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Workshop

Towards the next generation Electronic Health Record

28th of January 2025
Athens Digital Health Week (Athens, Greece)

Generalitat de Catalunya

Sistema de Salut de Catalunya

Background

Catalonia: A long tradition in the deployment of HIT

Published on 18.11.2024 in Vol 26 (2024)

Preprints (earlier versions) of this paper are available at https://preprints.jmir.org/preprint/58933, first published March 28, 2024.

A 25-Year Retrospective of Health IT Infrastructure Building: The Example of the Catalonia Region

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Abstract

Over the past decades, health care systems have significantly evolved due to aging populations, chronic diseases, and higher-quality care expectations. Concurrently with the added health care needs, information and communications technology advancements have transformed health care delivery. Technologies such as telemedicine, electronic health records, and mobile health apps promise enhanced accessibility, efficiency, and patient outcomes, leading to more personalized, data-driven care. However, organizational, political, and cultural barriers and the fragmented approach to health information management are challenging the integration of these technologies to effectively support health care delivery. This fragmentation collides with the need for integrated care pathways that focus on holistic health and wellness. Catalonia (northeast Spain), a region of 8 million people with universal health care coverage and a single public health insurer but highly heterogeneous health care service providers, has experienced outstanding digitalization and integration of health information over the past 25 years, when the first transition from paper to digital support occurred. This Viewpoint describes the implementation of health ITs at a system level, discusses the hits and misses encountered in this journey, and frames this regional implementation within the global context. We present the architectures and use trends of the health information platforms over time. This provides insightful information that can be used by other systems worldwide in the never-ending transformation of health care structure and services.

Source: https://www.jmir.org/2024/1/e58933

Digital Health Strategy 2024-2030

Integrated, people-centred care, supported by an information systems model that systematically leverages health data to build value-added services, that fosters innovation and is built on a collaboration model based on open standards

1. Construction and deployment of the new **Catalan Electronic Health Record**.
2. Deployment of an information systems model based on the **open platform paradigm**.
3. Deployment of **innovation** through the systematic use of health data.
4. Establishment of a governance model for information systems with the **participation** of all stakeholders within the Catalan health ecosystem.

Context

Using scientific methods to inform policy

- Mixed methods study to guide the definition of the future Catalonian Electronic Health Record – Ethics Approval Reference: PR141/24 at the Biomedical Research Institute of Bellvitge (Barcelona, Spain)

    1. Delphi consensus on the future of information systems in the Spanish NHS.
    2. Co-defining the future healthcare delivery model and the health information technologies paradigm to support it.
    3. National survey on the satisfaction with current Electronic Health Record systems.
    4. Workshop “Towards the next generation EHR” at Health & Tech Summit 2024 (Paris, France).

Once upon a time…

A promise long time overdue?

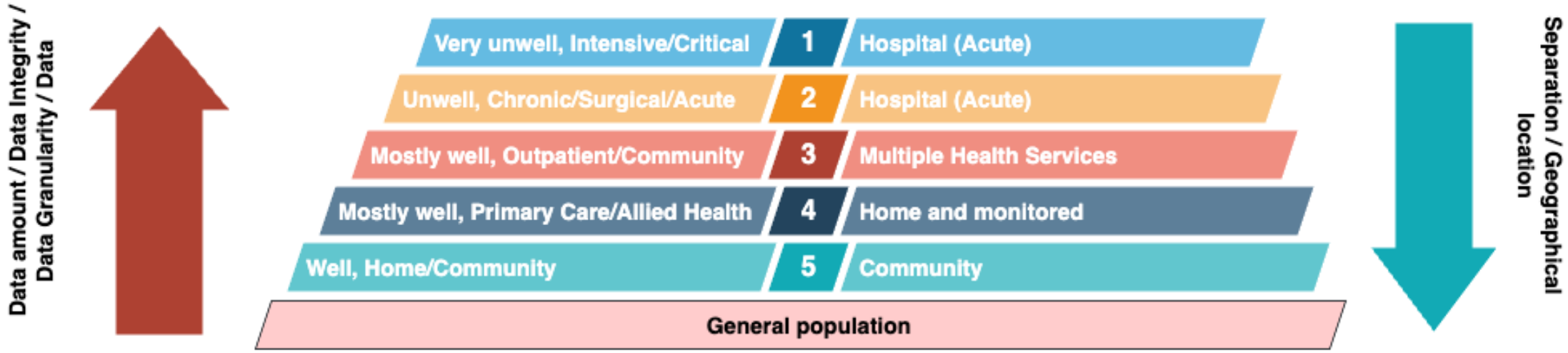
"… fundamental changes in health delivery with the main objective to improve the quality of care focusing on six qualities of care: Safe, Effective, Patient-centred, Timely, Efficient and Equitable".

