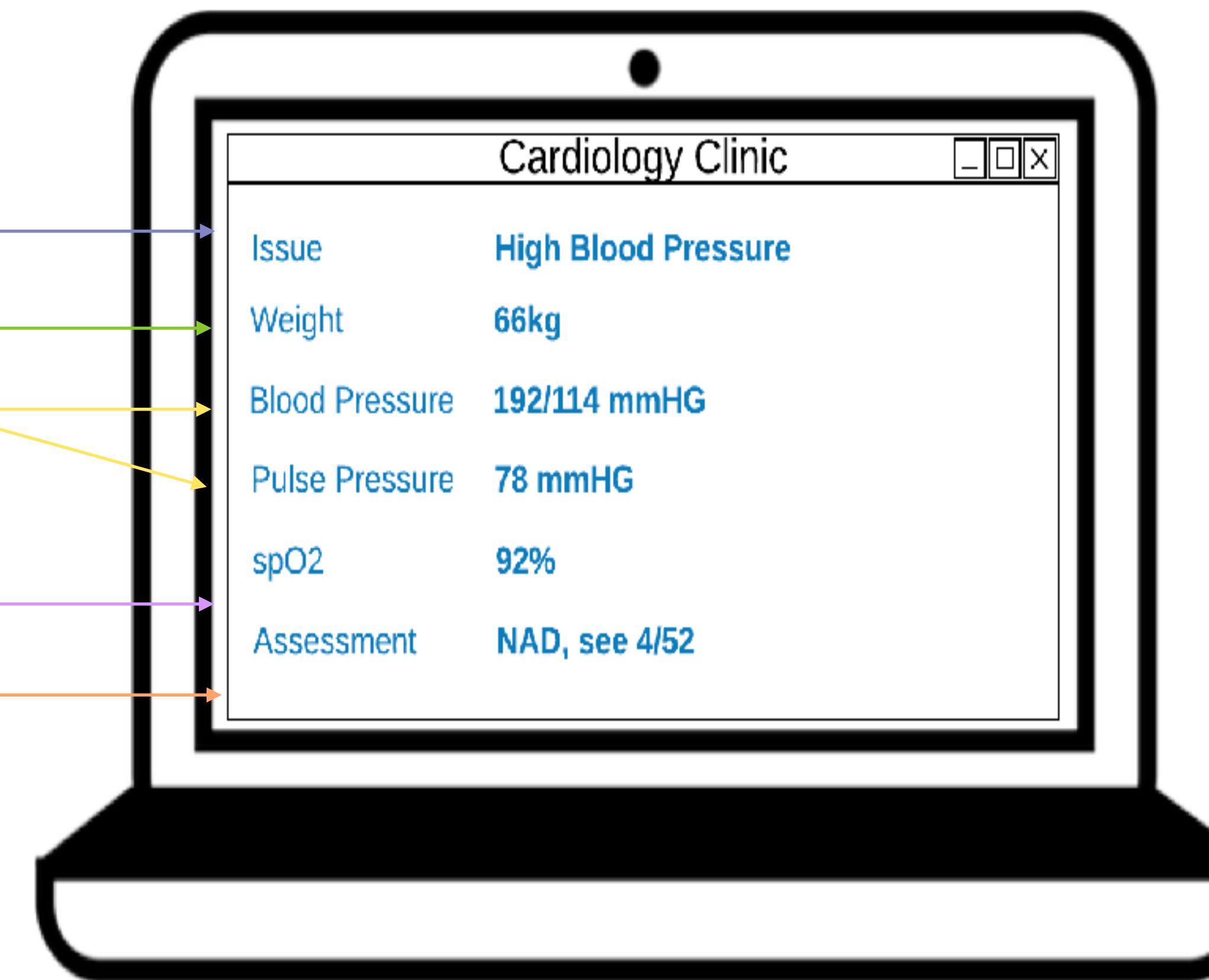
Template underpinning application



Archetypes used in template



Template underpinning application



# Discovery process

## Care Home data standards?

openEHR

### The Development of a Care Home Data Platform in Scotland: Insights from the Care Home Innovation Partnership, Lothian

<b>nightingale hammerson</b>	<b>F1a- ASSESSMENT ON ADMISSION</b>	
RESIDENT'S NAME:	UNIT:	
<b>ASSESSMENT ON ADMISSION TO BE COMPLETED WITHIN 72 HOURS OF ADMISSION</b>		
<b>Personal Cleansing</b> (preferred personal hygiene routine, level of assistance needed)	<b>Eating and Drinking</b> (food preferences, sufficient fluid intake, usual meal pattern, food restrictions)	
<b>Personal Dressing</b> (How often are the clothes changed, what are the individual's personal dressing habits?)	<b>Breathing</b> (include respiration rate)	
<b>Observations &amp; Baseline</b> (Anxious, withdrawn, distressed, Temp etc)	<b>Mobility</b> (assistance needed, limitations, abilities)	
<b>Sleeping Routines</b> (usual sleep rest pattern, preferred time of rest/sleep, sedation)	<b>Elimination Urine and Bowels</b> (incontinence, catheters, size, bowel patterns, laxatives)	

Table 4: Data sources - Assessment tools/measures for each data inventory item

Inventory No.	Area assessed	1	2	3	4	5	6
<b>1</b>	<b>Dependency/ indicator of need</b>	Augmented IoRN	IoRN	Dependency assessment	IoRN	IoRN	Organisation Form
<b>2</b>	<b>Nutrition</b>	MUST	MUST	MUST	MUST	Eating Well in Care homes/ Cook Safe	Organisation Form
<b>3</b>	<b>Weight</b>	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI
<b>4</b>	<b>Incidence and risk of falls</b>	FRASE	Organisation Form	Falls Risk	Falls Risk	Organisation Form	Organisation Form
<b>5</b>	<b>Incidence and risk of pressure sores</b>	Braden	Pressure Ulcer Cross/ PU Checklist/ Waterlow	Waterlow	Waterlow	Waterlow	Skin integrity Care Plan
<b>6</b>	<b>Infections</b>	Count/ type of infection	Count/ type of infection	Count/ type of infection	Count/ type of infection	Count/ type of infection	Count/ type of infection
<b>7</b>	<b>Wounds (new and ongoing)</b>	Internal Chart	STAR Classification	Wounds assessment	Chart on PCS	NHS Wound Assessment Chart	Organisation Form
<b>8</b>	<b>Frailty</b>	CIRC	SPAR Tool	Edmonton Frailty Scale	Clinical Frailty Scale	Not collected	Not collected
<b>9</b>	<b>Bowel Movement(s)</b>	Bristol Stool Chart	Bristol Stool Chart	Chart on PCS	Bristol Stool Chart	Bristol Stool Chart	Organisation Form
<b>10</b>	<b>Fluid Intake</b>	Internal Chart	Organisation Form	Chart on PCS	Chart on PCS	Organisation Form	Organisation Form
<b>11(a)</b>	<b>Mood: Depression</b>	Geriatric Depression scale/ Cornell scale for Depression in dementia	No measure/tool reported*	No measure/tool reported	Cornell scale for depression in dementia	No measure/tool reported	No measure/tool reported
<b>11(b)</b>	<b>Mood: Delirium</b>	4AT	4AT	Not recorded	Not recorded	Care support plan	Not collected
<b>12</b>	<b>Pain</b>	PAINAD Doloplus2 Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale
<b>13</b>	<b>Movement</b>	Roper, Logan, Tierney model of ADL Nolan's 6 senses f/work	Care Support Plan	No measure/tool reported	No measure/tool reported	Care Support Plan	In Care Plan
<b>14</b>	<b>Sleep</b>		Care Support Plan	Care Support Plan	Organisation Form	Organisation Form	Organisation Form
<b>15</b>	<b>Observations/ Vital Signs</b>	←----- Various charts -----→					

# Cancer pathways / reporting - UK

# *open*EHR

# CKM - Collaborative review / publication

openEHR

ckm.apperta.org/ckm/templates/1051.57.52/orgchart

Apps AD c4h 18 uk CKMs inidus News c4h UML AD openEHR AQL openEHR API Other Bookmarks

Ian McNicoll Log out.

