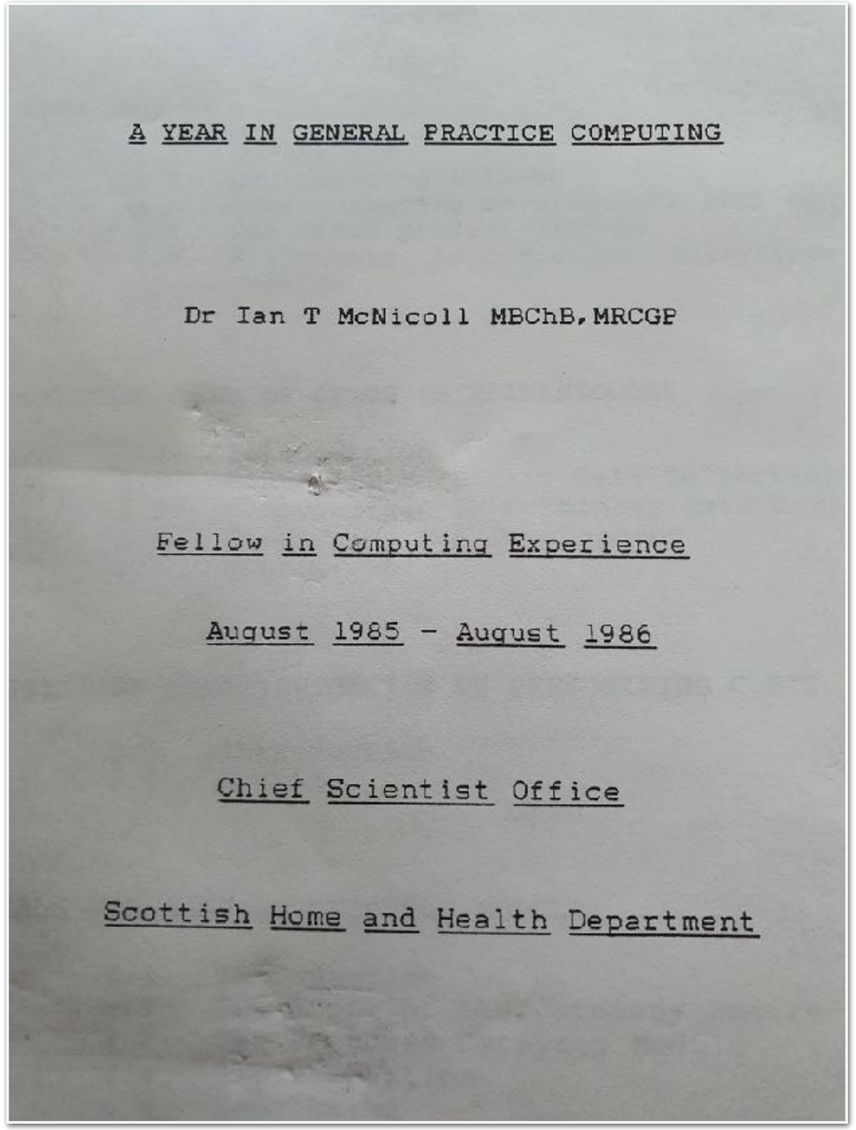
What is openEHR:
Towards a coherent patient-centric digital healthcare ecosystem



A YEAR IN GENERAL PRACTICE COMPUTING

Dr Ian T McNicoll MBChB,MRCGP

Fellow in Computing Experience

August 1985 - August 1986

Chief Scientist Office

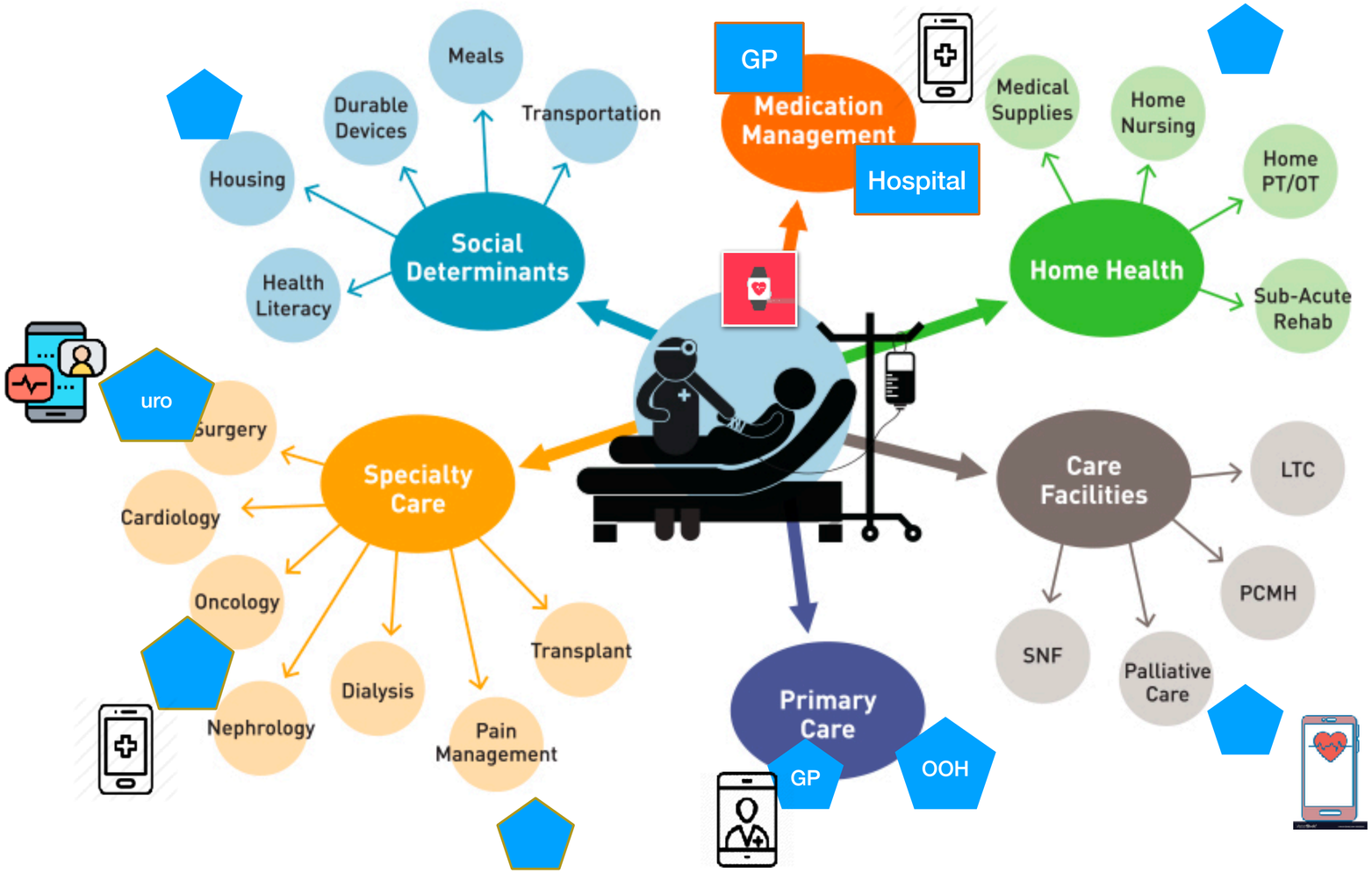
Scottish Home and Health Department

FACULTY OF CLINICAL INFORMATICS

freshEHR Clinical Informatics

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

openEHR



chemoHildi

openEHR

chemohildi.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

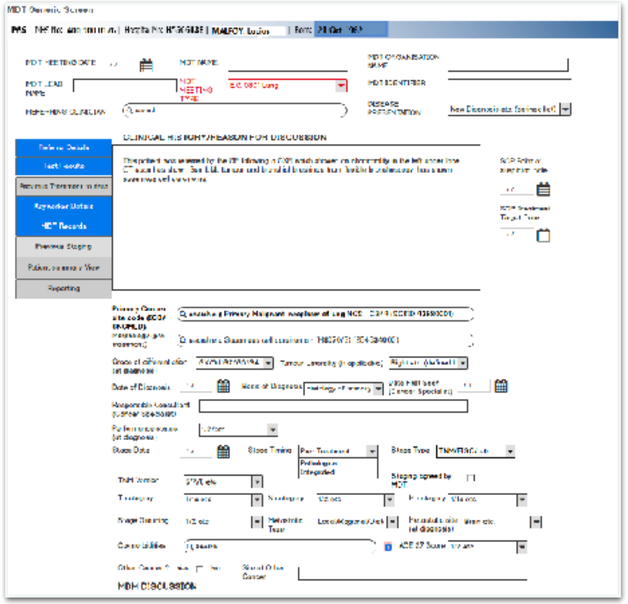
The extra mile
20-July-18

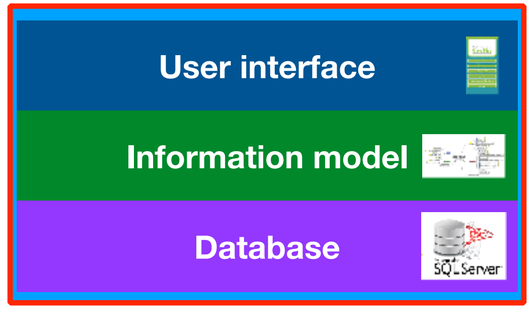
The long road to getting my prescription
18-July-18

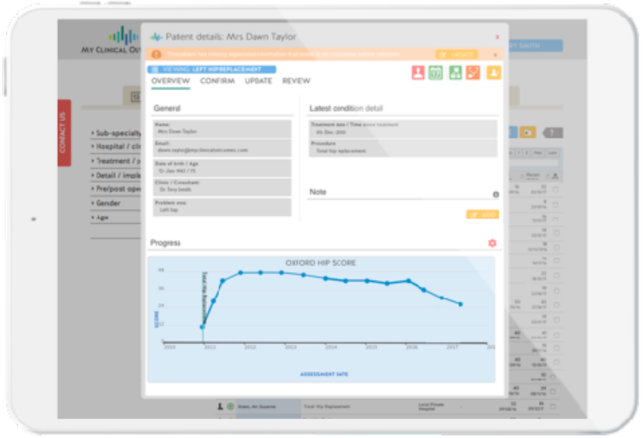
The New Normal
15-July-18

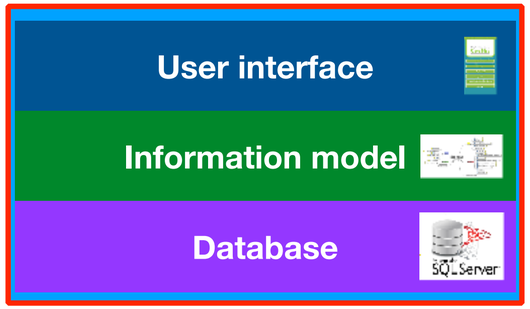
What is an ‘IT system’?

openEHR



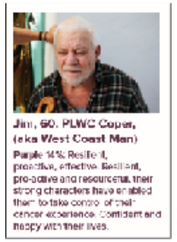






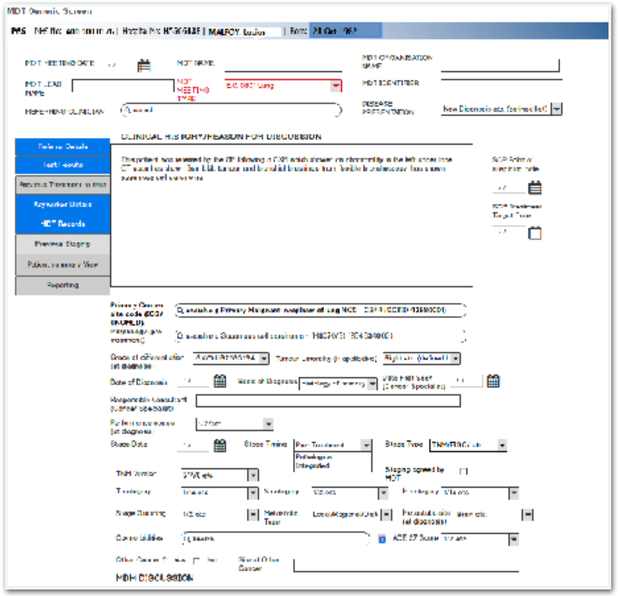
Cancer journey

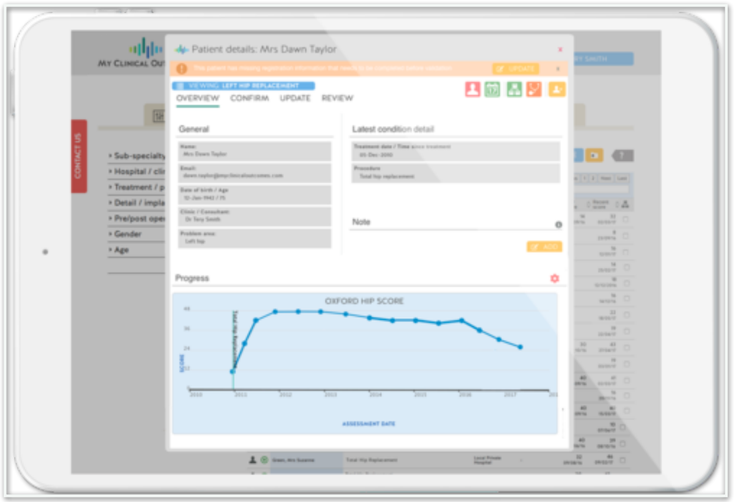
openEHR

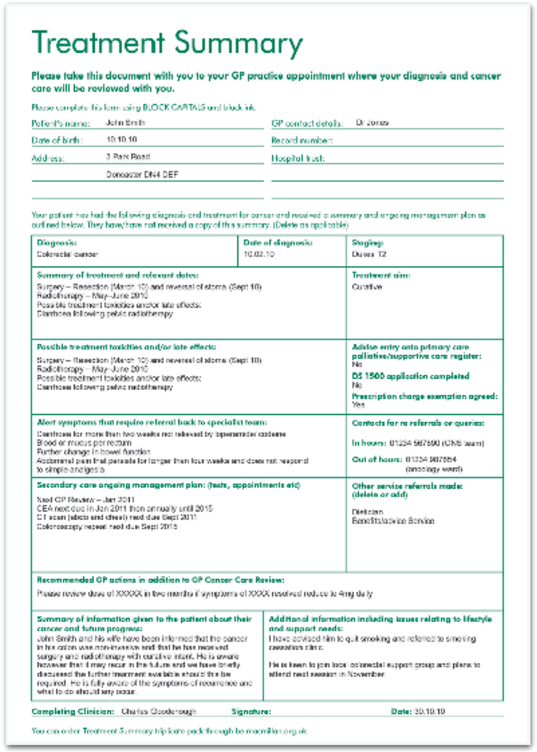


Jim, 60, PLWC Copar, (aka West Coast Man)

Purple 14% Resilient, proactive, effective. Resilient, pro-active and resourceful, their strong characters have enabled them to take control of their cancer experience. Confident and happy with their lives.