"… to achieve the main objective, the care processes need to be redesigned and a ***strong investment in health information technology is required****. The focus of this investment has to be on supporting care processes in the context of the Internet revolution to* ***foster access of health information by all stakeholders****…".*

Source: Crossing the Quality Chasm (Institute of Medicine, 2001).

Where is health data produced?

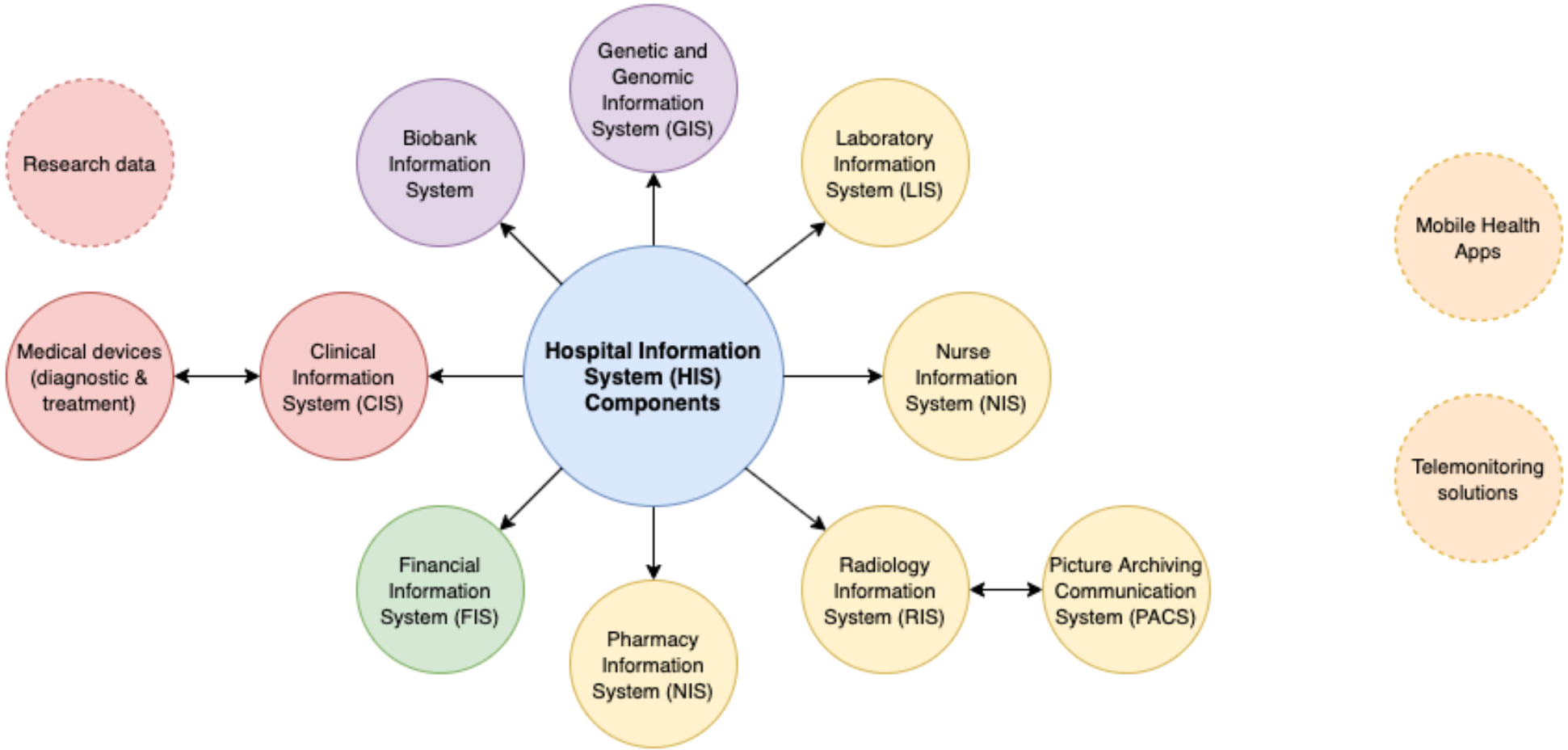
Quantity vs quality vs origin



Source: NIH Grant application (Jordi Piera-Jiménez et al, 2021).