Preferred View

All Resources

Subdomain: All subdomains

Project / incubator: All projects

Active Under review Published

Set as Preferred View

Templates

- GEL Rare diseases withdrawal cl
- GlucometerDeviceReadings
- Housing COVID-19
- ICHOM LPC Summary.v0
- IDCR - Adverse Reaction List.v1
- IDCR - Body Measurements Enc
- IDCR - Cancer MDT Output Repo
- IDCR - Immunisations List.v0
- IDCR - Medication Statement Lis
- IDCR - Problem List.v1
- IDCR - Procedures List.v1
- IDCR - Vital Signs Encounter.v1
- Living will UK
- Macmillan\_holistic\_assessment.v
- Mental Health Triage-v0
- Mobility
- My asthma plan-v0
- NDS - Essential ACP.v.0.1
- NDS - SBAR\_Care\_Home.v0.0
- NDS Covid-19 Data Dictionary.v0

Projects & Incubators

New and Modified Resources

Resource Watchlist

Checked-Out Resources

IDCR - Cancer MDT Output Report.v0

Report

```
graph TD; Report --> Holistic[Holistic needs assessment]; Report --> Referral[Referral details]; Report --> History[History]; Report --> Problems[Problems and diagnoses]; Report --> Plan[Plan and requested actions]; Holistic --> MDTReferral[MDT Referral]; Holistic --> OriginalReferral[Original referral]; Referral --> Question[Question for MDT]; Referral --> Story[Story/History]; History --> SignificantPast[Significant past medical history]; History --> SignificantFactors[Significant factors]; History --> Investigations[Investigations and results]; History --> AssessmentScales[Assessment scales]; SignificantPast --> ProblemDiagnosis[Problem/diagnosis]; SignificantPast --> LaboratoryTest[Laboratory test]; SignificantPast --> PhysicalFindings[Physical examination findings]; SignificantFactors --> ImagingResult[Imaging examination result]; SignificantFactors --> Histopathology[Histopathology]; SignificantFactors --> Cystoscopy[Cystoscopy]; Investigations --> WHOStatus[WHO Performance Status]; Investigations --> TNMStaging[Tumour - TNM Cancer staging]
```

Click on archetype to display archetype mindmap, double-click to collapse or expand, right-click for more options.

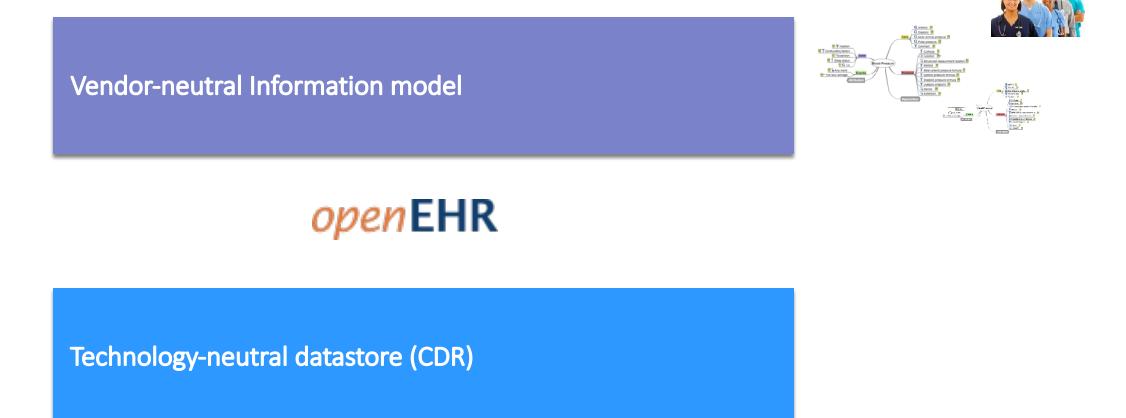
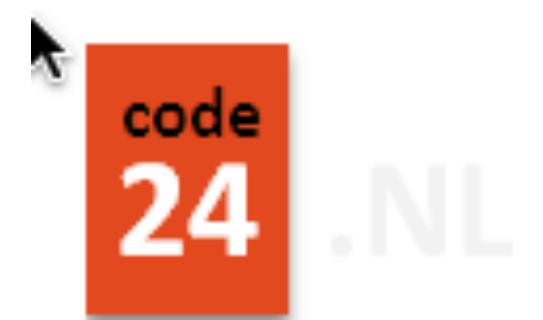
# CDR - Clinical data repository

*open*EHR

- Smart datastore which natively stores, retrieves, queries openEHR data via a standard API



- All data completely available
- AQL - Vendor-neutral querying
- 'No-code' deployment of new clinical content definitions



# openEHR / ehrscape API

*open*EHR

The screenshot shows the openEHR REST API documentation generated by Swagger. It lists several resource types:

- Composition (EHR API - Composition Resource v1.0)
- Contribution (EHR API - Contribution Resource (WIP v1.0.1))
- Directory (EHR API - Directory Resource (v1.0))
- EHR (EHR API - EHR Resource (v1.0))
- EHR\_STATUS (EHR API - EHR\_STATUS Resource (WIP v1.0.1))
- Query (Query API - Query Resource (WIP v1.0.1))
- Stored Query (Definitions API - Stored Query Resource (WIP v1.0.1))
- Template (Definitions API - Template Resource (WIP v1.0))

The screenshot shows the Postman application interface. A collection named "Apperla C4H: openEHR REST APIs" is selected. The "Body" tab displays a JSON response for a GET request:

```
24  },
25  },
26  },
27  },
28  },
29  },
30  },
31  },
32  },
33  },
34  },
35  },
36  },
37  },
38  },
39  },
40  },
41  },
42  },
43  },
44  },
45  },
46  },
47  },
48  },
49  },
50  },
51  },
52  },
53  },
54  },
55  },
56  },
57  },
58  },
59  },
60  }
```

The "Headers" tab shows the following headers:

- Content-Type: application/json
- Accept: application/json

# AQL - Archetype Query Language

openEHR

cdr.code4health.org/studio/aql-builder

34

5.11.2020 @ 13:23 + :

< NCD-Generic Patient Encounter.v0

Search...

Patient Encounter

→ context

- Generic

– Vital Signs

– Heart Rate

– Heart rate reading

Q Heart rate

– Blood pressure

– Blood pressure reading

Q Systolic

Q Diastolic

T Position

T Location of measurement

T Method

- Body temperature

– Body temperature reading

Q Temperature

- Oxygen saturation

– SPO2 reading

1:2 SpO<sub>2</sub>

– Inspired oxygen

Q Flow rate

✓ On room air

T Method of oxygen delivery

- Anthropometrics

– Height/Length

– Height/length measurement

1 SELECT c/uid/value as compositionId,  
2 c/name/value as compositionName,  
3 p/Systolic as systolic,  
4 p/Diastolic as diastolic,  
5 a/Weight as weight,  
6 f/Body\_mass\_index as bmi,  
7 r/Analyte\_result as glucose\_result  
8 FROM EHR e  
9 CONTAINS COMPOSITION c  
10 CONTAINS (OBSERVATION m#Blood\_glucose or OBSERVATION p#Blood\_pressure or OBSERVATION a#Body\_weight or OBSERVATION f#Body\_mass\_index or CLUSTER r#Laboratory\_analyte\_result)  
11 WHERE e/ehr\_id/value = {{ehrId}}  
12 OFFSET 0 LIMIT 10

Num. of results: 10

Export Expand table Compact Detailed Raw

#	compositionId	compositionName	systolic	magnitude	units	precision	d
1	7b20dc2b-6494-467d-8986-469367f7c75b::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations	169	mm[Hg]	0	69	
2	3484653f-c211-464b-bace-83ff626d0b6b::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations	169	mm[Hg]	0	69	
3	aaa1da4b-ea92-4933-ac25-66f84bcd717c::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations					
4	ae04cf64-4d76-4742-9c44-3ff2b8a2e9fd::4cce5a07-be4d-4318-a94f-3b8401853a20::1	NCD - first visit	110	mm[Hg]		76	
5	ae04cf64-4d76-4742-9c44-3ff2b8a2e9fd::4cce5a07-be4d-4318-a94f-3b8401853a20::1	NCD - first visit	99	mm[Hg]		80	
6	ae04cf64-4d76-4742-9c44-3ff2b8a2e9fd::4cce5a07-be4d-4318-a94f-3b8401853a20::1	NCD - first visit	123	mm[Hg]		55	
7	ae04cf64-4d76-4742-9c44-3ff2b8a2e9fd::4cce5a07-be4d-4318-a94f-3b8401853a20::1	NCD - first visit	155	mm[Hg]		66	
8	7ff115e4-dcd1-4315-a3bb-70b5e8a59134::4cce5a07-be4d-4318-a94f-3b8401853a20::1	JMOHW - Passport observations.v0	120	mm[Hg]	0	88	
9	687d40df-57d1-4d29-ab41-88396f810de0::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations	124	mm[Hg]	0	88	
10	159c3aab-8bb6-45dd-a452-cbf3e4ac1fe8::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations	124	mm[Hg]	0	90	

# openEHR REST API /query

openEHR

Filter languages...