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:	
	Doncaster DN4 0EF		

Your patient has had the following diagnosis and treatment for cancer and received a summary and ongoing management plan as outlined below. They have/have not received a copy of this summary. (Delete as applicable)

Diagnosis:	Date of diagnosis:	Staging:
Colorectal cancer	10.02.10	Dukes T2

Summary of treatment and relevant dates:
Surgery – Resection (March 10) and reversal of stoma (Sept 10)
Radiotherapy – May-June 2010
Possible treatment toxicities and/or late effects:
Diarrhoea following pelvic radiotherapy

Treatment aim:
Curative

Possible treatment toxicities and/or late effects:
Surgery – Resection (March 10) and reversal of stoma (Sept 10)
Radiotherapy – May-June 2010
Possible treatment toxicities and/or late effects:
Diarrhoea following pelvic radiotherapy

Advise entry onto primary care palliative/supportive care register:
No
DS 1500 application completed
No
Prescription charge exemption agreed:
Yes

Alert symptoms that require referral back to specialist team:
Diarrhoea for more than two weeks not relieved by loperamide/codeine
Blood or mucus per rectum
Further change in bowel function
Abdominal pain that persists for longer than four weeks and does not respond to simple analgesia

Contacts for re referrals or queries:
In hours: 01234 567890 (CNS team)
Out of hours: 01234 987654 (oncology ward)

Secondary care ongoing management plan: (tests, appointments etc)
Next GP Review – Jan 2011
CEA next due in Jan 2011 then annually until 2015
CT scan (abdo and chest) next due Sept 2011
Colonoscopy repeat next due Sept 2015

Other service referrals made: (delete or add)
Dietician
Benefits/advice Service

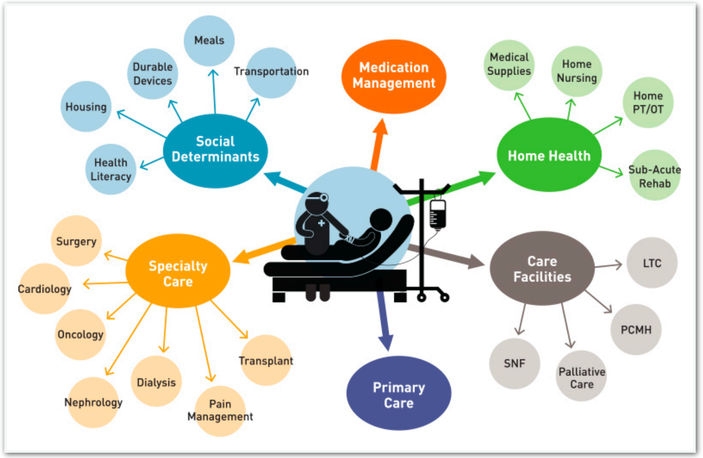
Recommended GP actions in addition to GP Cancer Care Review:
Please review dose of XXXXX in two months if symptoms of XXXX resolved reduce to 4mg daily

Summary of information given to the patient about their cancer and future progress:
John Smith and his wife have been informed that the cancer in the colon was more invasive wall that he has received surgery and radiotherapy with curative intent. He is aware however that it may recur in the future and we have briefly discussed the further treatment available should this be required. He is fully aware of the symptoms of recurrence and what to do should any occur.

Additional information including issues relating to lifestyle and support needs:
I have advised him to quit smoking and referred to smoking cessation clinic.
He is keen to join local colorectal support group and plans to attend next session in November.

Completing Clinician: Charles Goodenough **Signature:** **Date:** 20.10.10

You can order Treatment Summary triplicate pads through be.macmillan.org.uk



RESPECT Recommended Summary Plan for Emergency Care and Treatment

1. This plan belongs to:

Preferred name

Date completed

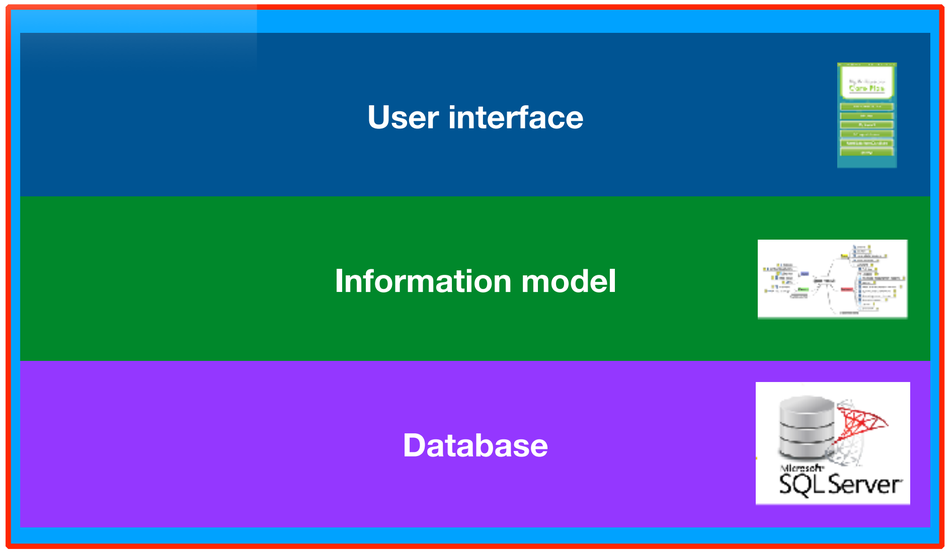
A. One system to rule them all?

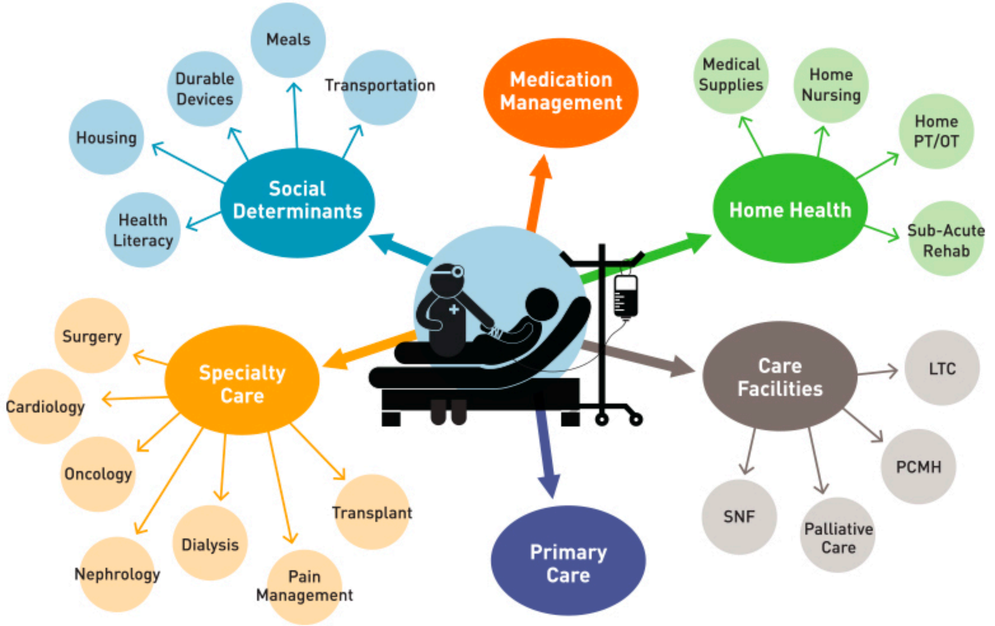
openEHR

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

NHS Connecting for Health

tpp





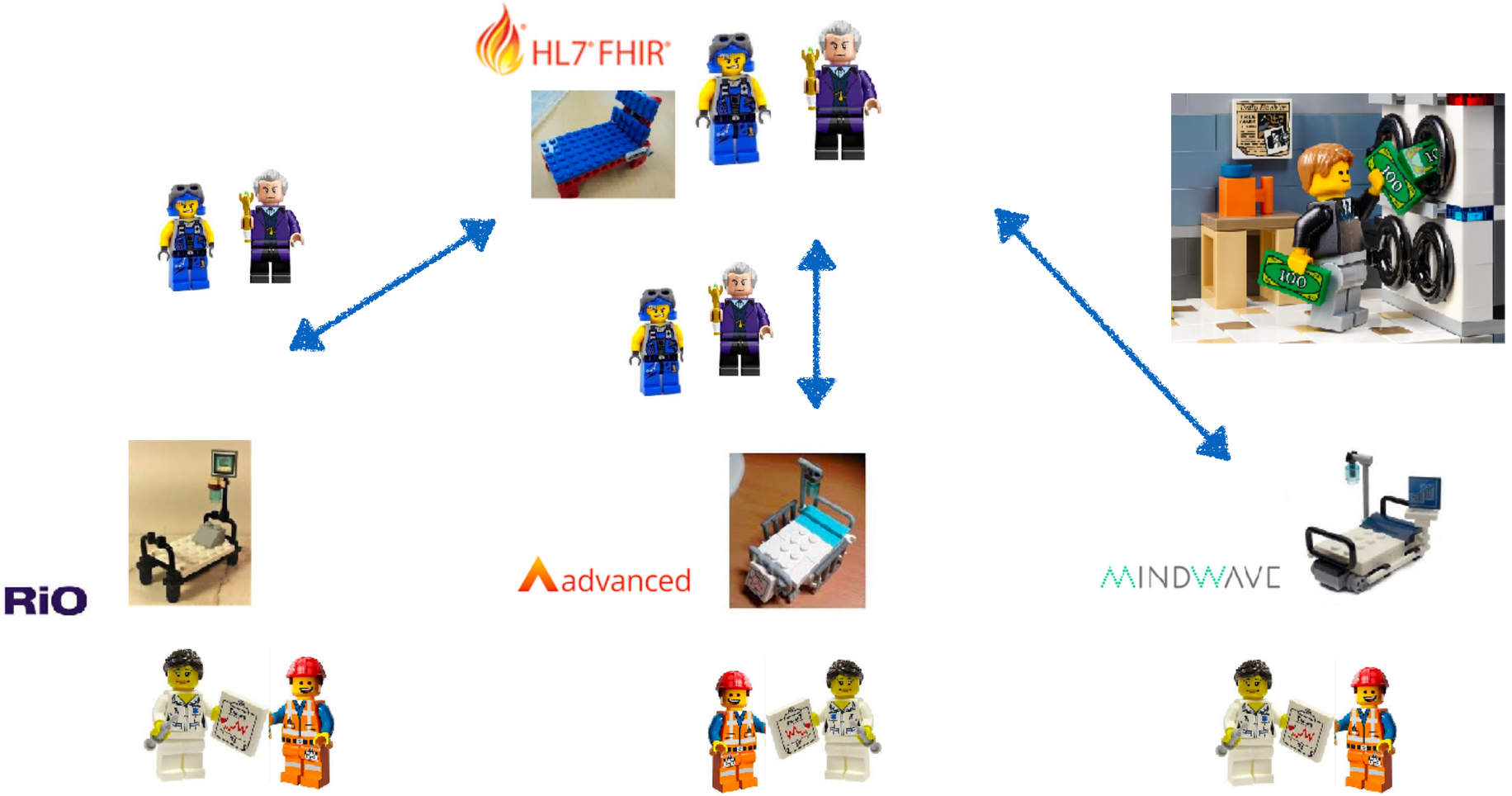
Epic

with the patient at the heart

InterSystems
Creative data technology

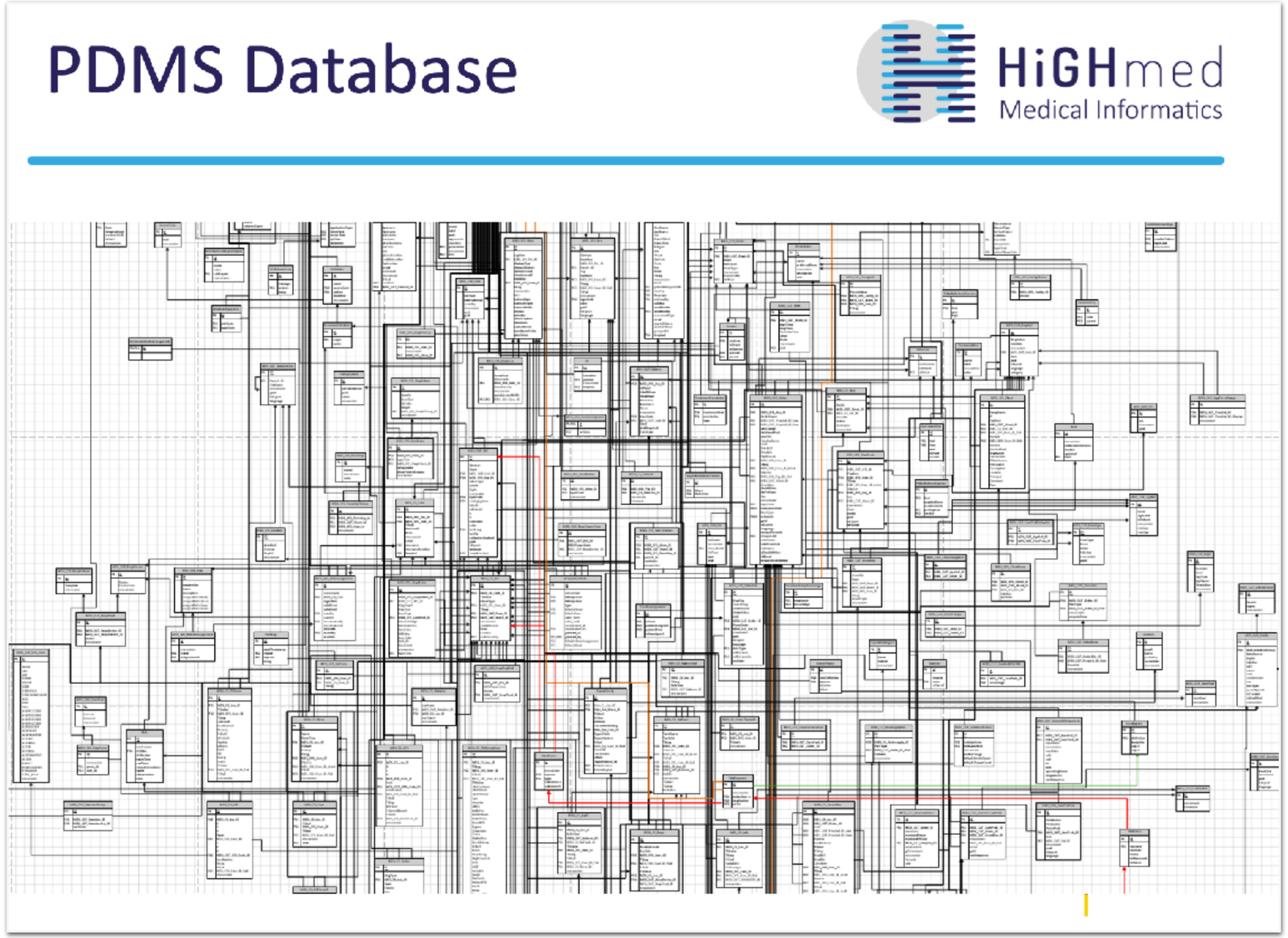
B. Best of Breed - ‘interoperability’