EMRs continue to be the main source of information

A system of systems



Source: Digital Health Strategy for Catalonia 2018-2022 (Jordi Piera-Jiménez, 2018).

Some of the known problems related to health data quality and the EMRs

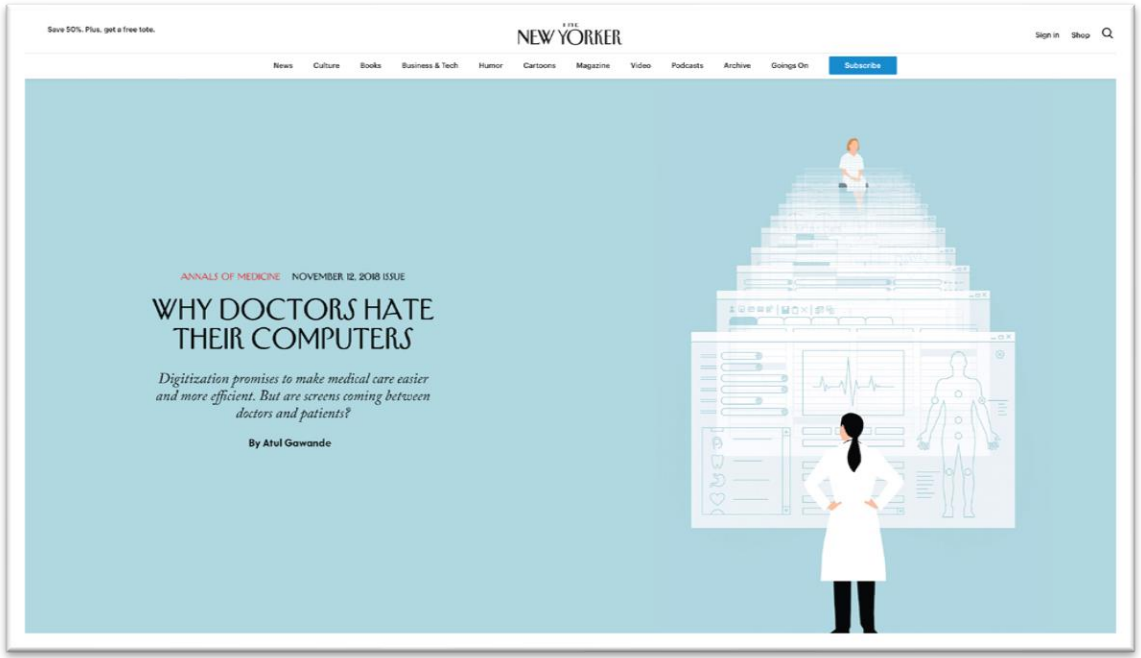
My personal take on this

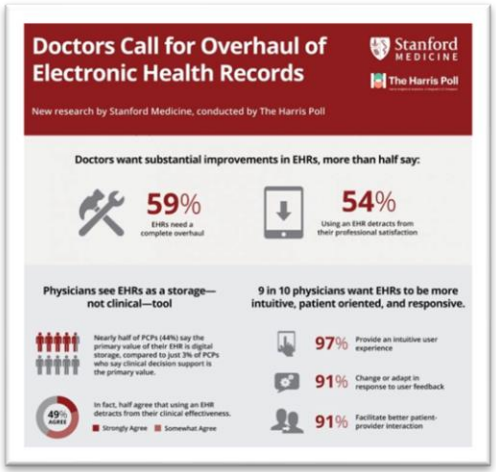
- **Bad engineering of the EMRs**
  - UX/UI (data entries, structured vs non-structured, care pathways, etc.)
  - Lack of usage of standard terminologies and vocabularies
  - Data models (proprietary, lack of metadata, etc.)
  - Data persistence (relational databases)

- **Cultural**
  - Lack of training
  - Copy-pasting

- **Organisational**
  - Lack of time to properly document

Maybe this was expected





Data silos in healthcare

Something we all know

Using Catalonia as an example:

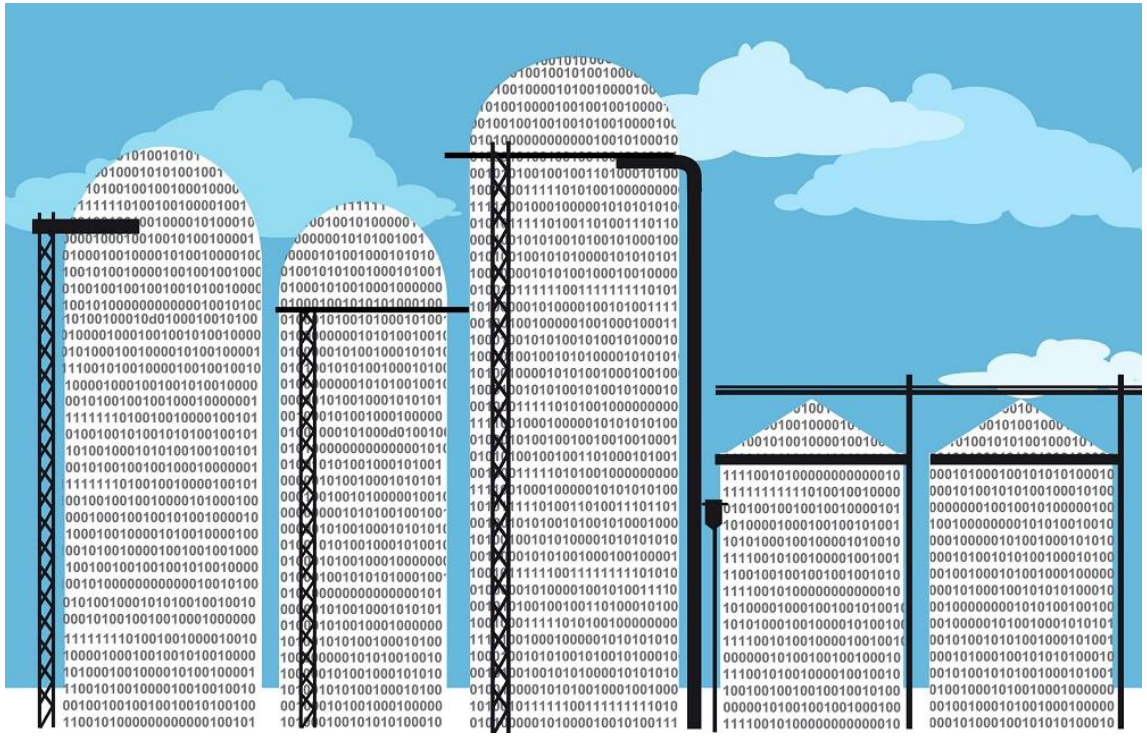
- 69 hospitals and 29 different EMR products
- Each tertiary hospital has around 600-800 silos of information
- Each secondary hospital has around 400-500 silos of information
- Our prospections indicate us we have more than 16k silos of patient-related information
- Huge heterogeneity of proprietary data models

Source: https://link.springer.com/article/10.1007/s40264-018-00793-z

Data silos in healthcare

Maybe the most important barrier

- The average hospital uses over 400 different digital applications, each creating its own isolated data repository
- Clinical data, administrative data, research data, and patient-generated data live in separate universes, making it impossible to create a complete patient journey
- Department-specific workflows create resistance to data sharing, even within the same organisation
- Point-to-point integrations become exponentially complex and expensive to maintain



Source: Aleutie/Dreamstime.com

Data is not understood even when connecting the same vendor system

Surprise surprise

> J Am Med Inform Assoc. 2022 Apr 13;29(5):753-760. doi: 10.1093/jamia/ocab289.

Quantitating and assessing interoperability between electronic health records

Elmer V Bernstam [1 2], Jeremy L Warner [3], John C Krauss [4], Edward Ambinder [5], Wendy S Rubinstein [6], George Komatsoulis [6], Robert S Miller [6], James L Chen [7]

Affiliations + expand

PMID: 35015861 PMCID: PMC9006690 (available on 2023-01-07)
DOI: 10.1093/jamia/ocab289

- Allscripts
- Varian Medical Systems
- General Electric
- Cerner
- Epic Systems
- IntrinsicQ
- Elekta
- NextGen
- Flatiron Health

As defined in the study, ***intra-vendor interoperability*** refers to the ability to share information between instances of the same vendor's product (e.g., Epic > Epic). ***Inter-vendor interoperability*** refers to the ability to share information between instances of different vendor products (e.g., Epic > Cerner)."