- C - libcurl
- C# - RestSharp
- cURL
- Go - Native
- HTTP
- Java - OkHttp
- Java - Unirest
- JavaScript - Fetch
- JavaScript - jQuery
- JavaScript - XHR
- NodeJs - Axios
- NodeJs - Native
- NodeJs - Request
- NodeJs - Unirest

Generated code for NodeJs - Axios [Contribute on GitHub](#)

```
1 var axios = require('axios');
2 var data = '{\n  "q": "SELECT c/uid/value as compositionId,\nc/name/value\n  as compositionName,np/data[at0001]/events[at0006]/data[at0003]/items\n  [at0004]/value as systolic,\n          p/data[at0001]/events[at0006]/data\n  [at0003]/items[at0005]/value as diastolic,\n          a/data[at0002]/events\n  [at0003]/data[at0001]/items[at0004]/value as weight,\n          f/data\n  [at0001]/events[at0002]/data[at0003]/items[at0004]/value as bmi,\n          r/items[at0001]/value as glucose_result\nFROM EHR e\nCONTAINS COMPOSITION\n  c\nCONTAINS (OBSERVATION m[openEHR-EHR-OBSERVATION.laboratory_test_result.\nv1] or OBSERVATION p[openEHR-EHR-OBSERVATION.blood_pressure.v2] or\nOBSERVATION a[openEHR-EHR-OBSERVATION.body_weight.v2] or OBSERVATION f\n[openEHR-EHR-OBSERVATION.body_mass_index.v2] or CLUSTER r\n[openEHR-EHR-CLUSTER.laboratory_test_analyte.v1])\nWHERE e/ehr_id/value =\nb4a4577f-7496-4053-ae60-45e22cf9952\nOFFSET 0 LIMIT 10"\n}';

3
4 var config = {
5   method: 'post',
6   url: 'https://cdr.code4health.org/rest/openehr/v1/query/aql',
7   headers: {
8     'Accept': 'application/json',
9     'Content-Type': 'application/json',
10    'Authorization': 'Basic\nNGNjZTVhMDctYmU0ZC00MzE4LWE5NGYtM2I4NDAxODUzYTIw0iQyYSQxMCQ2MTlraQ==',
11    'Cookie': '_2269c=http://10.0.0.203:8080'
12  },
13  data : data
14 }
```

# NHS Scotland: National Digital Platform

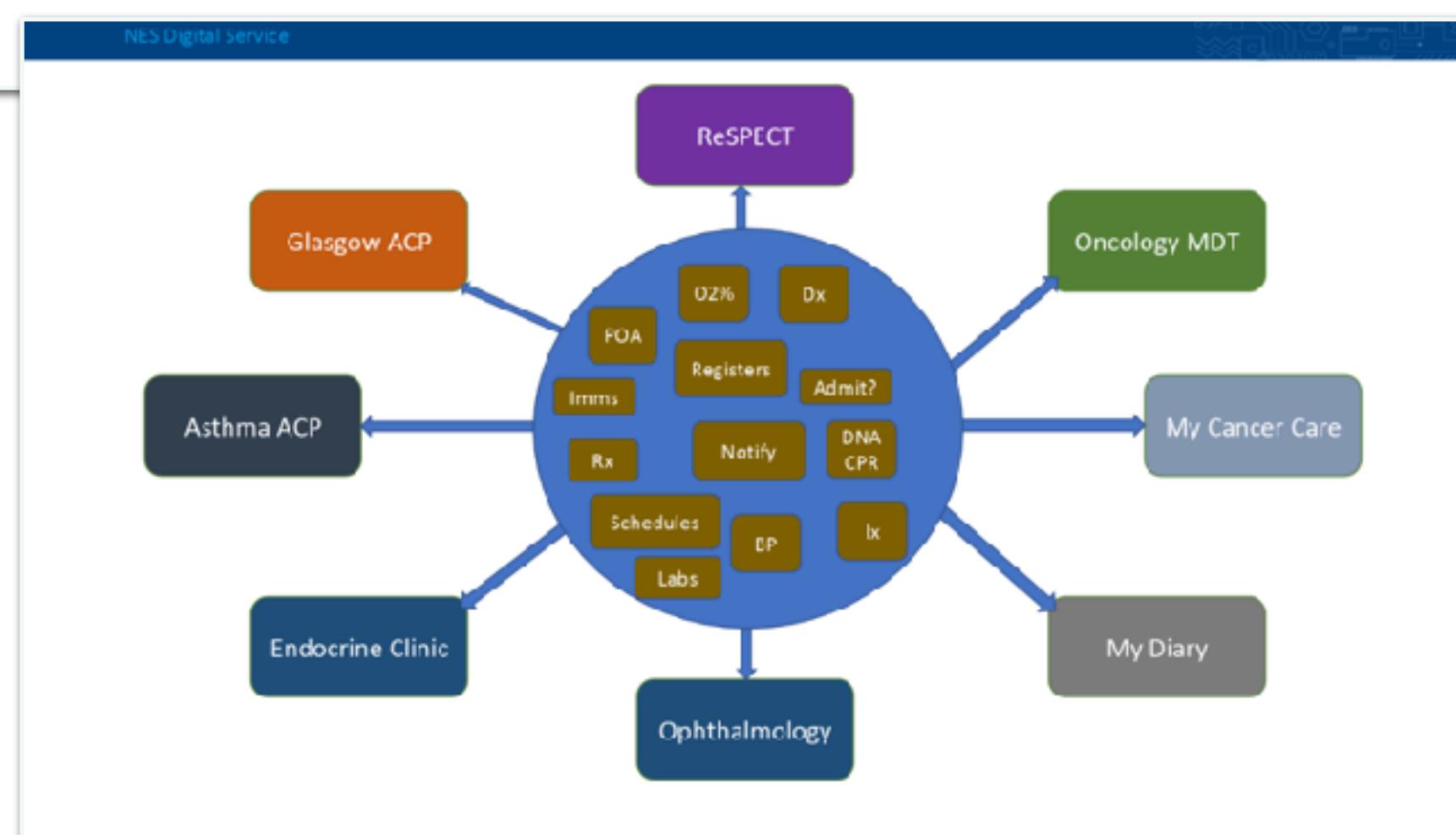
openEHR

194. It is no longer acceptable in this age that our health service is still using multiple incompatible systems and various platforms. In all our work we have heard

*It is no longer acceptable in this age that our health service is still using multiple incompatible systems...*

167. We agree the best way forward for data sharing is through a single platform, or spine, for data that other systems connect into and we note witnesses and the Scottish Government are in agreement. Can the Scottish Government advise whether it has had discussions with other countries regarding the use of a single platform?

*...the best way forward for data sharing is through a single platform...*



 **Paul Miller** @docpaulmiller 2d  
Running thought: There is no need to try to maintain the GP record as the 'source of truth' when we have [@ndsscotland](#) platform. We only ever did that before because there was nothing else better. ACPs, DNACPR, Immunisations etc, are not just for GPs. Put them on the platform!