openEHR



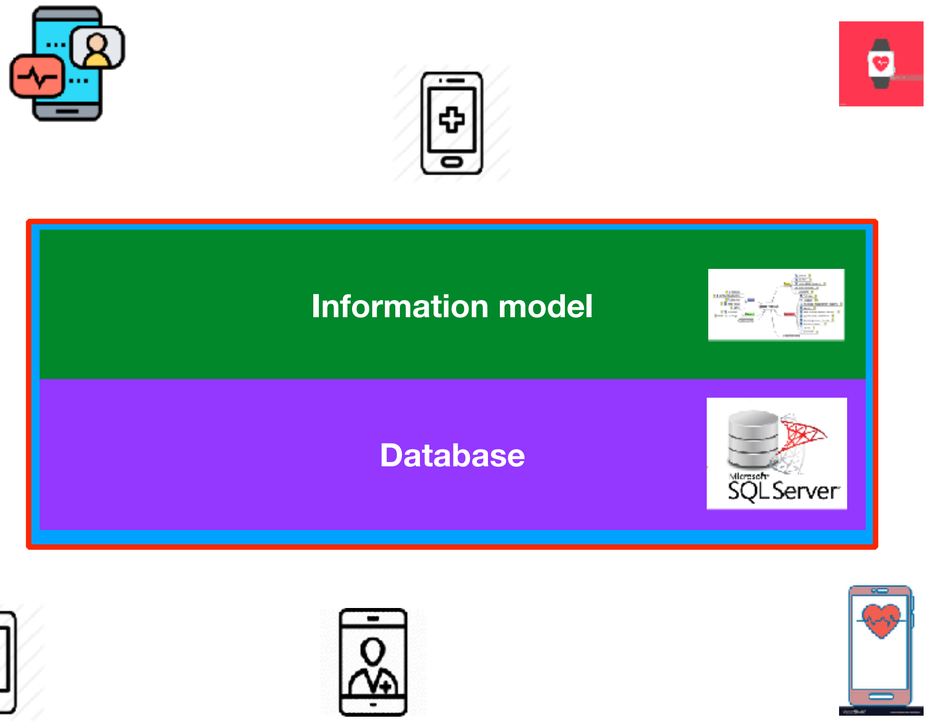
RDBMS - ‘so 20th century’?

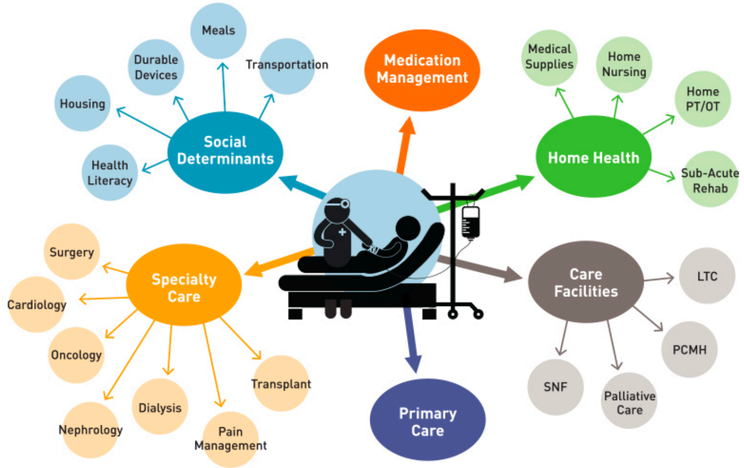
openEHR



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

openEHR

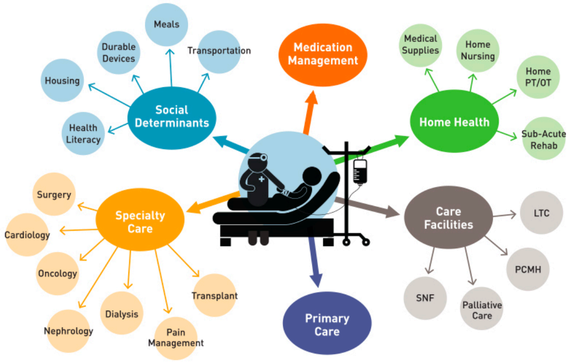




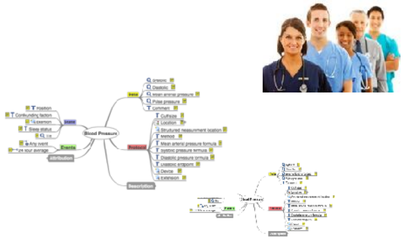
open Platform - vendor-neutral

openEHR

Apps



Vendor-neutral Information model



openEHR

Technology-neutral datastore (CDR)

EtherCIS

DIPS

code 24 .NL

better BY MARAND

CaboLabs

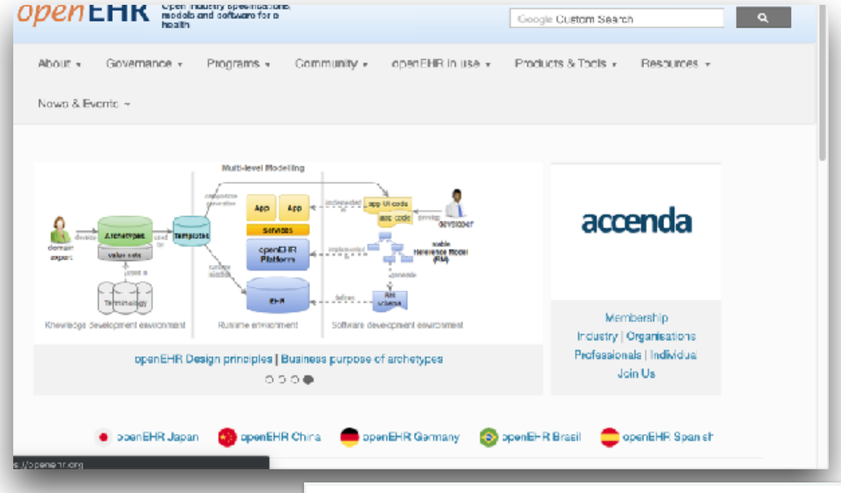
EHRbase

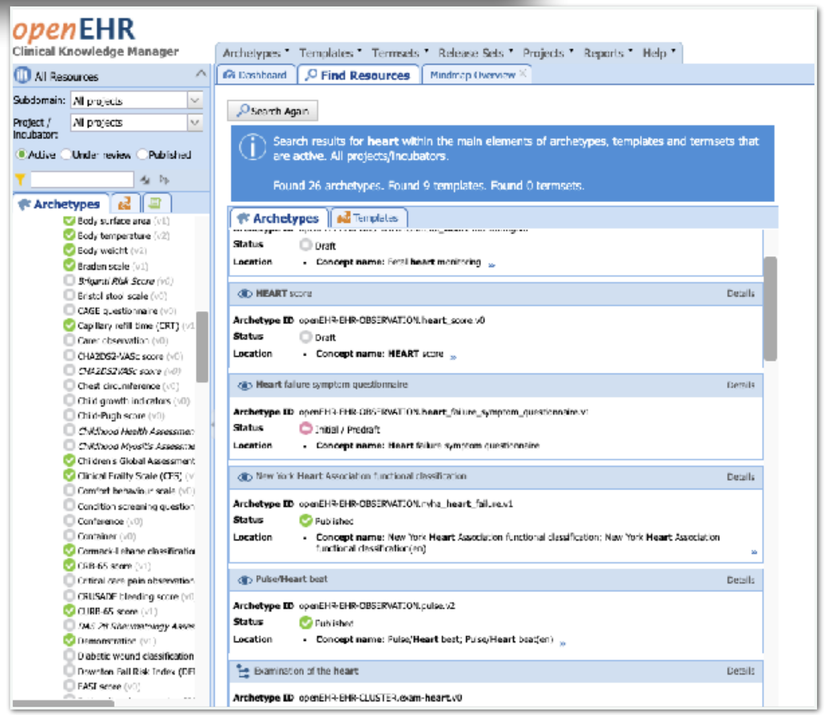
Ocean HEALTH SYSTEMS

What is 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
  - specifications.openehr.org -specifications
  - ckm.openehr.org - clinical models





openEHR - vendor-neutral information model for persistence

openEHR

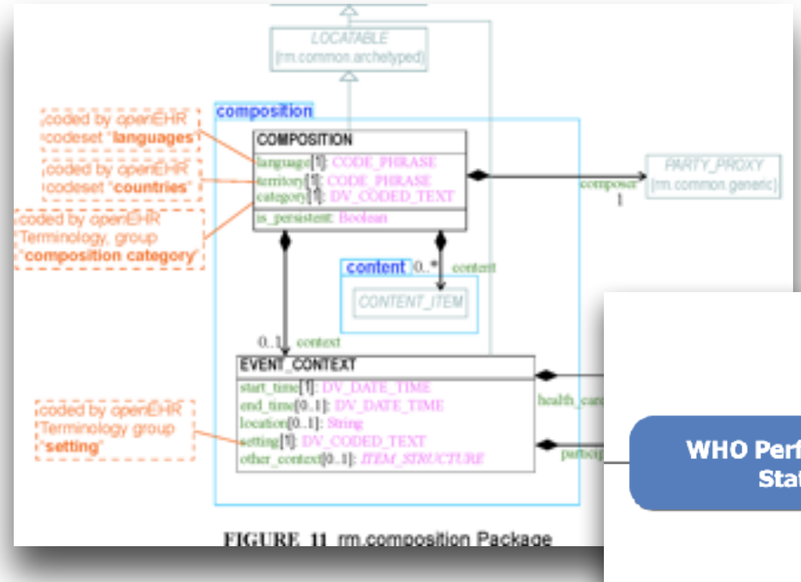
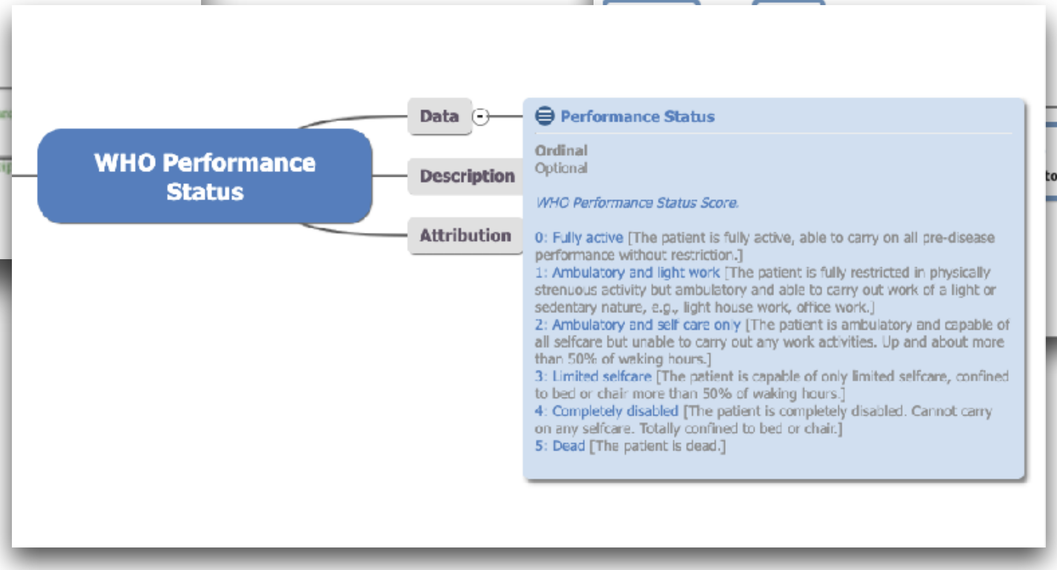
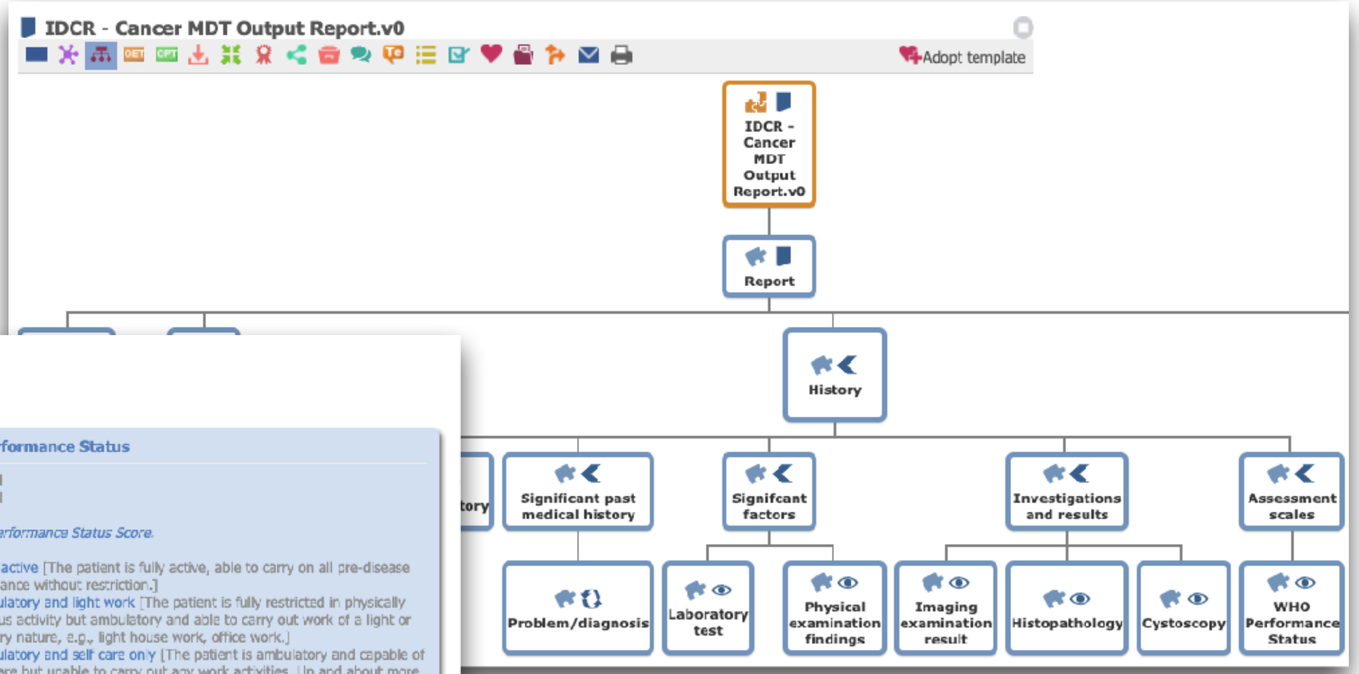