A recent study of EHR interoperability found that **68% of data was "understood" when exchanged across different sites using the same vendor**, but only **22% was "understood" when exchanged across different EHR vendors.**

Discussion: *"In contrast to data elements required for successful billing, clinically relevant data elements are rarely standardized, even though applicable standards exist."*

About connecting systems in healthcare

Feels a bit patchy, don't you think?

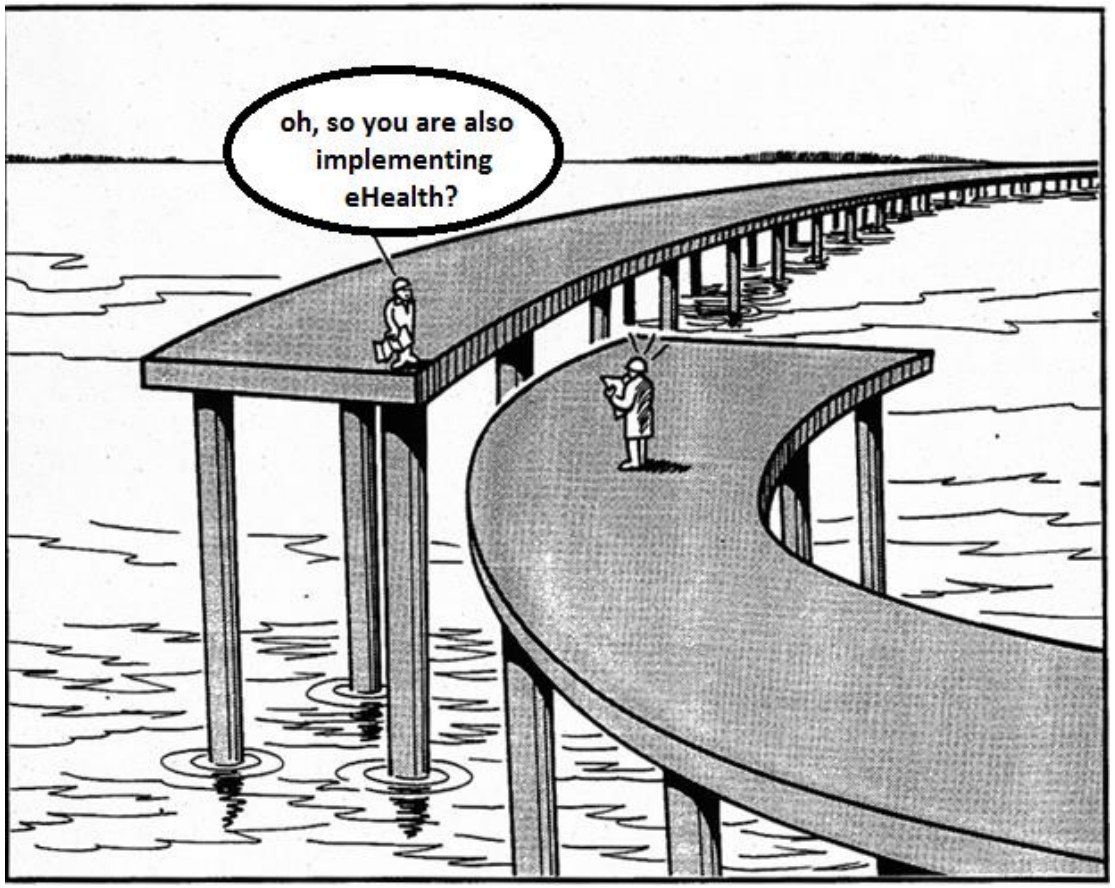
Interoperability

FHIR

- Interoperability is bad: get the systems to agree on content up front
  - Still have protocol challenges etc
- In general, the earlier you can agree, the better off everyone is
  - Healthcare is characterised by being unable to agree
  - Messy interoperability isn't going away