  You

## Open digital platform

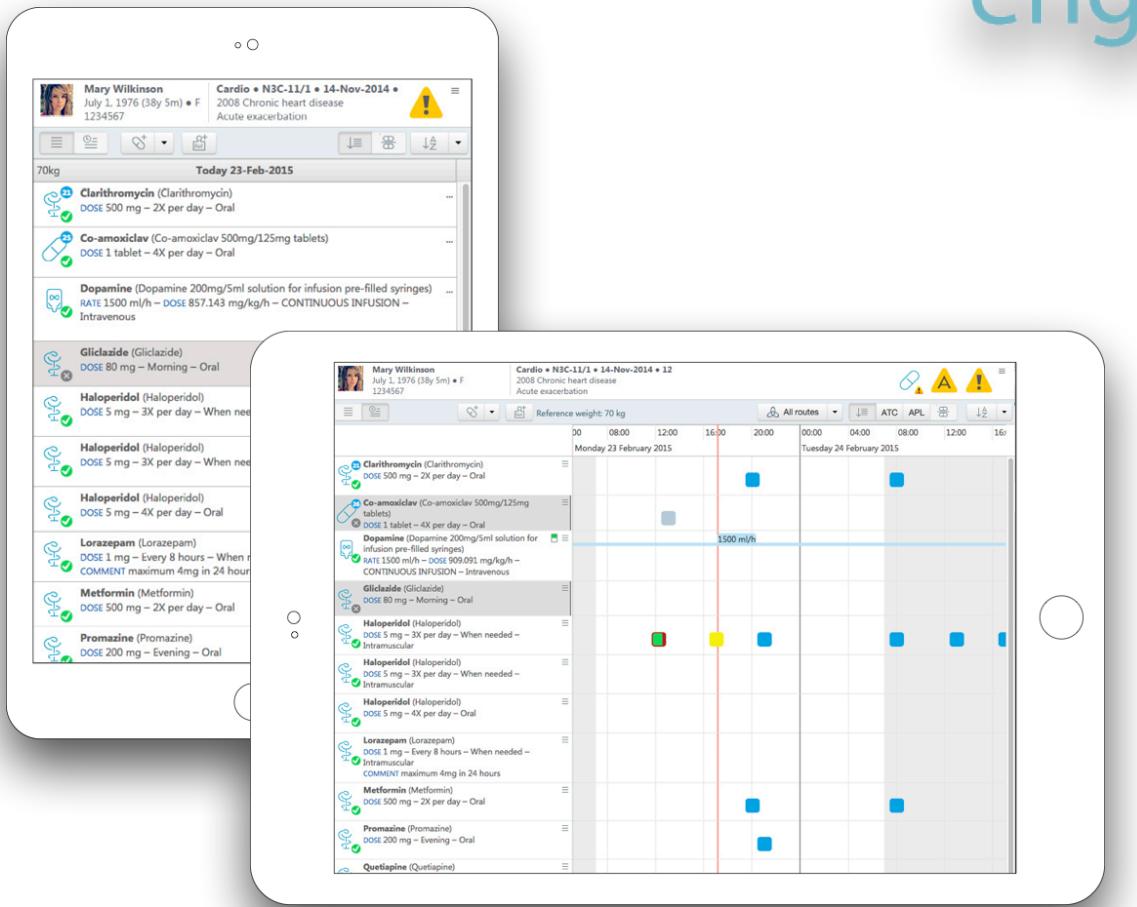
1 - 2 years

- Enhance the NHS Wales EMPI along open principles to facilitate a more developed Patient/Citizen identification strategy.
- Enhance the NHS Wales Integration and Interaction Engine to provide a truly open platform for NHS Wales.
- Focus the work of the National Data Resource (NDR) programme on the creation of a National Clinical Data Repository in line with open principles whilst progressing the programme as a whole.
- Make migrating the WCP to an open architecture the highest priority for the product in the next 12 months. This will need to address any impacts on the current work programme.

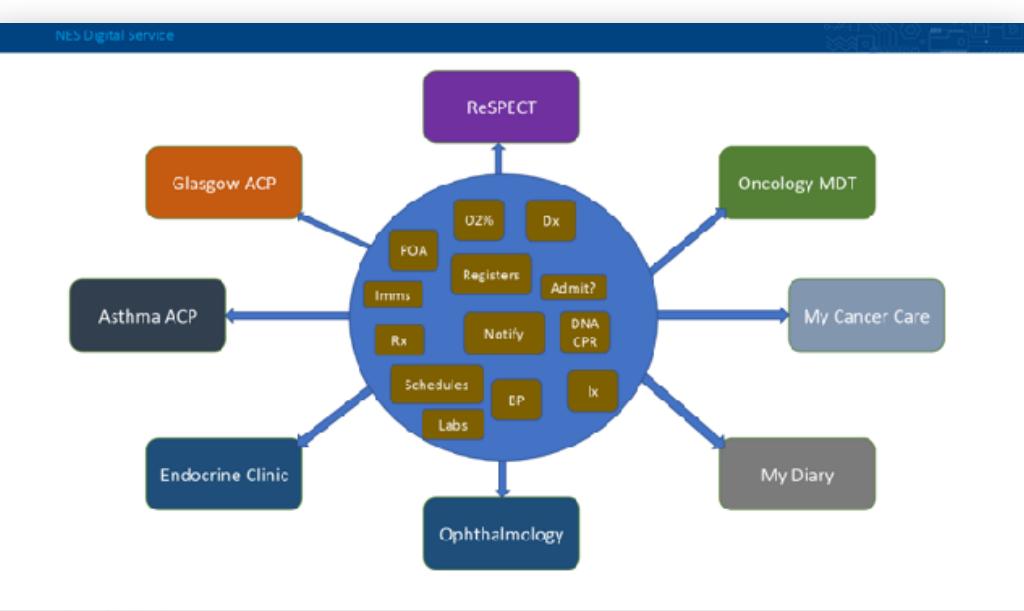
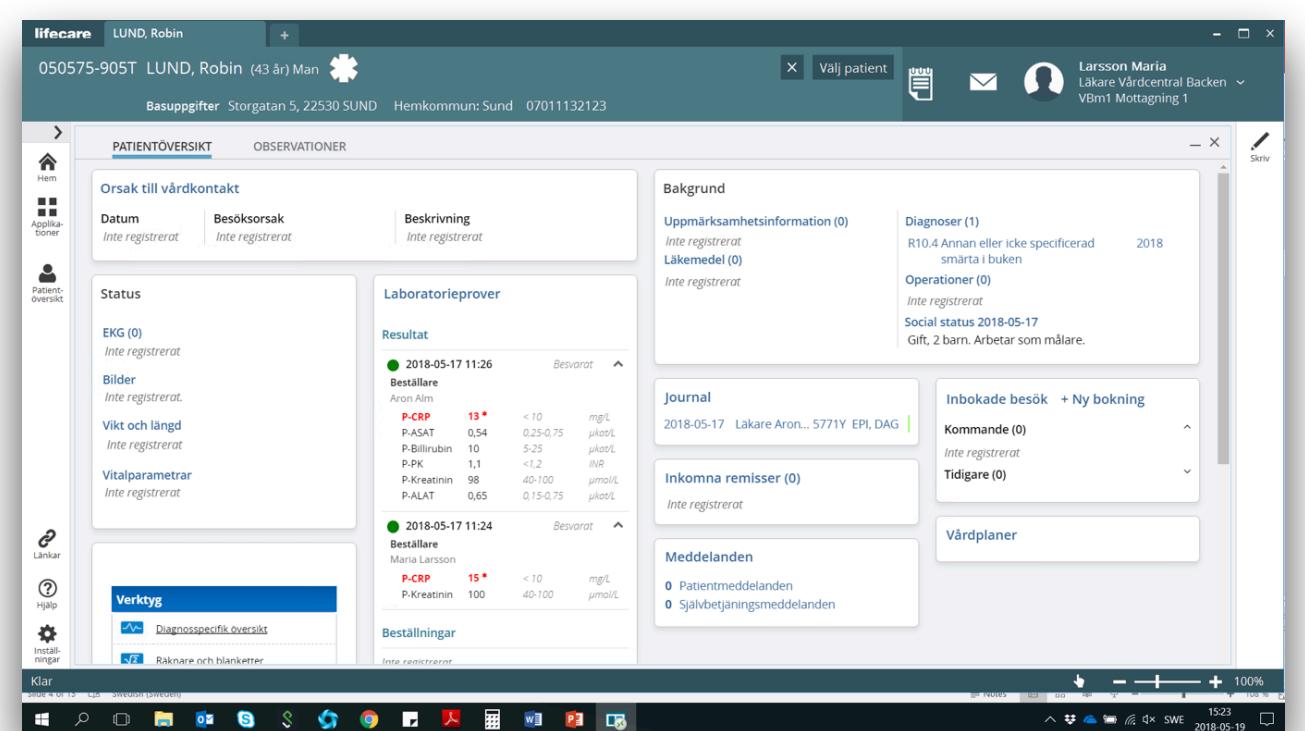
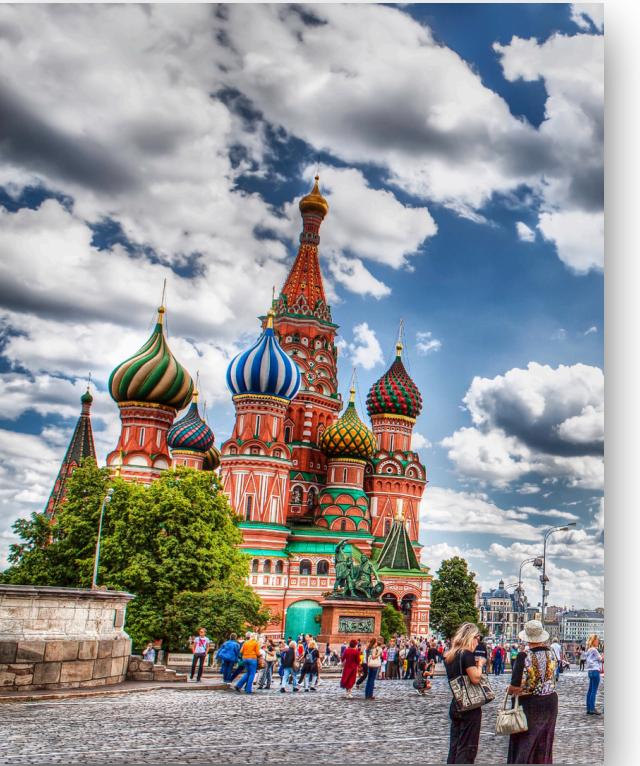
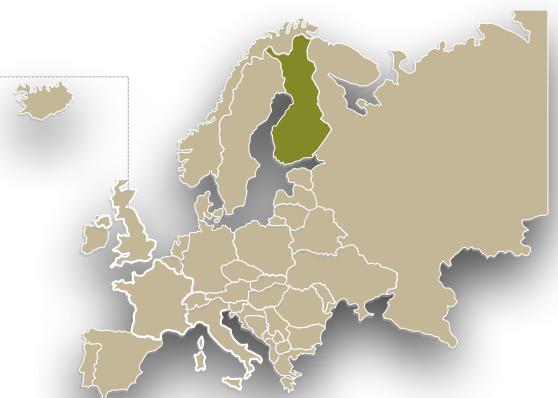
# openEHR applications - at scale