FIGURE 11 rm.composition Package

Reference model

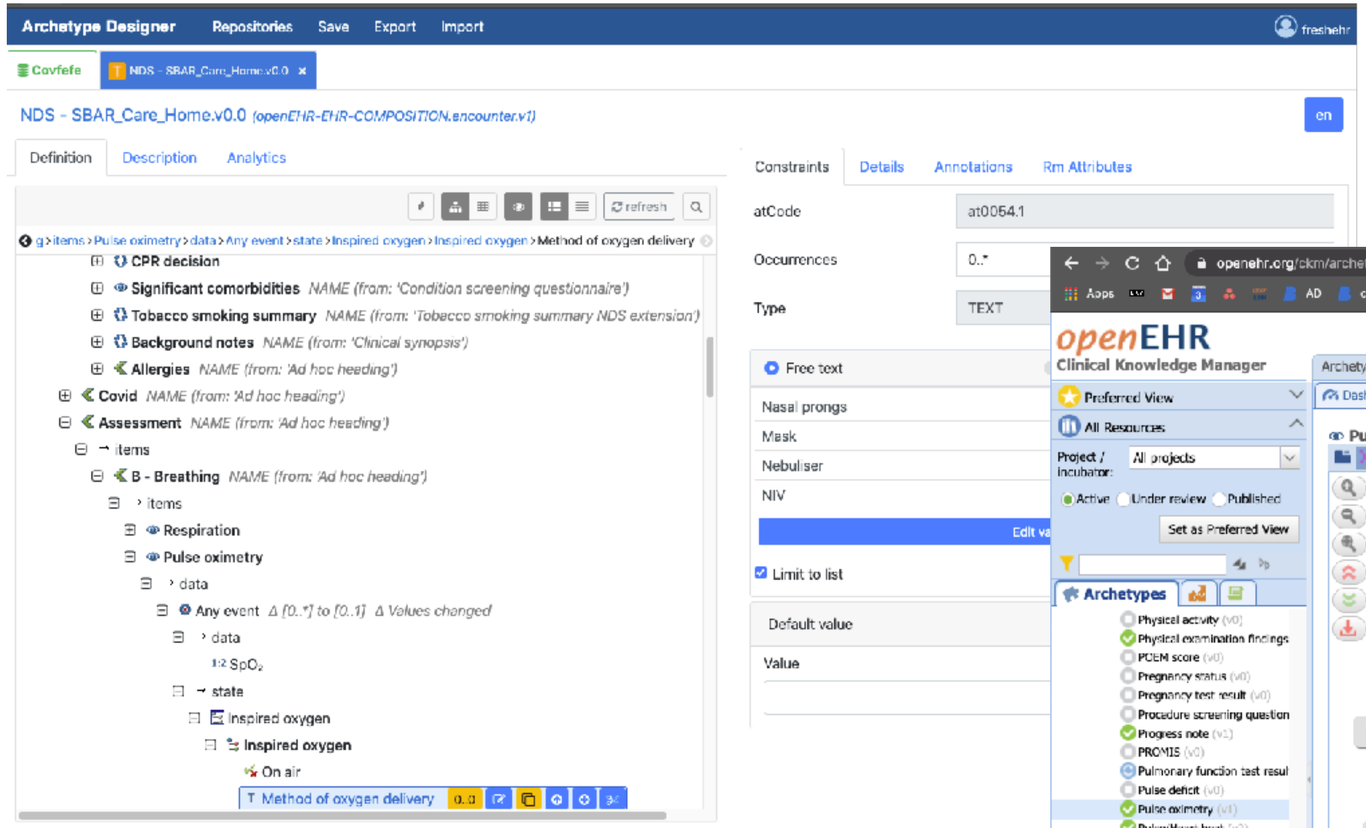




Templates

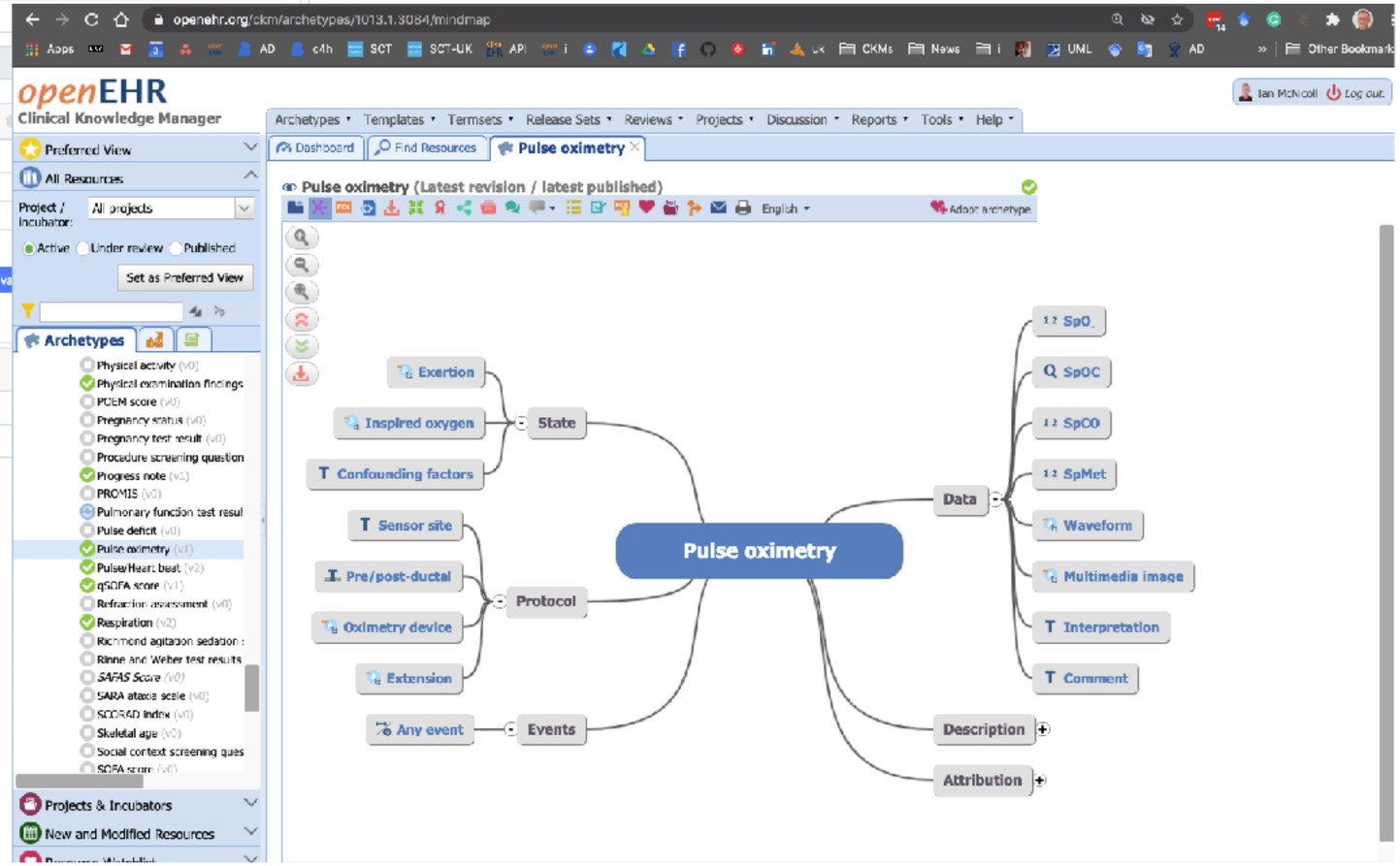
Archetypes

openEHR tooling



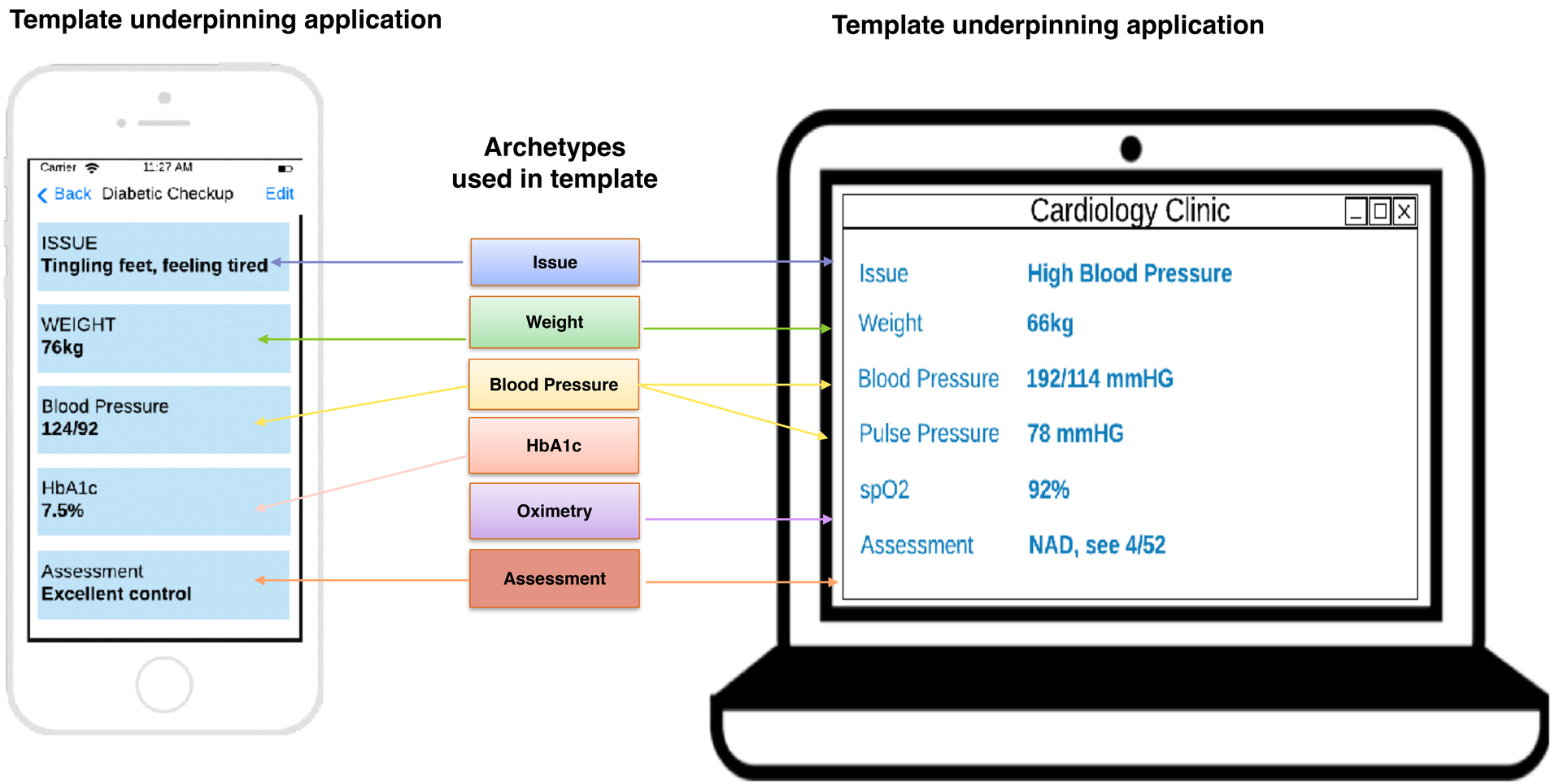
https://openehr.org/ckm

https://tools.openehr.org/



Archetypes and templates

openEHR



Discovery process
Care Home data standards?

nightingale hammerson — F1a- ASSESSMENT ON ADMISSION

RESIDENT'S NAME: UNIT:

ASSESSMENT ON ADMISSION
TO BE COMPLETED WITHIN 72 HOURS OF ADMISSION

Personal Cleansing (preferred personal hygiene routine, level of assistance needed)	**Eating and Drinking** (food preferences, sufficient fluid intake, usual meal pattern, food restrictions)
Personal Dressing (How often are the clothes changed, what are the individual's personal dressing habits?)	**Breathing** (include respiration rate)
Observations & Baseline (Anxious, withdrawn, distressed, Temp etc)	**Mobility** (assistance needed, limitations, abilities)
Sleeping Routines (usual sleep rest pattern, preferred time of rest/sleep, sedation)	**Elimination Urine and Bowels** (incontinence, catheters, size, bowel patterns, laxatives)

