The Digital Health Strategy for Catalonia:
the role of openEHR and FHIR in the construction of the new EHR

HiGHmed SYMPOSIUM 2021

“Digitalization in the healthcare system: openEHR and FHIR – friends or foes?”

Berlin, 14th October 2021

Generalitat de Catalunya
Departament de Salut

/Salut

Highlights on Catalan Health System

7,722,203

Population in Catalonia on January 1, 2020.

Universal coverage

The publicly health care system of Catalonia was founded in 1990 under the principle of universality; so all individuals and communities are able to receive the health services.

10,000 M€

Catalan Health Service budget for 2020. The system is funded from general taxation and government founds and contributions.

> 160

Health care entities to provide health care services.

>16,000

Applications across the Catalan Health System:

- ✓ 1 EMR for primary care.
- ✓ > 29 EMR products for hospitals.
- ✓ At least 10 different systems for social care records.

999

Facilities that range from primary health care centres to hospitals and intermediate care centres.

- 71 hospitals (9 big third level)
- 369 primary care centres
- 96 intermediate care centres
- 41 mental health centres (including hospitalization unit)
- 422 other resources (rehabilitation centres, etc.)

The Catalonian Digital Health Platform

Health care platforms in Catalonia

Primary care EMR (1 product)

Hospitals intermediate care EMRs (29 products)

Social care records systems

National Patient Index (RCA)

7,697,069 people (2021)
+ 43,224 previous year

Electronic Prescribing (SIRE)

416 M of prescriptions
37,000 health care professionals as users
1,346 M dispensing of medicines

Shared Electronic Health Record (HC3)

> 600 M documents
> 70% structured information

Personal Health Portal (LMS)

> 4.5 M citizens

Care Process Management (IS3)

> 15,6 M referrals

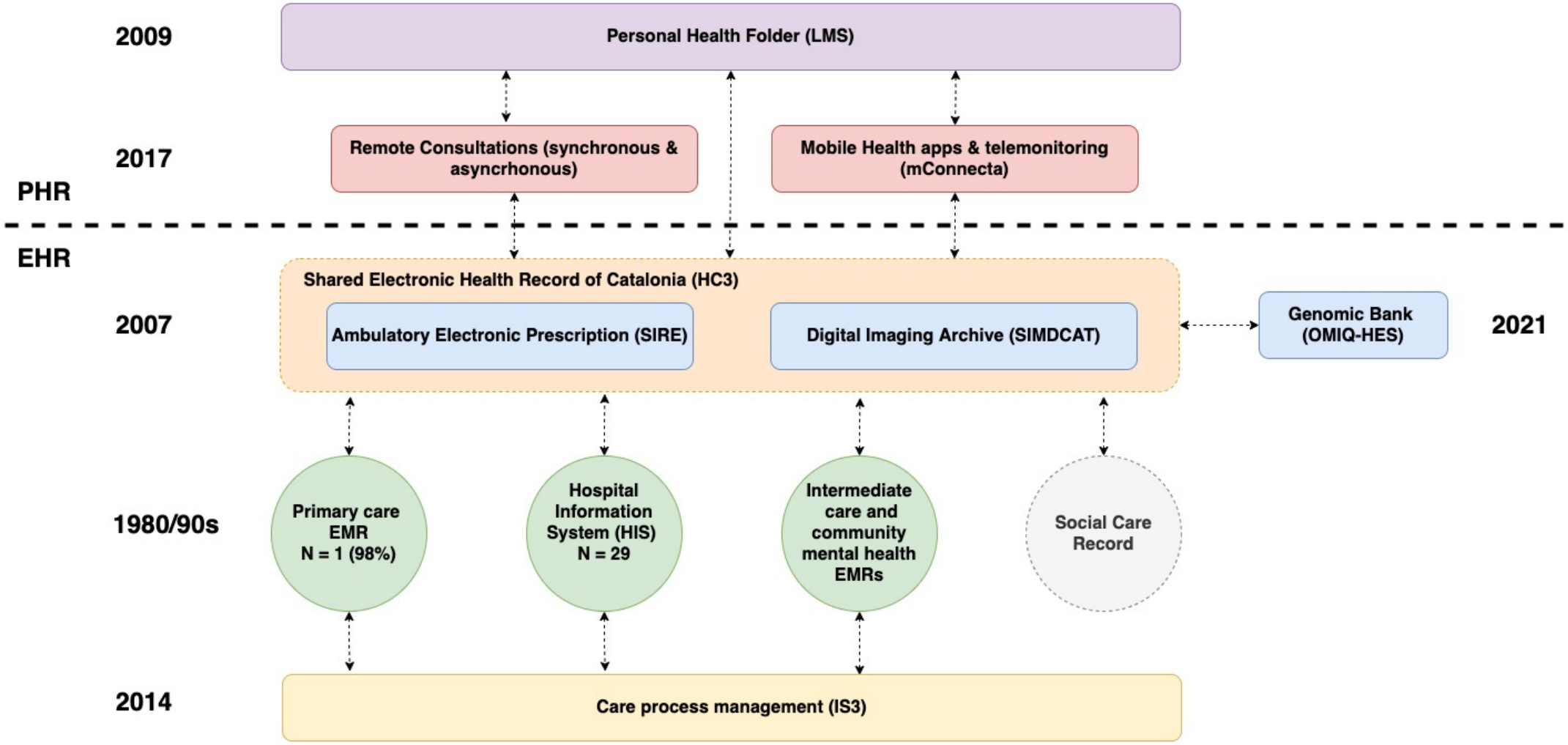
Central PACS System (SIMDCAT)