openEHR

Genomics  
england



una



Three screenshots of openEHR applications. The top right screenshot shows a mobile application interface for a patient named TRILLE, Lille, with a map of Europe in the background. The middle right screenshot shows a desktop application interface for a patient named Larsson Maria, displaying a timeline of events and lab results. The bottom right screenshot shows a web-based application interface for a patient named Aron, featuring a human body diagram and a list of tasks.

# Covid-19

openEHR

Register ny:

Screening COVID-19

Anamnese

Er noen av følgende symptomer tilstede hos pasienten?

**Hoste \***

Tilstede  Ukjent  Fraværende

**Kortpustet \***

Tilstede  Ukjent  Fraværende

**Feber \***

Tilstede  Ukjent  Fraværende

Resultat COVID-19

Covid-19 smitte er:

Negativ prøve - fremdeles mistanke

Pasienten forblir mistenkt smittet av COVID-19

Register ny:

Isolasjon/karantene COVID-19

Isolasjon/karantene av mulig smittet

Start for isolasjon/karantene  
24. mar 2020 kl 13:31

Dato for når prosedyren er avsluttet

openEHR Discussion Forums

Project Covfefe

openEHR COVID-19 Project

How medical pros decide whether to test someone for COVID-19 | HeraldNet.com

A citizen-facing equivalent has been produced by NHS-111 in the UK, using the Public Health England Risk assessment advice

openEHR Clinical Models

BEAU85459309 POSTIVE

B. Breathing

SPO2 (on arrival) 88% Respiration rate 22 bpm

Right lung finding Normal Left lung finding Wheeze

Oxygen-delivery Mask O2 flow rate 15 l/min SPO2 (post O2) 97%

Increased work of breathing Yes No

C. Circulation

Heart rate 22 bpm Blood pressure 120/80 Cap refill > 3 secs

Abdomen Current IV fluids Left None

COVID-19-screening-interface

Covid-19 Screening Interface using Covid-19 OpenEHR Clinical Models

Developed in the Open

Summary

This repository contains software which enables an organisation to rapidly deploy a Covid-19 screening programme. Data collected will be stored in the local openEHR database and reports to the WHO standard made available.

Being Open Source, the application can be implemented within an organisation using existing systems therefore reducing privacy and information governance challenges associated with cloud systems.

Being modular, the application can be connected to an existing openEHR repository or operated with a stand-alone repository.

PatientSky

FIGHT COVID-19

Kampen mot COVID-19: Register symptomer og hjelp andre

openEHR CDR in the hospital

Clinical Support

Research

Patient Service

Data exchange

Archetype: 120

Template: 80

CLEVER: openEHR CDR

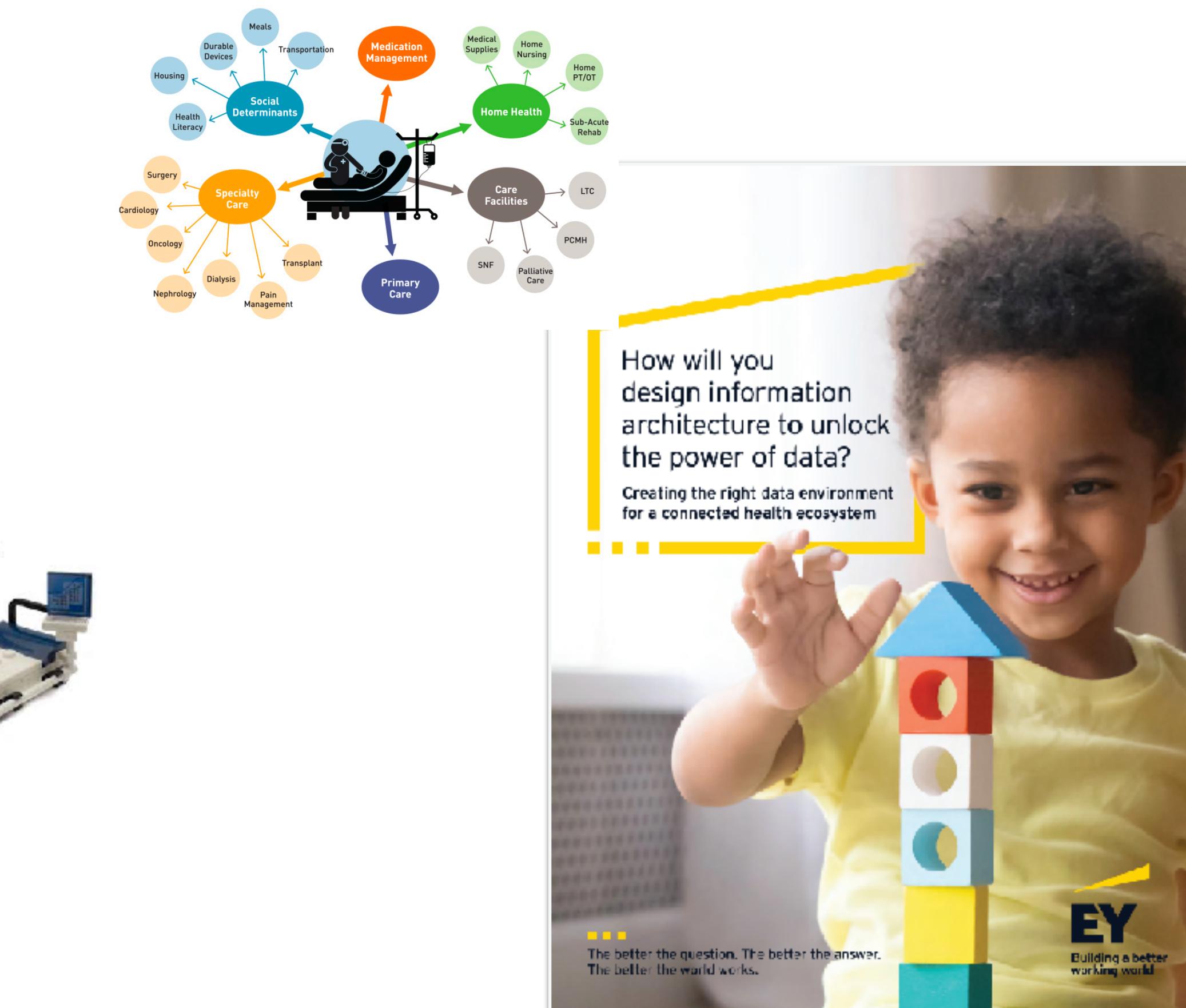
1,500,000 patient cases so far

HIS CIS LIS PACS EMR RIS ...