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

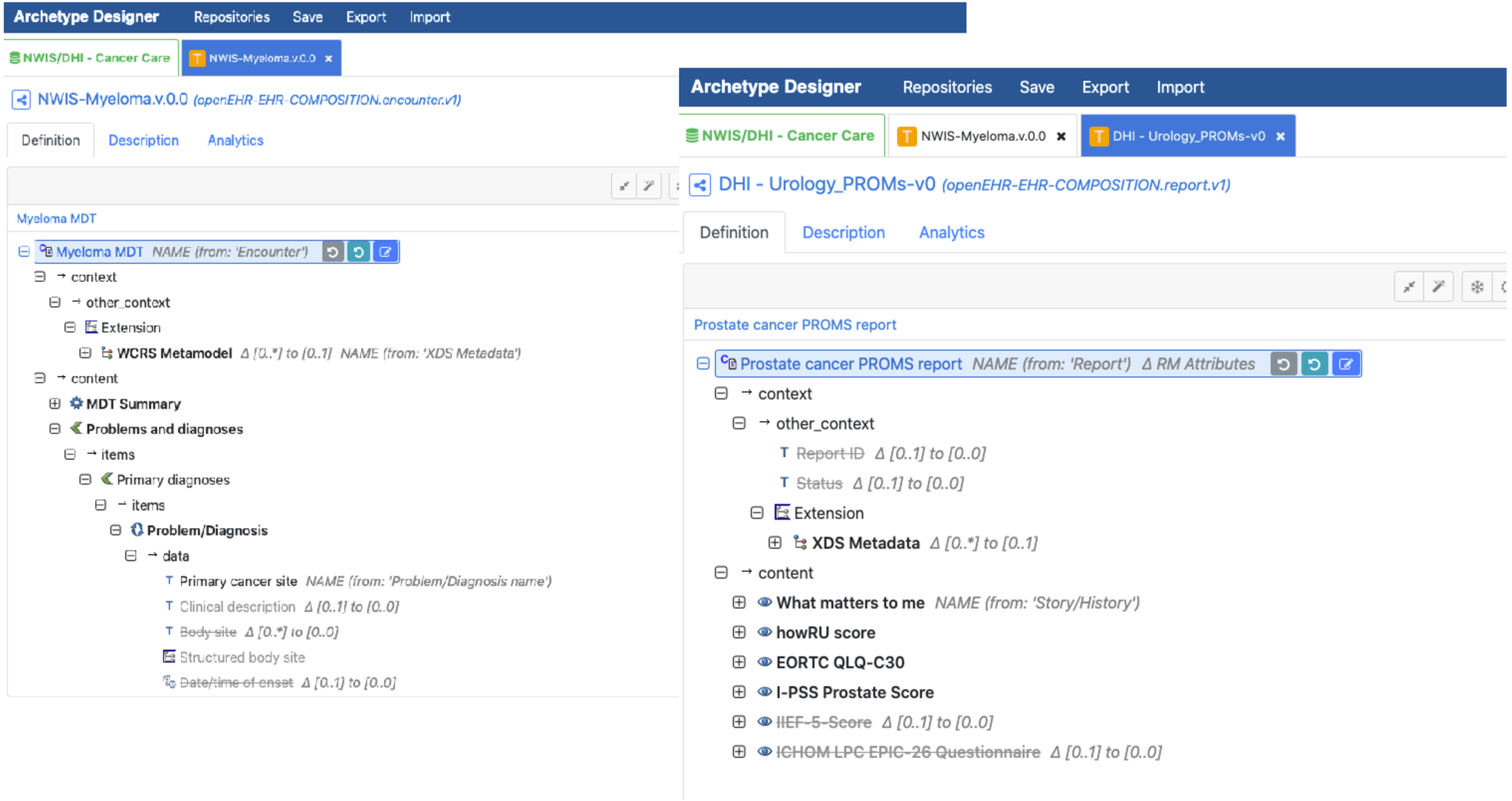
openEHR

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

Inventory No.	Area assessed	1	2	3	4	5	6
1	Dependency/ indicator of need	Augmented IoRN	IoRN	Dependency assessment	IoRN	IoRN	Organisation Form
2	Nutrition	MUST	MUST	MUST	MUST	Eating Well in Care homes/ Cook Safe	Organisation Form
3	Weight	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI
4	Incidence and risk of falls	FRASE	Organisation Form	Falls Risk	Falls Risk	Organisation Form	Organisation Form
5	Incidence and risk of pressure sores	Braden	Pressure Ulcer Cross/ PU Checklist/ Waterlow	Waterlow	Waterlow	Waterlow	Skin integrity Care Plan
6	Infections	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	Wounds (new and ongoing)	Internal Chart	STAR Classification	Wounds assessment	Chart on PCS	NHS Wound Assessment Chart	Organisation Form
8	Frailty	CIRC	SPAR Tool	Edmonton Frailty Scale	Clinical Frailty Scale	Not collected	Not collected
9	Bowel Movement(s)	Bristol Stool Chart	Bristol Stool Chart	Chart on PCS	Bristol Stool Chart	Bristol Stool Chart	Organisation Form
10	Fluid intake	Internal Chart	Organisation Form	Chart on PCS	Chart on PCS	Organisation Form	Organisation Form
11(a)	Mood: Depression	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)	Mood: Delirium	4AT	4AT	Not recorded	Not recorded	Care support plan	Not collected
12	Pain	PAINAD Doloplus2 Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale
13	Movement	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	Sleep		Care Support Plan	Care Support Plan	Organisation Form	Organisation Form	Organisation Form
15	Observations/ Vital Signs	←----------		Various charts		----------→	

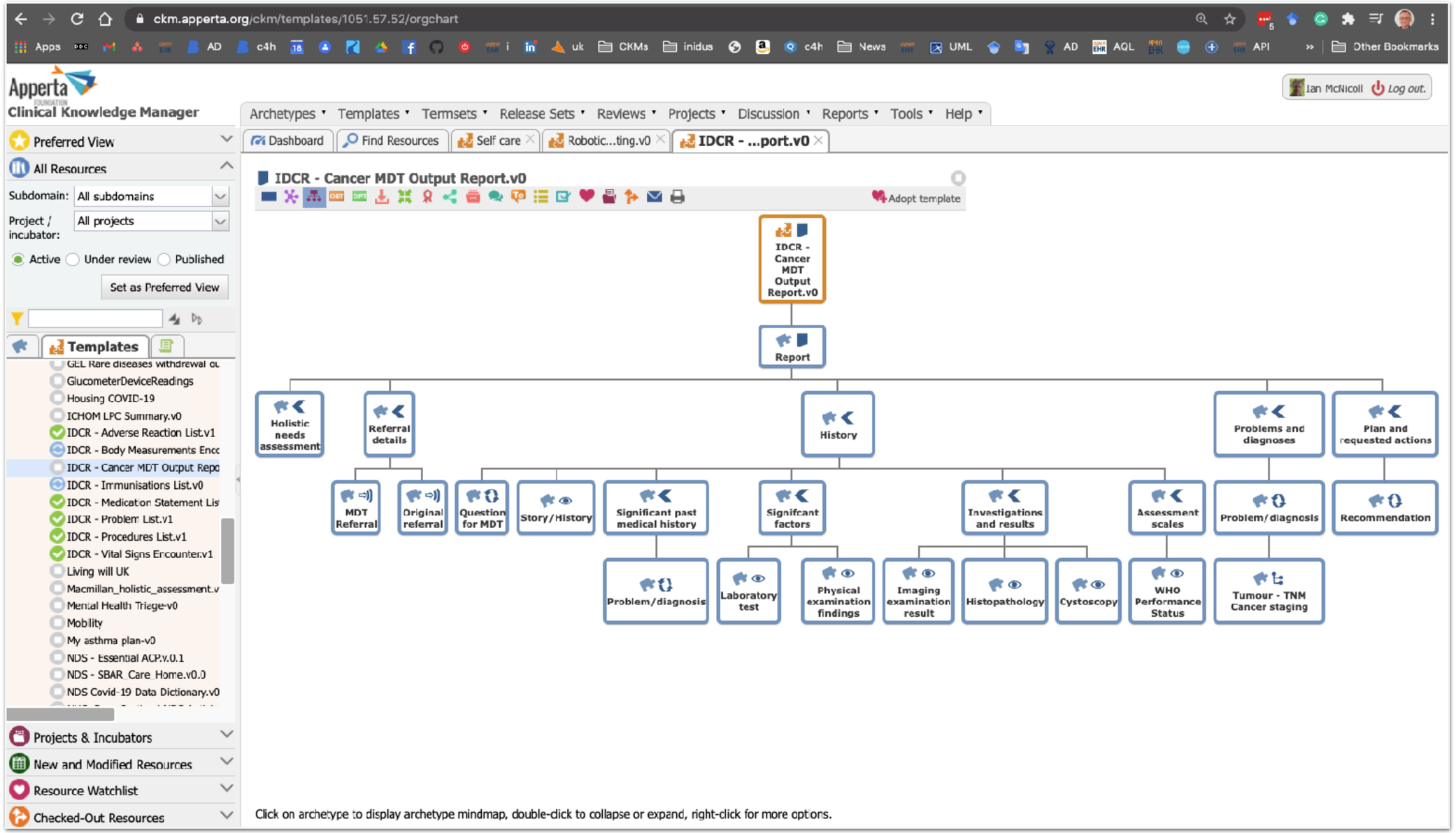
Cancer pathways / reporting - UK

openEHR



CKM - Collaborative review / publication

openEHR



CDR - Clinical data repository

openEHR

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

Ocean HEALTH SYSTEMS
Smart Data. Smart Care.