8

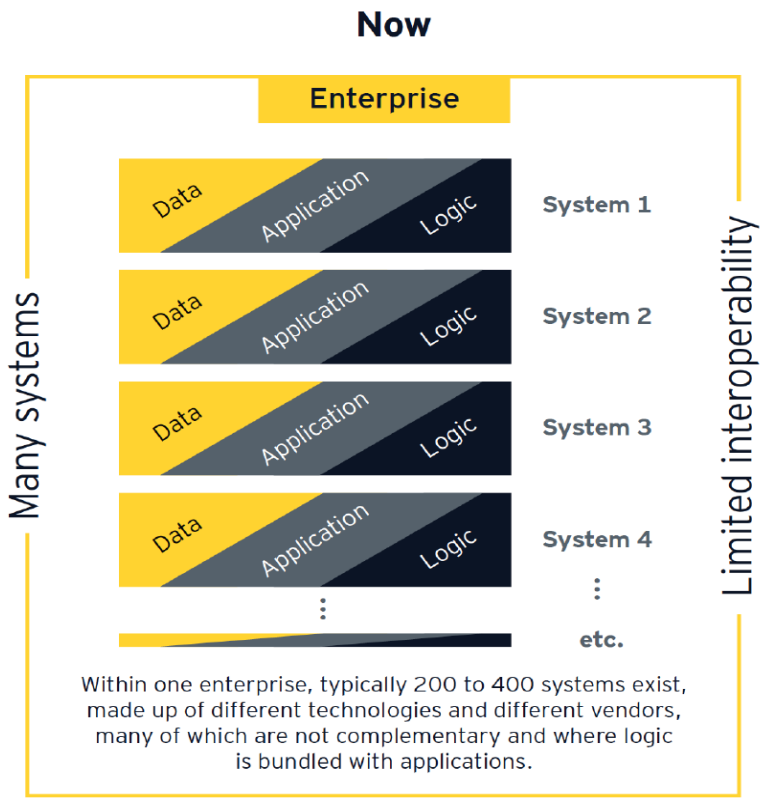
Source: Graham Grieve (HL7-FHIR) podcast with Sidharth Ramesh 2024.



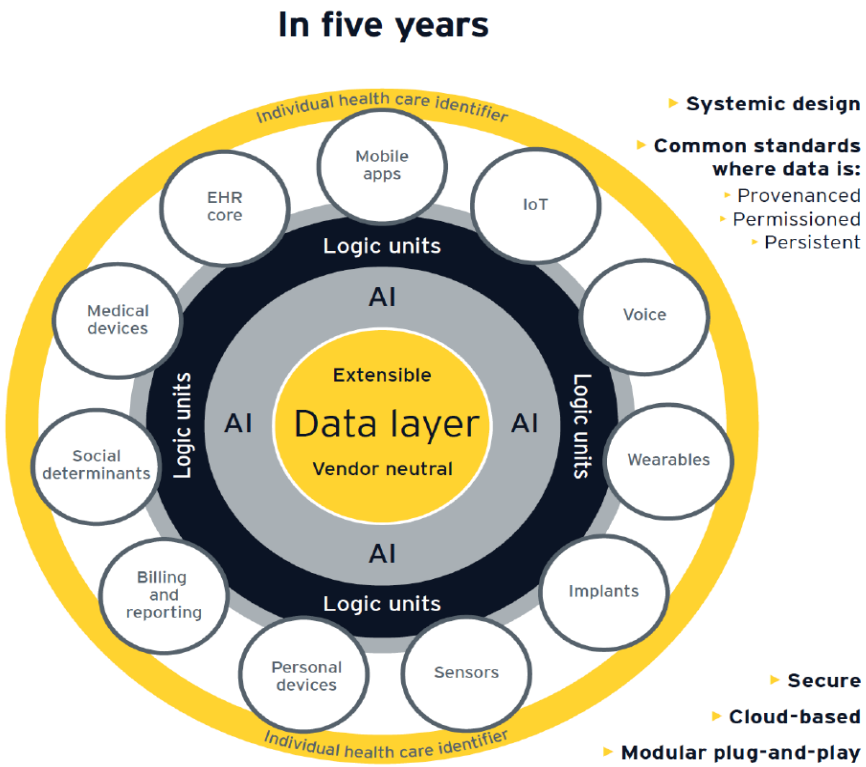
Source: Ed Simons (Nijmegen University), David Baker (CASRAI) and Josh Brown at euroCRIS meeting in Amsterdam 2014.

What is this all about?