<https://www.youtube.com/watch?v=oAzjHdiioDY&feature=youtu.be>

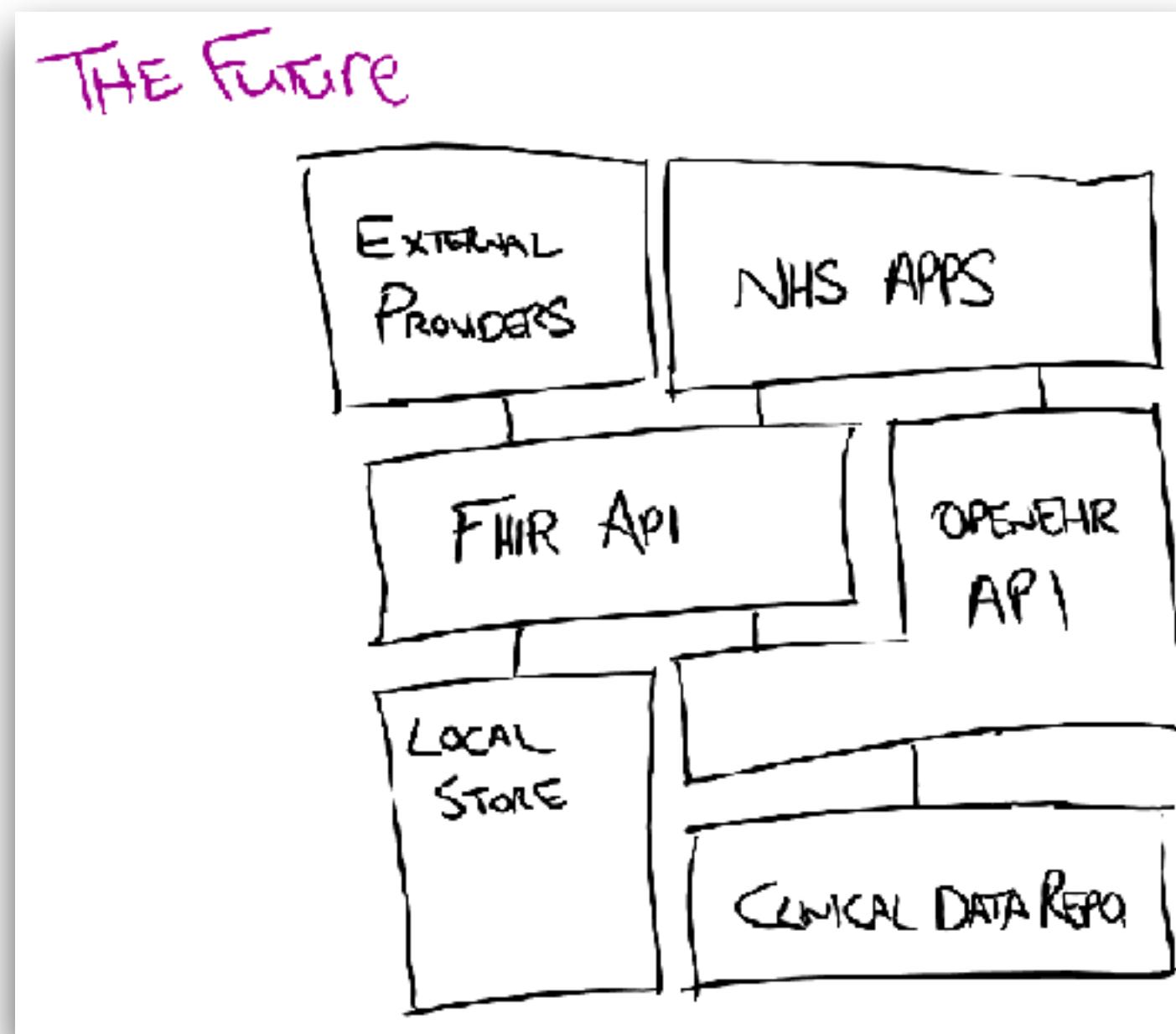
# EY - connected Health ecosystem

*open*EHR



# Why not ‘just’ use FHIR?

openEHR



INTEROPen

FHIR® and openEHR

The screenshot shows two main parts. On the left is a detailed table of the 'AllergyIntolerance' resource structure, listing fields like 'Identifier', 'clinicalStatus', 'verificationStatus', 'type', 'category', 'criticality', 'code', 'patient', 'onset[x]', 'assertedDate', 'recorder', 'asserter', 'lastOccurrence', 'note', 'reaction', 'substance', and 'manifestation'. Each field is defined by its name, flags (I), cardinality (e.g., 0..\*), type (e.g., Identifier, codeableConcept), and a detailed description with constraints. On the right is a clinical application interface titled 'Adverse reaction risk (Latest revision / latest published)'. It displays a tree view of clinical concepts such as 'Substance', 'Certainty', 'Manifestation', etc. A central node is 'Adverse reaction risk', which is connected to 'Protocol', 'Attribution', and 'Data'. Various clinical details like 'Last updated', 'Extension', 'URI Supporting clinical record information', 'Reaction reported?', 'Report summary', 'Initial exposure', 'Duration of exposure', etc., are shown as associated data points.

Name	Flags	Card.	Type	Description & Constraints
AllergyIntolerance	I		DomainResource	Allergy or Intolerance (generally: Risk of a + AllergyIntolerance.clinicalStatus SHALL be active   inactive   resolved + AllergyIntolerance.clinicalStatus SHALL be unconfirmed   confirmed   refuted   entered) Elements defined in Ancestors: id, meta, iri, externalId, system, value, code, codeableConcept, reference, dateTime, age, period, range, string, date, time, cdaTime, annotation, backboneElement, codeableConcept, codedConcept, uri, extension, supportingInformation, reaction, manifestation, protocol, attribution, data, reportSummary, report, initialExposure, durationOfExposure, acuteOfExposure, exposureDescription, exposureDetails, clinicalManagementDescription, clinicalManagementDetails
Identifier	S	0..*	Identifier	active   inactive   resolved
clinicalStatus	?! S I	0..1	code	AllergyIntoleranceClinicalStatus (Required) unconfirmed   confirmed   refuted   entered
verificationStatus	?! S I	1..1	code	AllergyIntoleranceVerificationStatus (Required) allergy   intolerance - Underlying mechanism
type	S	0..1	code	AllergyIntoleranceType (Required) food   medication   environment   biologic
category	S	0..*	code	AllergyIntoleranceCategory (Required)
criticality	S	0..1	code	low   high   unable-to-assess
code	S	0..1	CodeableConcept	AllergyIntoleranceCriticality (Required) Code that identifies the allergy or intolerance
patient	S	1..1	Reference(Patient)	AllergyIntolerance Substance/Product, Condition Who the sensitivity is for
onset[x]		0..1		When allergy or intolerance was identified
onsetDateTime			dateTime	
onsetAge			Age	
onsetPeriod			Period	
onsetRange			Range	
onsetString			string	
assertedDate		0..1	dateTime	
recorder		0..1	Reference(Practitioner   Patient)	
asserter	S	0..1	Reference(Patient   RelatedPerson   Practitioner)	
lastOccurrence		0..1	dateTime	
note		0..*	Annotation	
reaction		0..*	BackboneElement	
substance		0..1	CodeableConcept	
manifestation		1..*	CodeableConcept	