DIPS

better

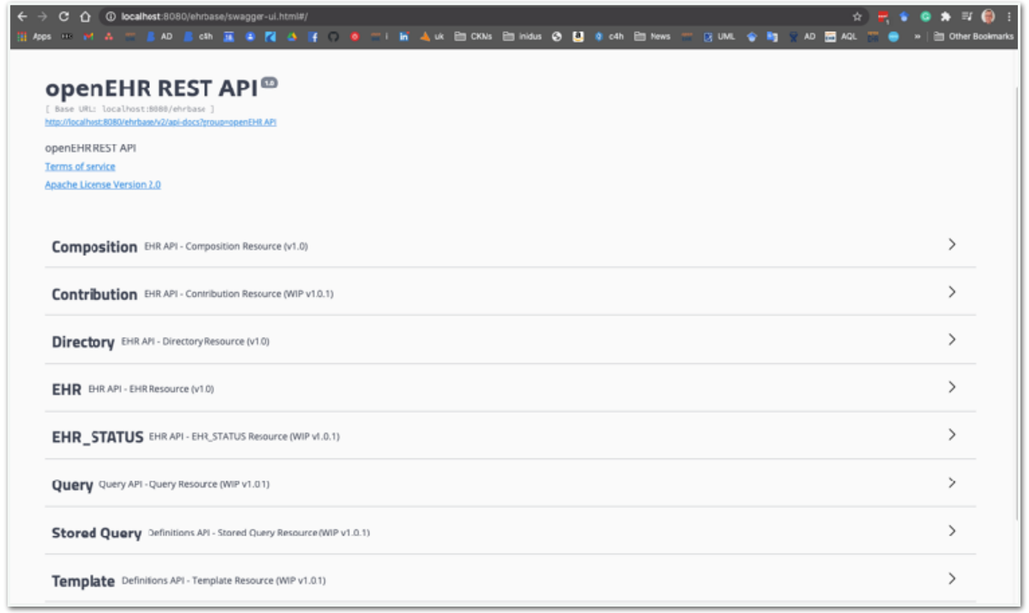
code 24 .NL

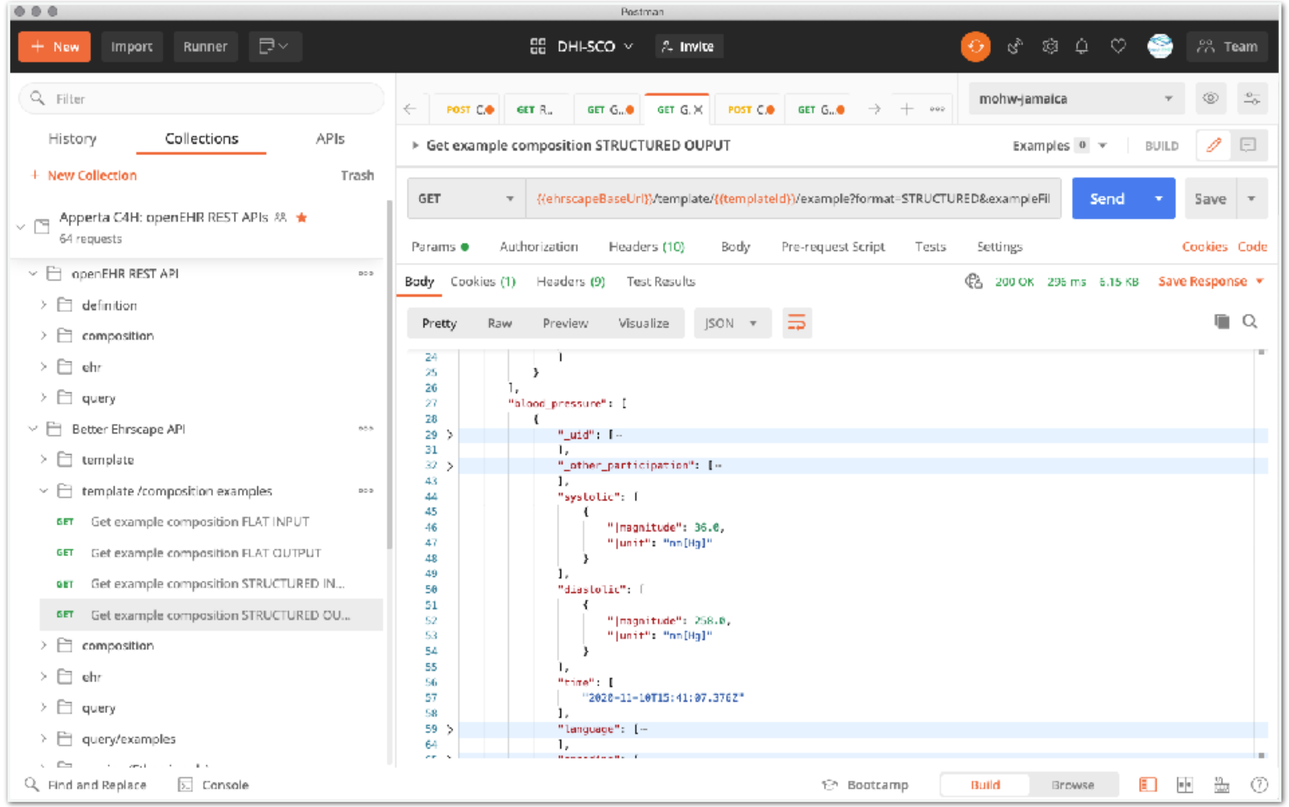
CaboLabs

EHRbase

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

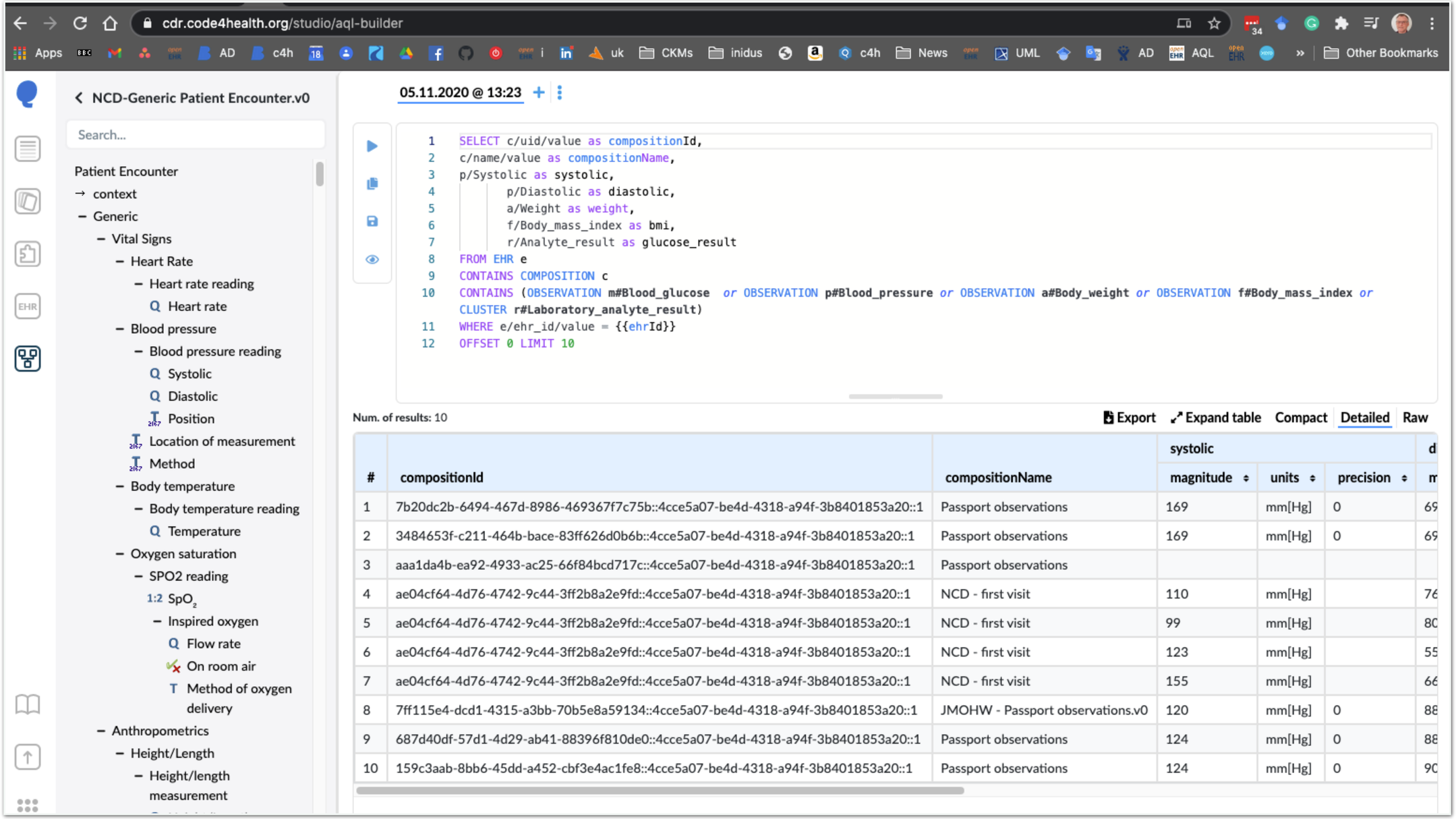
openEHR / ehrscape API





AQL - Archetype Query Language

openEHR



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			magnitude	units	precision	m
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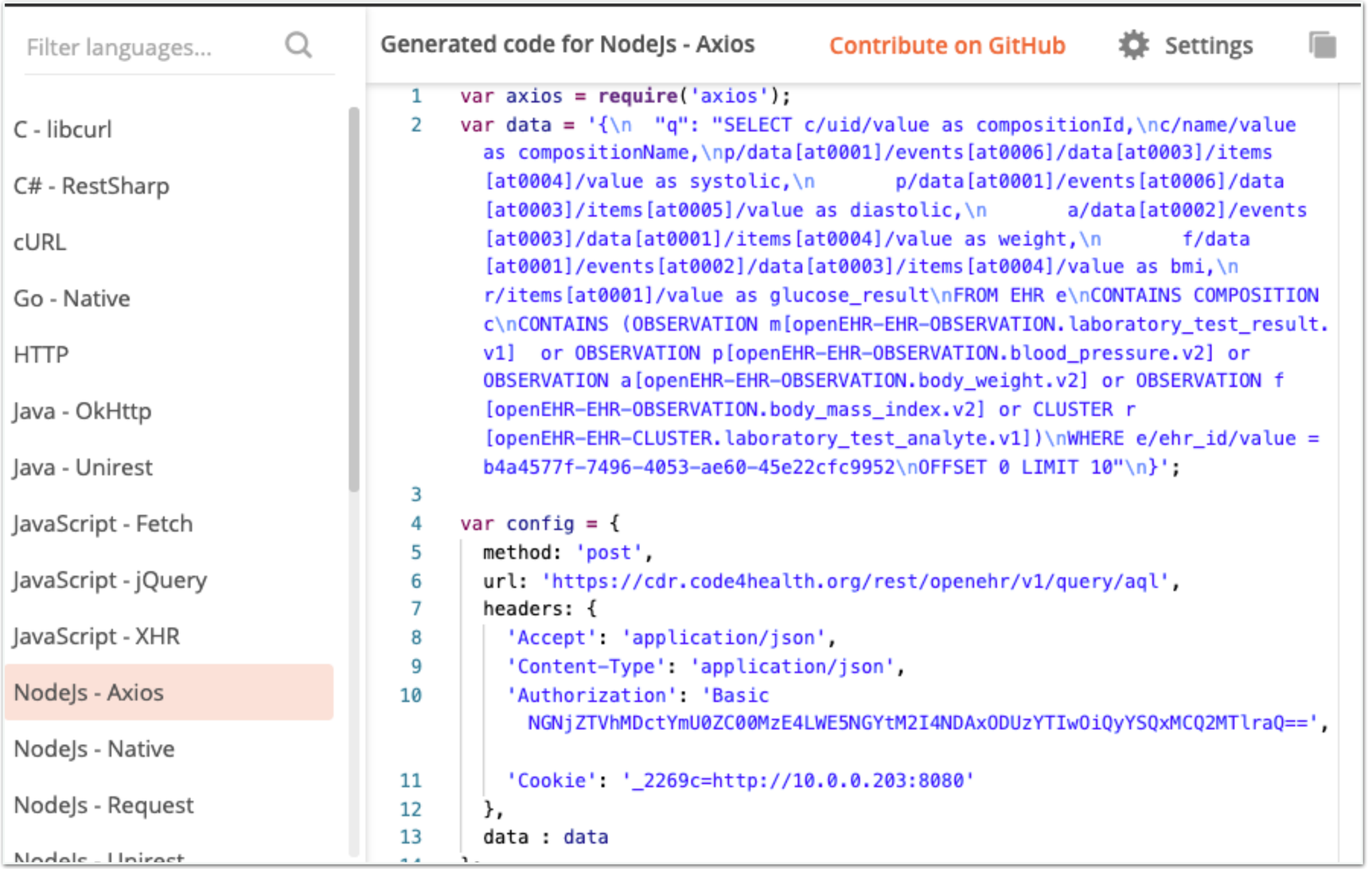
2	3484653f-c211-464b-bace-83ff626d0b6b::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations	169	mm[Hg]	0	69
3	aaa1da4b-ea92-4933-ac25-66f84bcd717c::4cce5a07-be4d-4318-a94f-3b8401853a20::1	Passport observations				
4	ae04cf64-4d76-4742-9c44-3ff2b8a2e9fd::4cce5a07-be4d-4318-a94f-3b8401853a20::1	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



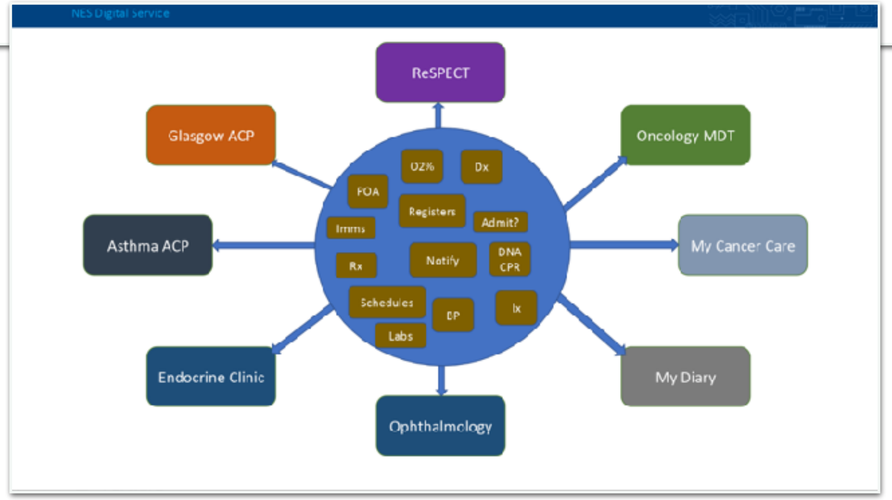
NHS Scotland: National Digital Platform

194. It is no longer acceptable in this age that our health service is still using multip 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…



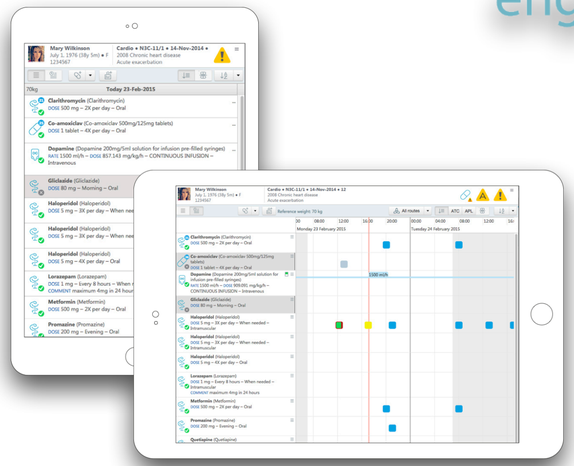
Open digital platform — 1 - 2 years

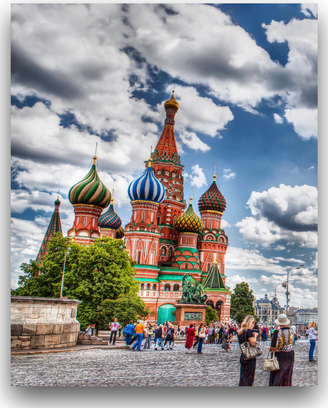
- Enhance the NHS Wales EMPI along open principles to facilitate a more developed Patient/Citizen identification strategy.
- Enhance the NHS Wales Integration and Interaction Engine to provide a truly open platform for NHS Wales.
- Focus the work of the National Data Resource (NDR) programme on the creation 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.