Current vs future view



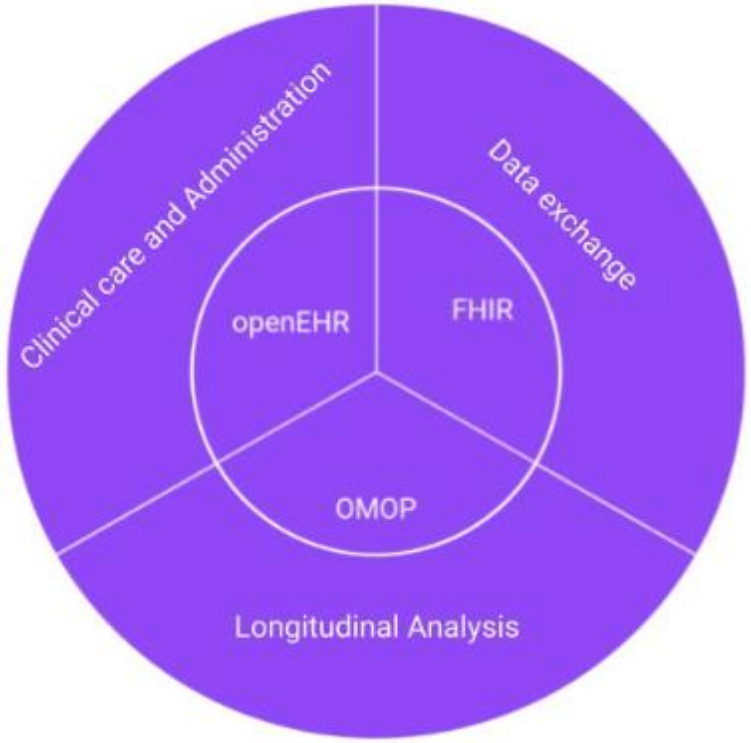
Present: Many systems all with intimately bound data logic and applications



Future: A cohesive technology stack, giving a unified experience for clinicians, professionals and patients; unique data at the center accessed by applications in real time through micro-services

A meaningful use of standards

Let’s use each standard for the purpose it was designed



Source: Tsafnat G, Dunscombe R, Gabriel D, Grieve G, Reich C. Converge or collide? Making sense of a plethora of open data standards in healthcare: an editorial. Journal of Medical Internet Research.

The postmodern EHR Approach

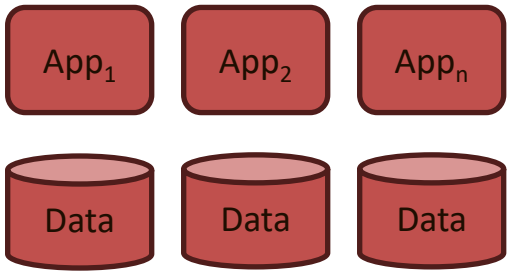
- Full data fluidity and pathways that span health and care domains
- A unified and life-long clinical data repository (CDR) designed on open-data standards
- Support for full interoperability between vendors, technologies, and applications
- Vendor neutral
- Applications with a “care-team-driven” user experience
- Agile and modular

Kanthan Theivendran
@KTheivendran

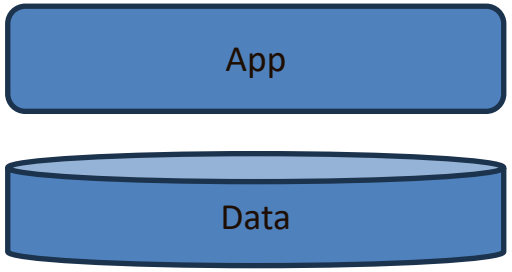
EMR/EHR models

Visual representation

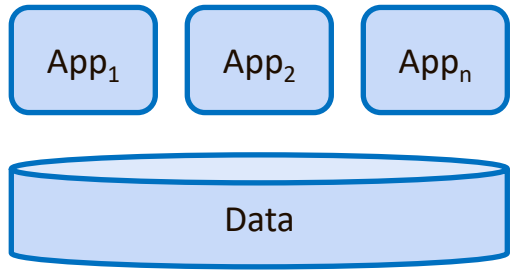
First generation
"best of breed"
(Standalone)



Second generation
"best of suite"
(Mega suite or monolith)



Third generation
"open platform"
(Open ecosystem or best of breed 2.0)



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