# openEHR vs + FHIR

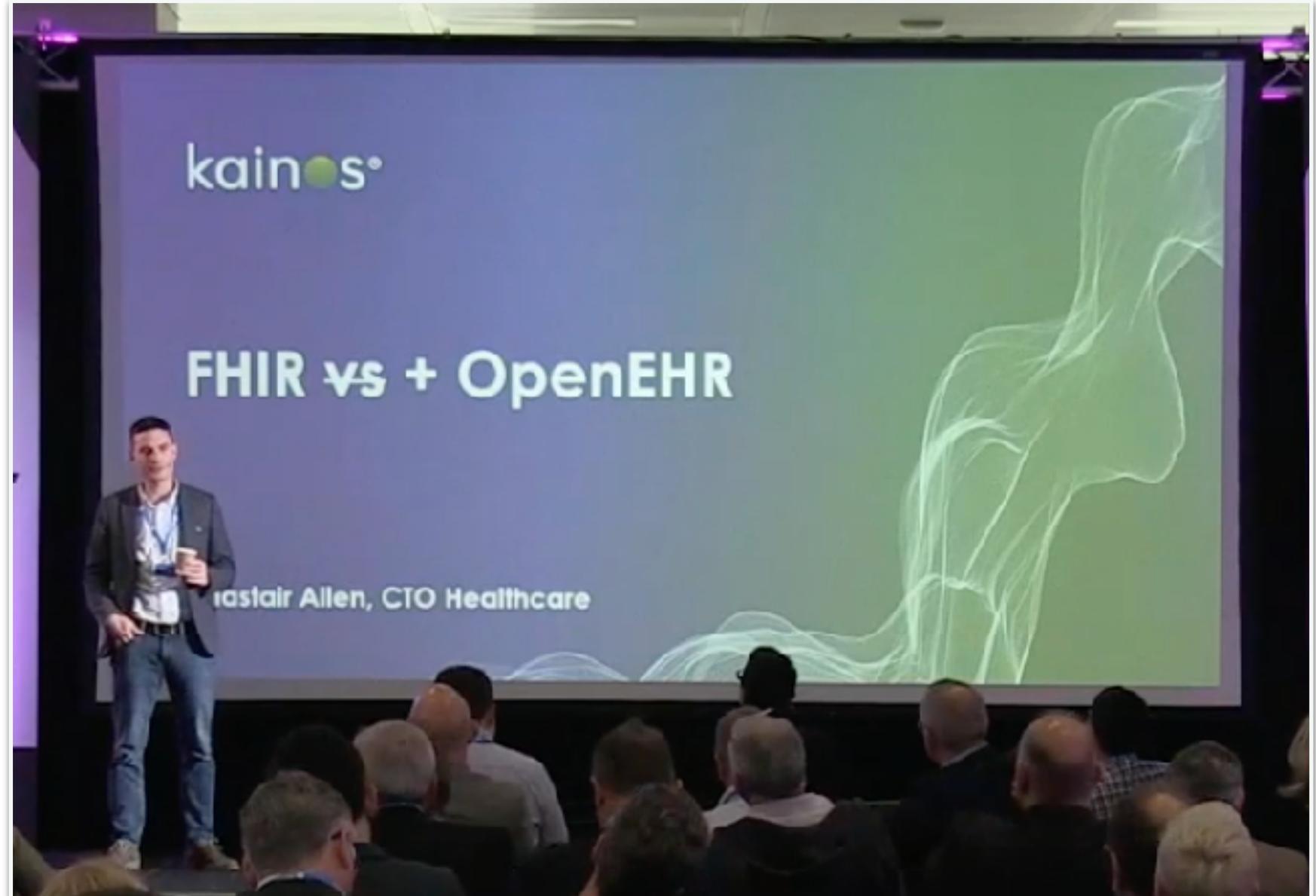
**openEHR**

FHIR has had a significant positive global impact in helping existing systems exchange high-value clinical information, in a modern developer-friendly way along with other helpful innovations such as vendor-neutral terminology service interfaces.

The openEHR development community is actively adopting FHIR standards, over openEHR-based datastores and tooling, in line with other more traditionally engineered systems, using FHIR ‘as intended’, to support information exchange between applications..

In contrast, openEHR supports a world where applications increasingly coalesce around communal, vendor-neutral structured data repositories (CDRs).

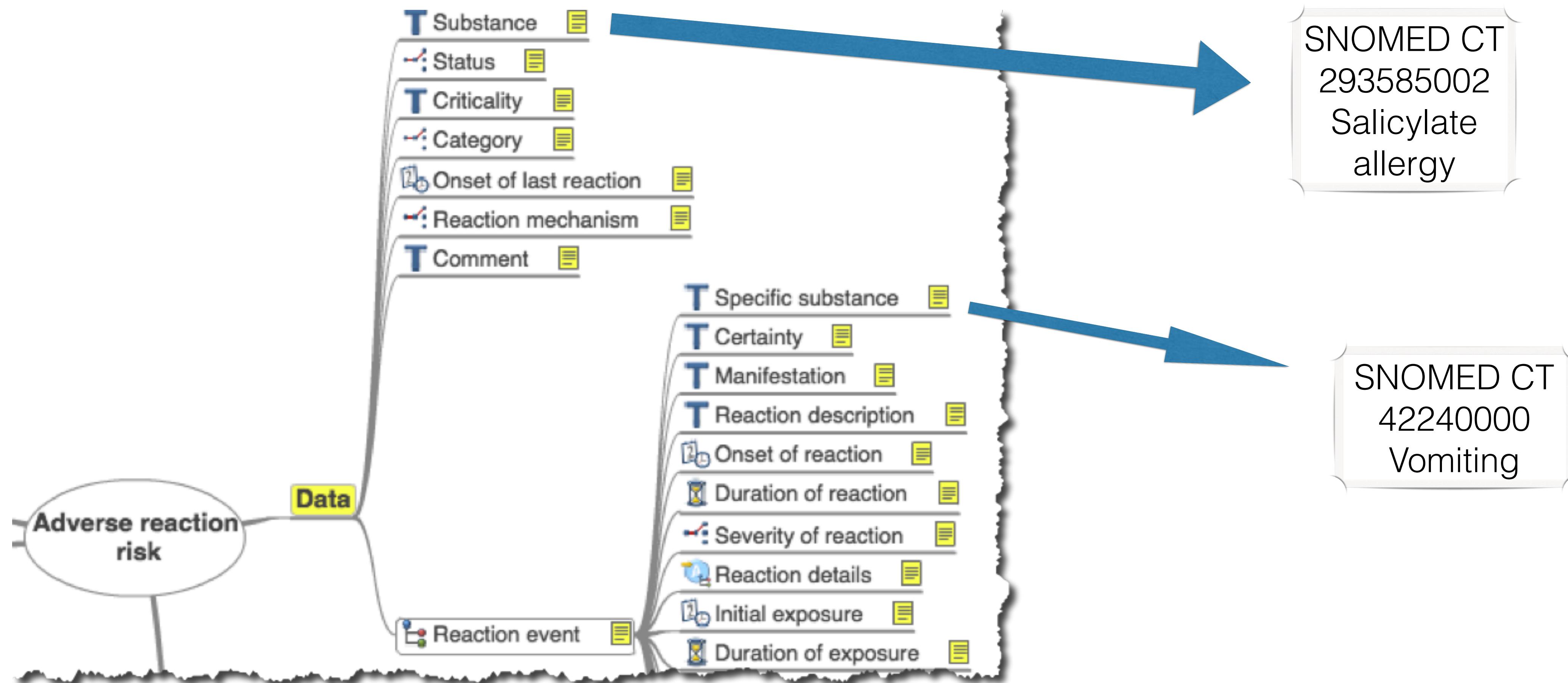
The ‘controller’ of the CDR (not the vendor) can upload new openEHR clinical model definitions without further engineering or recourse to the vendor and patient records can then immediately be created and fully-queried using those new definitions - a ‘no-code’ vendor-neutral data management environment.



Alastair Allen, CTO Kainos:  
The case for using FHIR  
and openEHR

<https://www.youtube.com/watch?v=biEXVRzjWmw>

# Why not ‘just’ use SNOMED CT?



# openEHR - rewiring healthIT:

- From ‘my system’ to a person-centric information system
  - separate the data from applications
  - **single source-of-truth** where that makes sense
    - but federate if needs be
  - **open platforms** / vendor & tech-neutral information standards
  - **Standardisation by negotiation** not by science, clinically-driven
  - The near future is openEHR + SNOMED CT + FHIR



# **openEHR and Secondary uses**

Ian McNicoll

# AQL: Archetype Query Language

openEHR

The screenshot shows the openEHR AQL interface. On the left, there is a sidebar with various icons and a search bar. The main area displays a query history entry for "DHI - Urology\_PROMs-v0" from "23.09.2020 @ 15:57". The query code is:

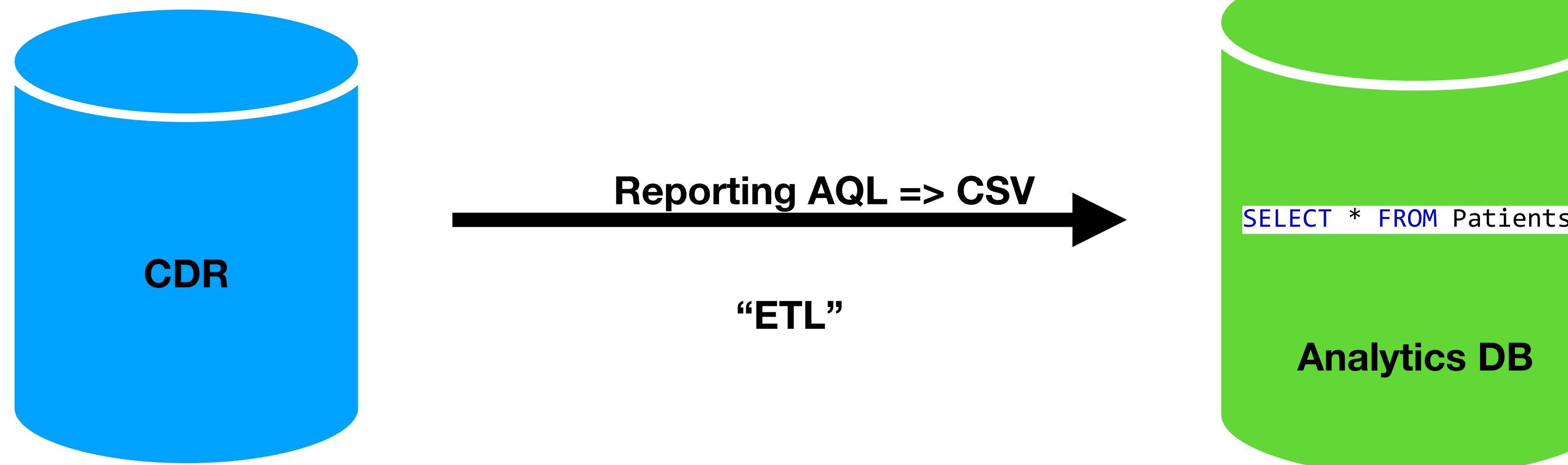
```
1 SELECT c
2 FROM EHR e
3 CONTAINS COMPOSITION c#Prostate_cancer_PROMS_report
4 WHERE c/name/value='Prostate cancer PROMS report'
5 OFFSET 0 LIMIT 10
```