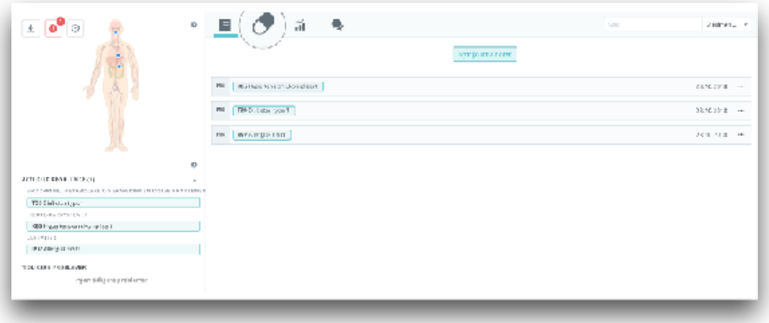
openEHR applications - at scale

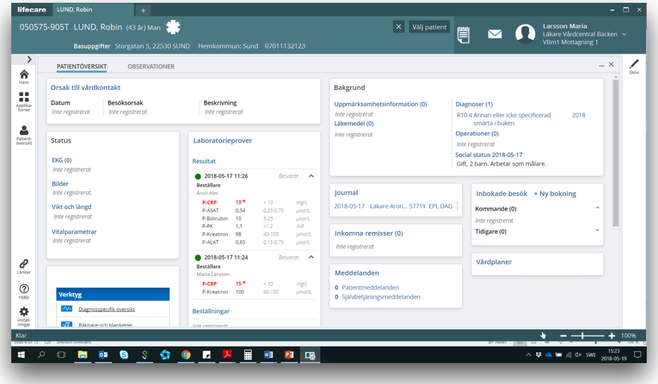
openEHR

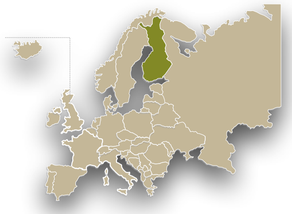
Genomics england

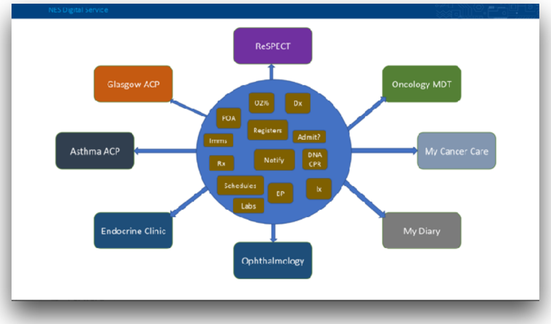






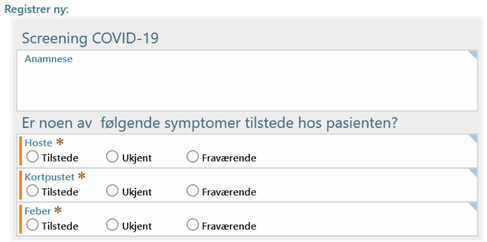


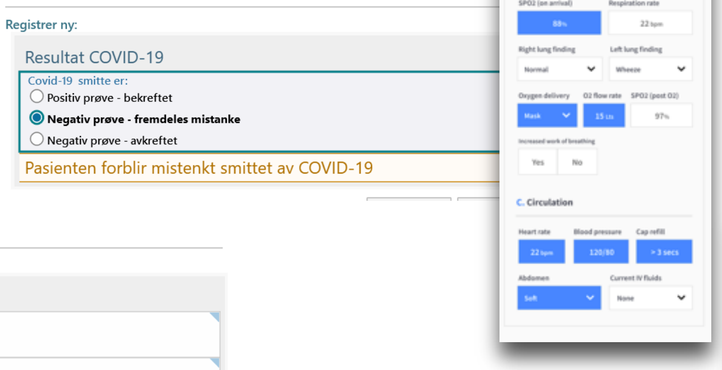


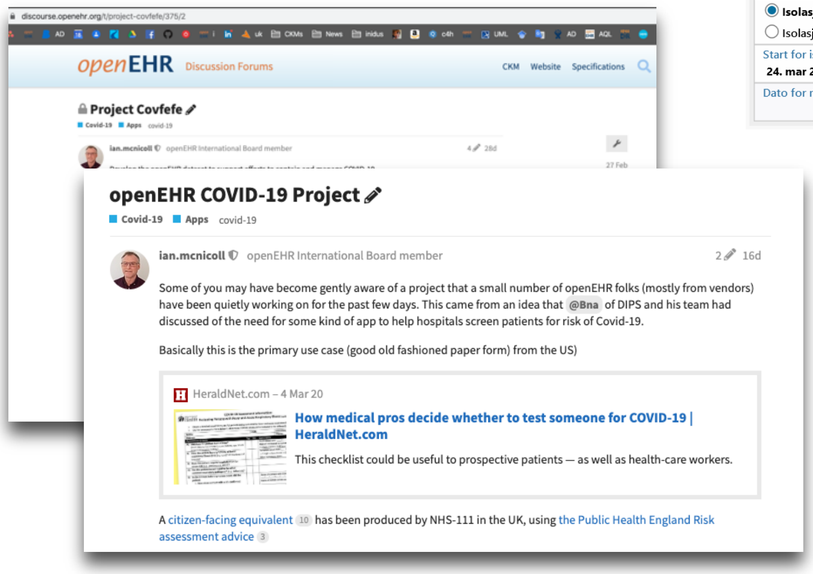


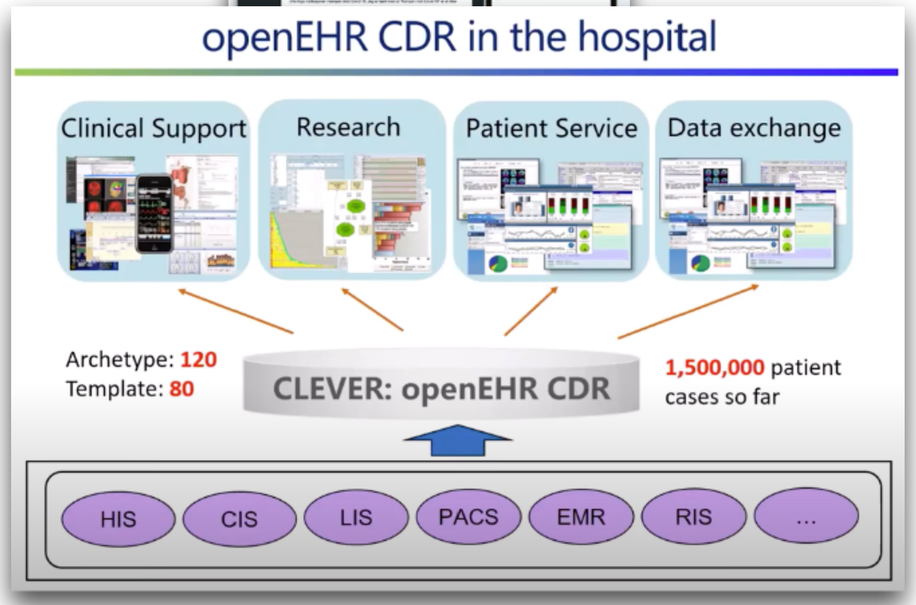
Covid-19

openEHR





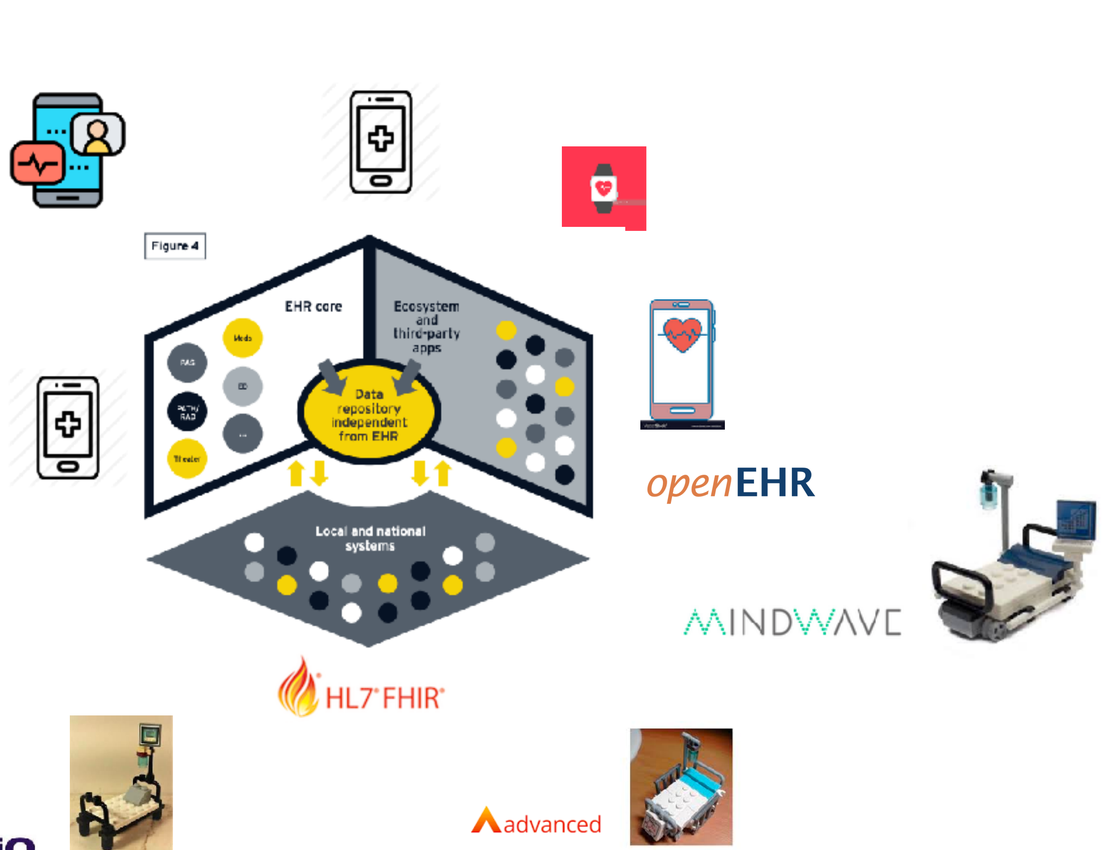


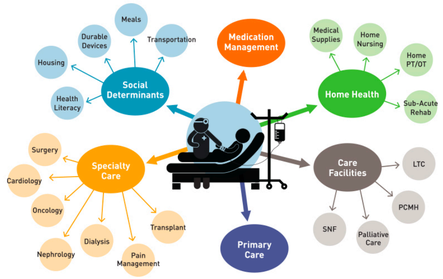


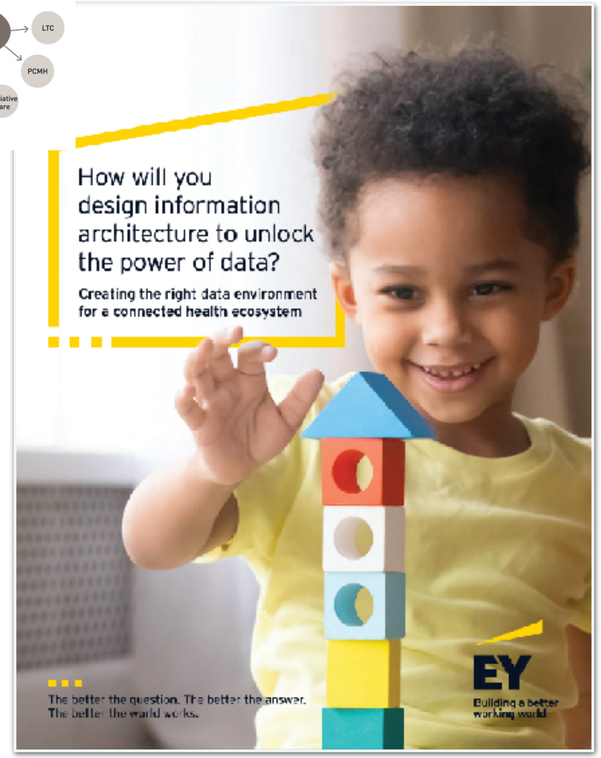
https://www.youtube.com/watch?v=oAzjHdiioDY&feature=youtu.be

EY - connected Health ecosystem

openEHR



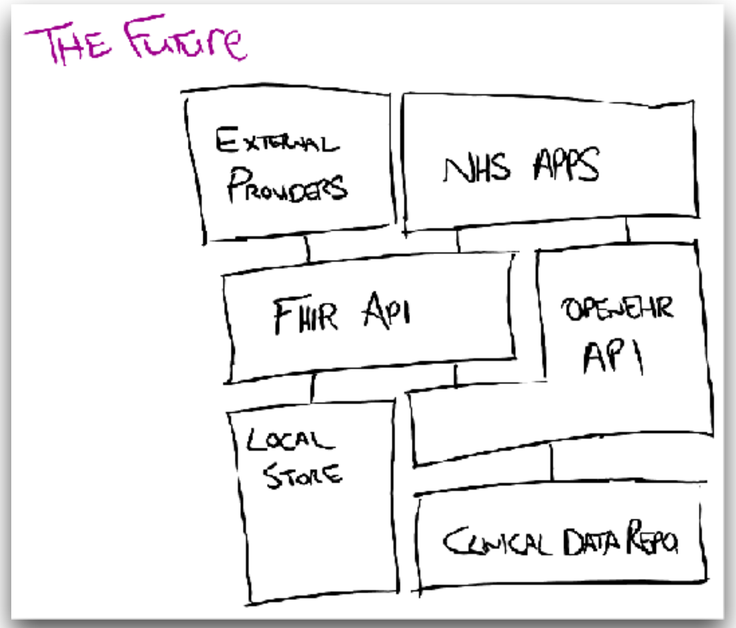


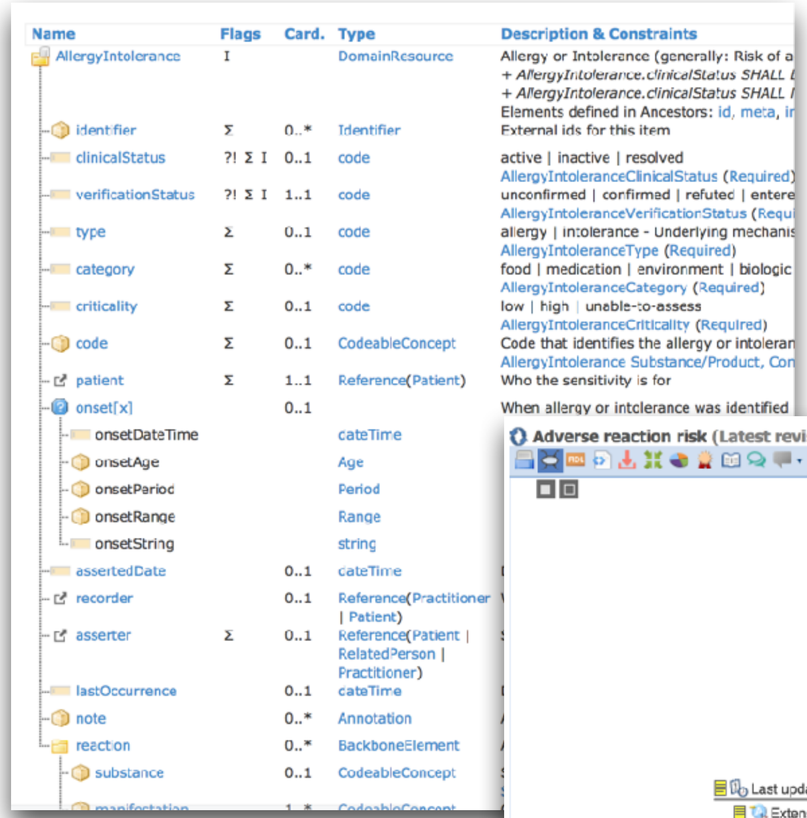


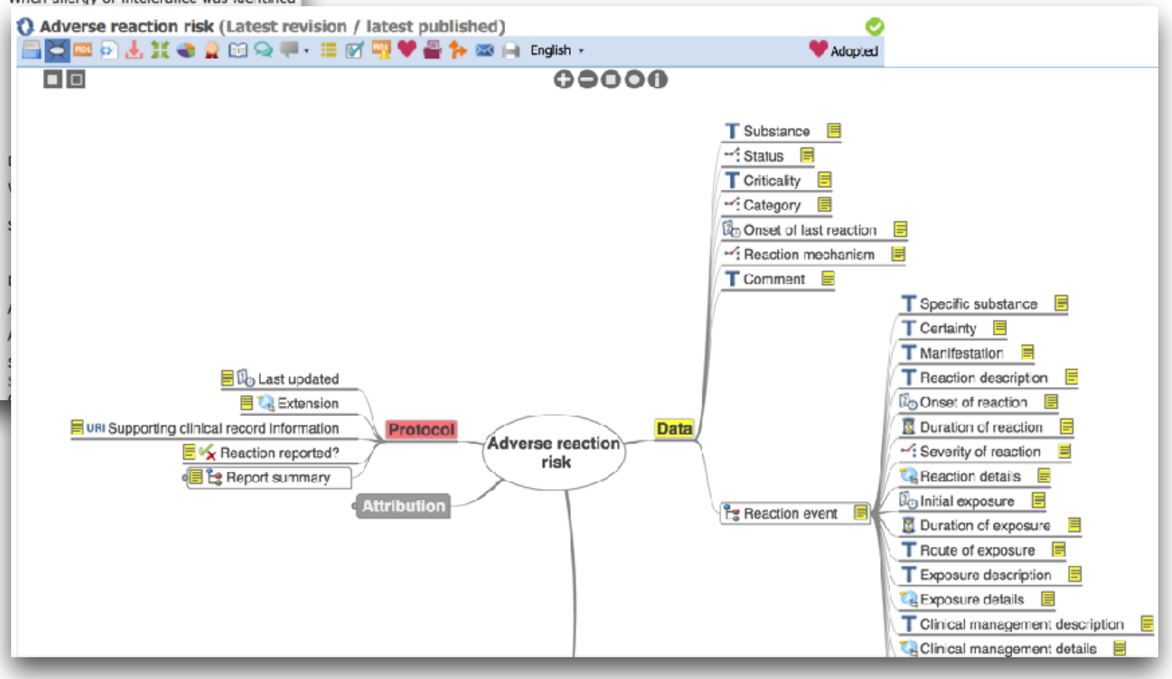
https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/health/ey-global-health-tech.pdf

Why not ‘just’ use FHIR?

openEHR







INTEROPen

FHIR® and openEHR

https://www.interopen.org/wp-content/uploads/2019/03/INTEROPen-openEHR-and-FHIR_March2019.pdf

openEHR ~~vs~~ + FHIR

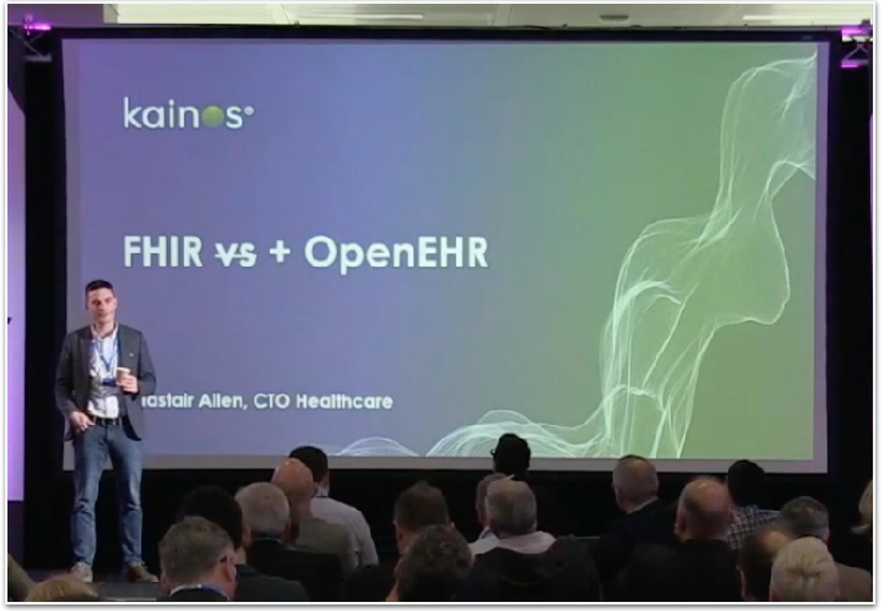
openEHR

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.