The results table shows 10 rows of data. The columns are:

#	archetype_id	template_id	formalism	system_id	archetype_id	tim
1	openEHR-EHR-COMPOSITION.report.v1	DHI - Urology_PROMs-v0	application/json	FormRenderer	openEHR-EHR-OBSERVATION.howru.v1	202
2	openEHR-EHR-COMPOSITION.report.v1	DHI - Urology_PROMs-v0	application/json	FormRenderer	openEHR-EHR-OBSERVATION.howru.v1	202
3	openEHR-EHR-COMPOSITION.report.v1	DHI - Urology_PROMs-v0	application/json	FormRenderer	openEHR-EHR-OBSERVATION.howru.v1	202
4	openEHR-EHR-COMPOSITION.report.v1	DHI - Urology_PROMs-v0			openEHR-EHR-OBSERVATION.howru.v1	202
5	openEHR-EHR-COMPOSITION.report.v1	DHI - Urology PROMs-v0	application/json	FormRenderer	openEHR-EHR-OBSERVATION.howru.v1	202

# openEHR Reporting

*open*EHR



# Discovery process

## Care Home data standards?

**openEHR**

nightingale hammerson		F1a- ASSESSMENT ON ADMISSION
RESIDENT'S NAME:	UNIT:	
<b>ASSESSMENT ON ADMISSION TO BE COMPLETED WITHIN 72 HOURS OF ADMISSION</b>		
<b>Personal Cleansing</b> (preferred personal hygiene routine, level of assistance needed)	<b>Eating and Drinking</b> (food preferences, sufficient fluid intake, usual meal pattern, food restrictions)	
<b>Personal Dressing</b> (How often are the clothes changed, what are the individual's personal dressing habits?)	<b>Breathing</b> (include respiration rate)	
<b>Observations &amp; Baseline</b> (Anxious, withdrawn, distressed, Temp etc)	<b>Mobility</b> (assistance needed, limitations, abilities)	
<b>Sleeping Routines</b> (usual sleep rest pattern, preferred time of rest/sleep, sedation)	<b>Elimination Urine and Bowels</b> (incontinence, catheters, size, bowel patterns, laxatives)	

### The Development of a Care Home Data Platform in Scotland: Insights from the Care Home Innovation Partnership, Lothian

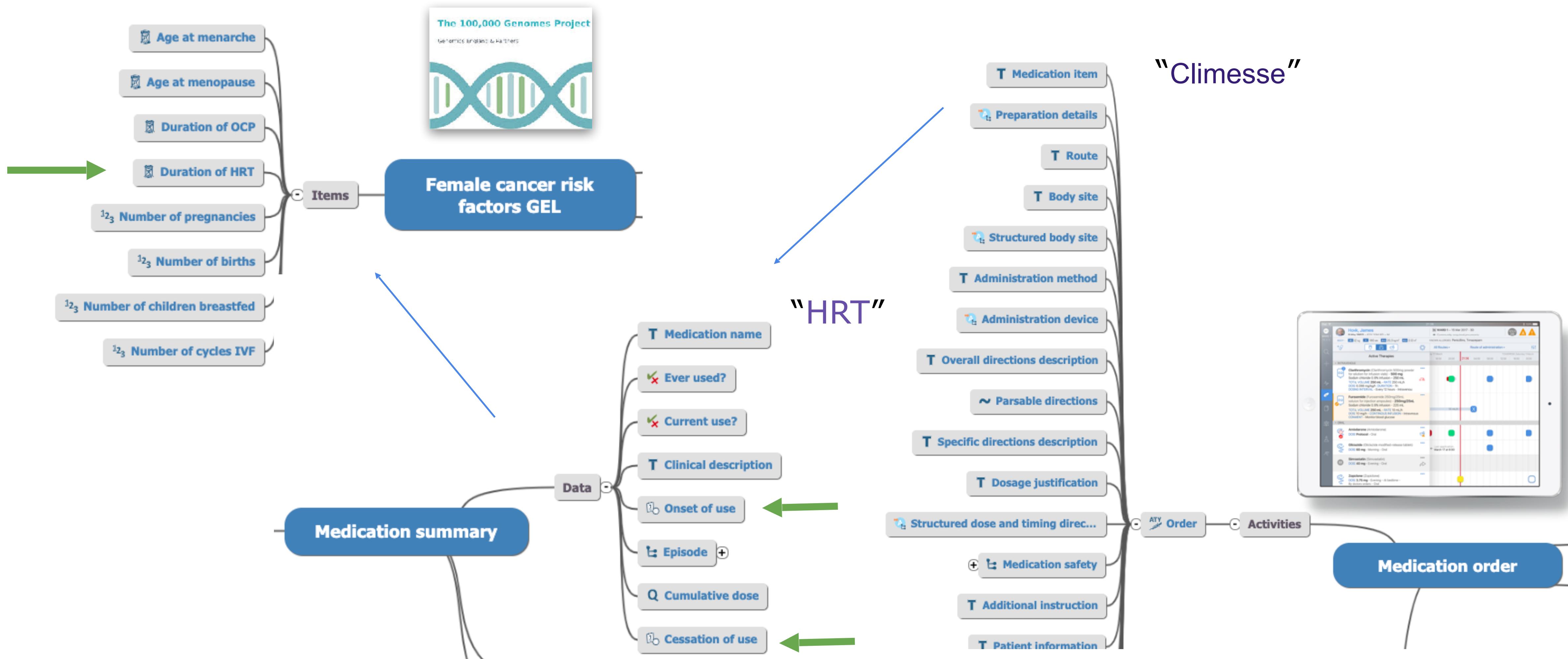
✉ Lucy Johnston, ✉ David AG Henderson, ✉ Jo Hockley, ✉ Susan D Shenkin

doi: <https://doi.org/10.1101/2020.08.17.20176503>

Inventory No.	Area assessed	1	2	3	4	5	6
1	<b>Dependency/ indicator of need</b>	Augmented IoRN	IoRN	Dependency assessment	IoRN	IoRN	Organisation Form
2	<b>Nutrition</b>	MUST	MUST	MUST	MUST	Eating Well in Care homes/ Cook Safe	Organisation Form
3	<b>Weight</b>	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI
4	<b>Incidence and risk of falls</b>	FRASE	Organisation Form	Falls Risk	Falls Risk	Organisation Form	Organisation Form
5	<b>Incidence and risk of pressure sores</b>	Braden	Pressure Ulcer Cross/ PU Checklist/ Waterlow	Waterlow	Waterlow	Waterlow	Skin integrity Care Plan
6	<b>Infections</b>	Count/ type of infection	Count/ type of infection	Count/ type of infection	Count/ type of infection	Count/ type of infection	Count/ type of infection
7	<b>Wounds (new and ongoing)</b>	Internal Chart	STAR Classification	Wounds assessment	Chart on PCS	NHS Wound Assessment Chart	Organisation Form
8	<b>Frailty</b>	CIRC	SPAR Tool	Edmonton Frailty Scale	Clinical Frailty Scale	Not collected	Not collected
9	<b>Bowel Movement(s)</b>	Bristol Stool Chart	Bristol Stool Chart	Chart on PCS	Bristol Stool Chart	Bristol Stool Chart	Organisation Form
10	<b>Fluid Intake</b>	Internal Chart	Organisation Form	Chart on PCS	Chart on PCS	Organisation Form	Organisation Form
11(a)	<b>Mood: Depression</b>	Geriatric Depression scale/ Cornell scale for Depression in dementia	No measure/tool reported*	No measure/tool reported	Cornell scale for depression in dementia	No measure/tool reported	No measure/tool reported
11(b)	<b>Mood: Delirium</b>	4AT	4AT	Not recorded	Not recorded	Care support plan	Not collected
12	<b>Pain</b>	PAINAD Doloplus2 Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale
13	<b>Movement</b>	Roper, Logan, Tierney model of ADL Nolan's 6 senses f/work	Care Support Plan	No measure/tool reported	No measure/tool reported	Care Support Plan	In Care Plan
14	<b>Sleep</b>		Care Support Plan	Care Support Plan	Organisation Form	Organisation Form	Organisation Form
15	<b>Observations/ Vital Signs</b>	←-----	Various charts	-----→			

# 100K Genomics: “Duration of HRT”

*open*EHR



# openEHR International : [openehr.org](http://openehr.org)

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