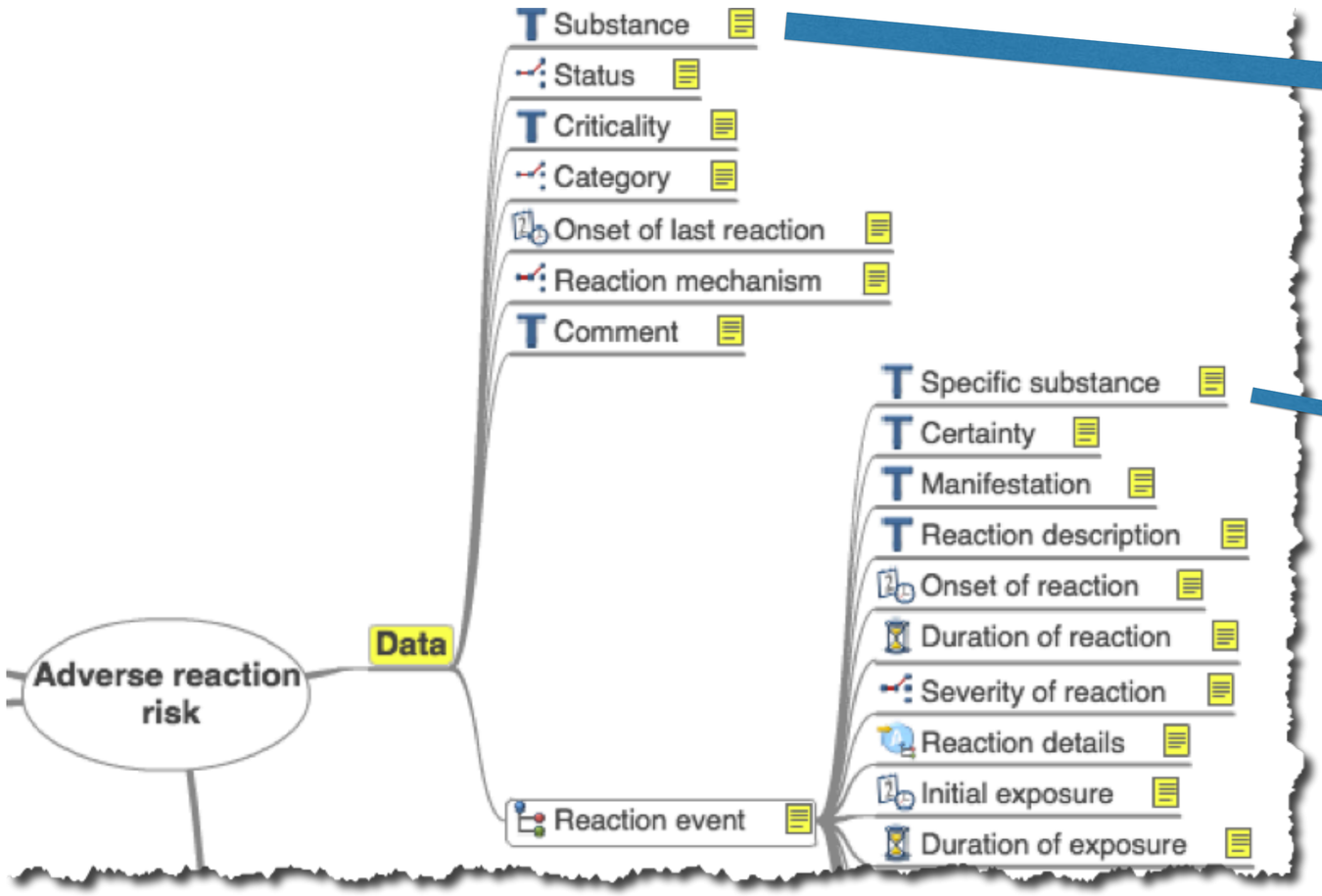


Alastair Allen, CTO Kainos:
The case for using FHIR
and openEHR

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

Why not ‘just’ use SNOMED CT?

openEHR

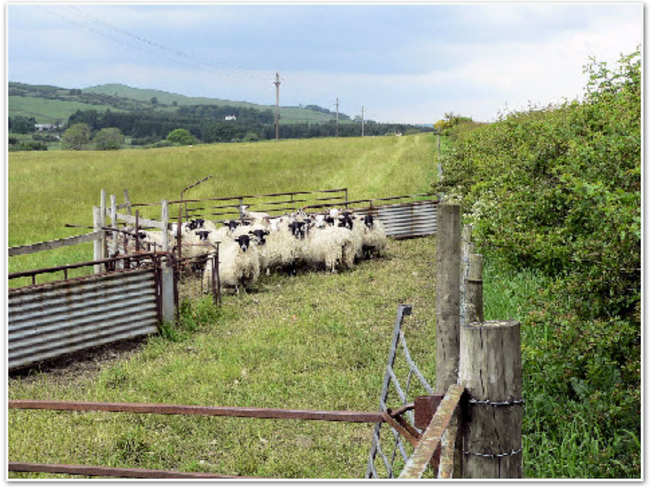


SNOMED CT
293585002
Salicylate allergy

SNOMED CT
42240000
Vomiting

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

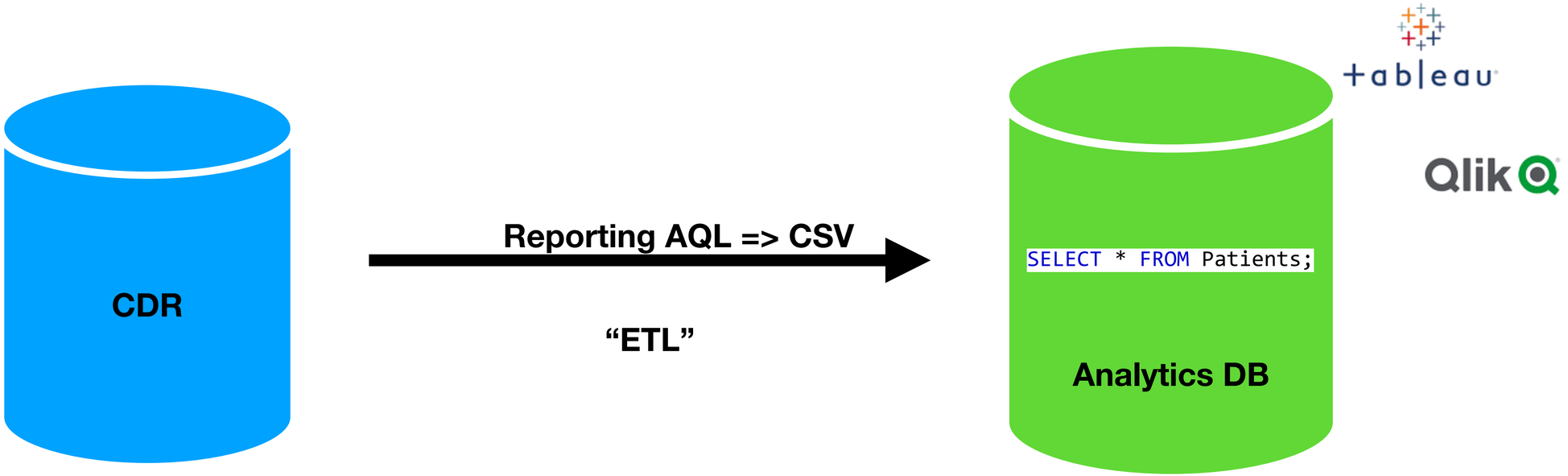
Ian McNicoll

AQL: Archetype Query Language

openEHR

	c					
	archetype_details		feeder_audit		howRU score	
			original_content	originating_system_audit	archetype_details	Re
#	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



Discovery process
Care Home data standards?

openEHR

nightingale hammerson — F1a- ASSESSMENT ON ADMISSION

RESIDENT'S NAME: UNIT:

ASSESSMENT ON ADMISSION
TO BE COMPLETED WITHIN 72 HOURS OF ADMISSION

Personal Cleansing	**Eating and Drinking**
(preferred personal hygiene routine, level of assistance needed)	(food preferences, sufficient fluid intake, usual meal pattern, food restrictions)
Personal Dressing	**Breathing**
(How often are the clothes changed, what are the individual's personal dressing habits?)	(include respiration rate)
Observations & Baseline	**Mobility**
(Anxious, withdrawn, distressed, Temp etc)	(assistance needed, limitations, abilities)
Sleeping Routines	**Elimination Urine and Bowels**
(usual sleep rest pattern, preferred time of rest/sleep, sedation)	(incontinence, catheters, size, bowel patterns, laxatives)

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

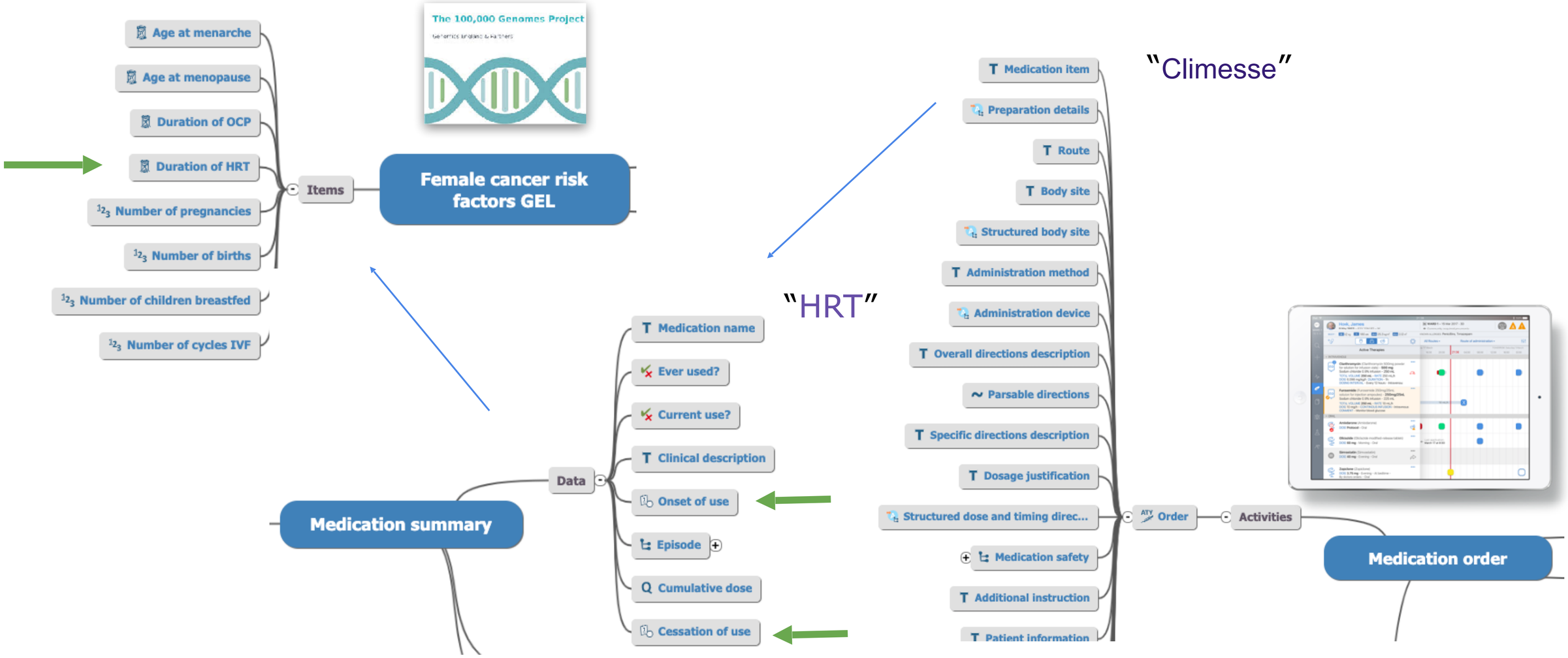
Lucy Johnston, David AG Henderson, Jo Hockley, Susan D Shenkin

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

Inventory No.	Area assessed	1	2	3	4	5	6
1	Dependency/ indicator of need	Augmented IoRN	IoRN	Dependency assessment	IoRN	IoRN	Organisation Form
2	Nutrition	MUST	MUST	MUST	MUST	Eating Well in Care homes/ Cook Safe	Organisation Form
3	Weight	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI	Kg/BMI
4	Incidence and risk of falls	FRASE	Organisation Form	Falls Risk	Falls Risk	Organisation Form	Organisation Form
5	Incidence and risk of pressure sores	Braden	Pressure Ulcer Cross/ PU Checklist/ Waterlow	Waterlow	Waterlow	Waterlow	Skin integrity Care Plan
6	Infections	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	Wounds (new and ongoing)	Internal Chart	STAR Classification	Wounds assessment	Chart on PCS	NHS Wound Assessment Chart	Organisation Form
8	Frailty	CIRC	SPAR Tool	Edmonton Frailty Scale	Clinical Frailty Scale	Not collected	Not collected
9	Bowel Movement(s)	Bristol Stool Chart	Bristol Stool Chart	Chart on PCS	Bristol Stool Chart	Bristol Stool Chart	Organisation Form
10	Fluid intake	Internal Chart	Organisation Form	Chart on PCS	Chart on PCS	Organisation Form	Organisation Form
11(a)	Mood: Depression	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)	Mood: Delirium	4AT	4AT	Not recorded	Not recorded	Care support plan	Not collected
12	Pain	PAINAD Doloplus2 Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale	Abbey Pain Scale
13	Movement	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	Sleep		Care Support Plan	Care Support Plan	Organisation Form	Organisation Form	Organisation Form
15	Observations/ Vital Signs	←----------		Various charts		----------→	

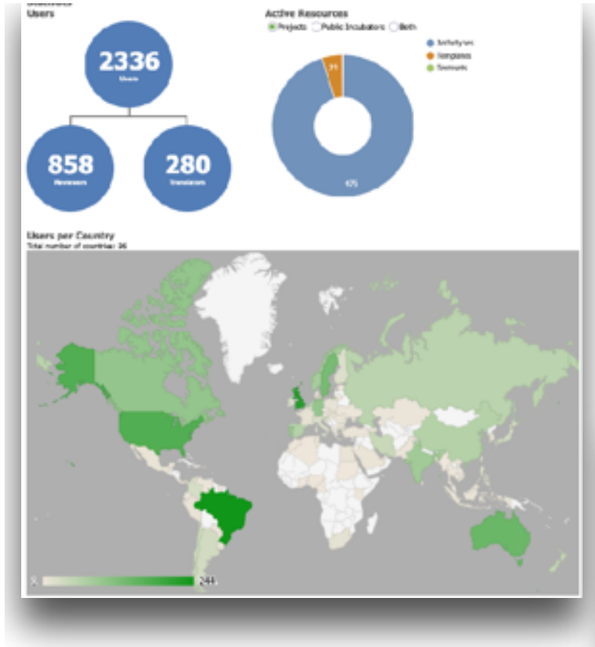
100K Genomics: “Duration of HRT”

openEHR



openEHR International : openehr.org

openEHR



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