> 5,000 M images

Remote Consultations

> 12 M

The Catalonian Digital Health Platform: components view



The primary care information system

- We started the development in year 1985
- Split among 22 databases and with more than 2k tables
- Runs in Oracle Forms and Visual Basic
- Gazillions of functionalities -> Frankenstein & X-mas tree
- Integrates all the information from the Shared EHR
- There is nothing alike in the market

The hospital information systems

- 71 hospitals and 29 different vendor products
- Each tertiary hospital has around 800 silos of information
- Each secondary hospital has around 400 silos of information
- Our prospections indicate us we have more than 16k silos of patient related information being the EMRs the biggest source (and growing fast due to digital health solutions)
- Proprietary data models & semantic incoherence

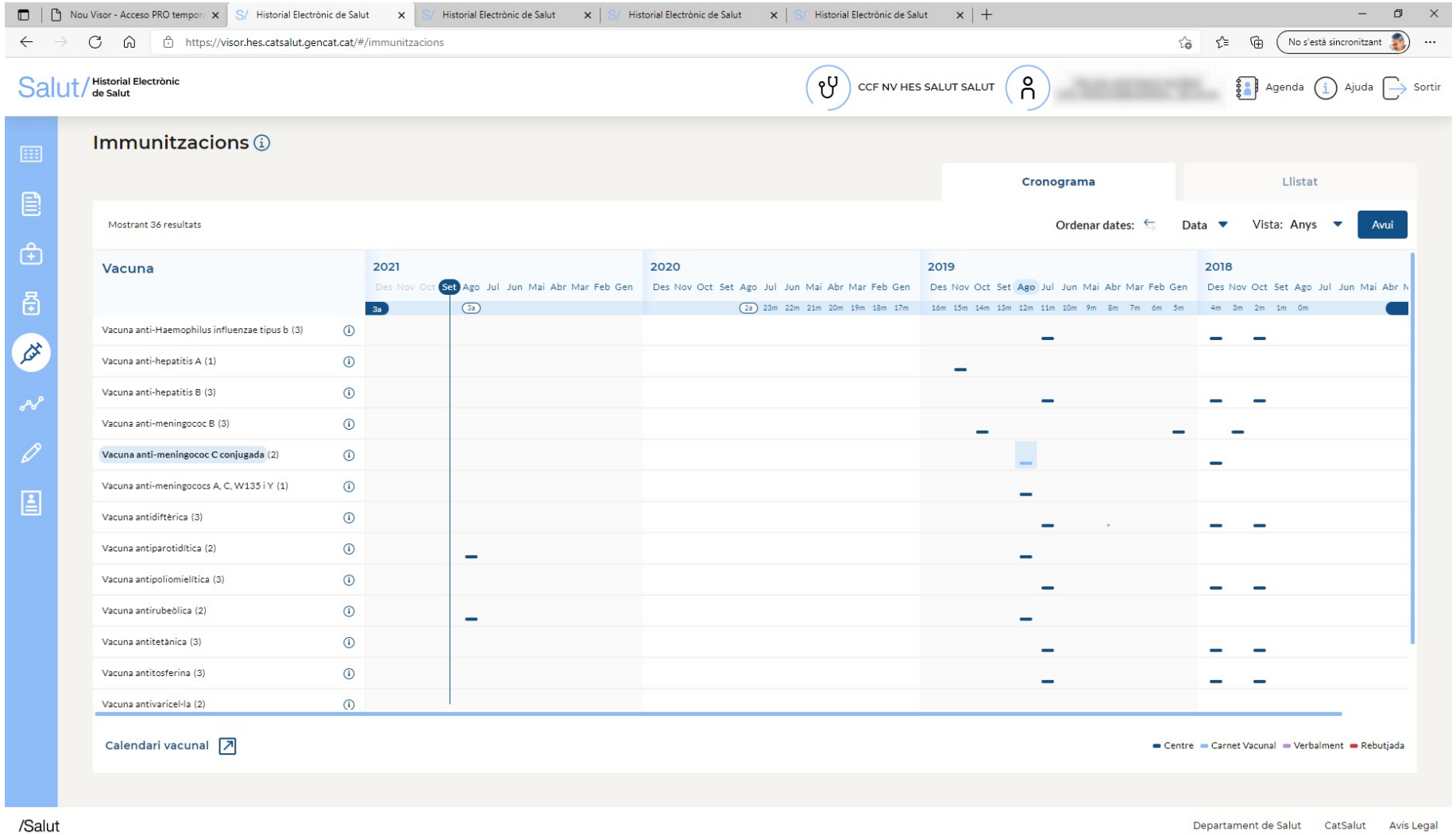
Shared Electronic Health Record of Catalonia

Type of information	Structured?	Observations	Standard
Documents	No	clinical reports, imaging-related reports, complementary test reports, laboratory reports, and pathological anatomy	SNOMED-CT (only the document type)
Medical images	No	WS to publish the medical images taken at the centres and previously registered from SIMDCAT	SERAM/SEMNIM
Pathological anatomy results	Yes	data of the samples and results (conclusions) of the same	SNOMED-CT
Clinical laboratory results		laboratory determination data	LOINC
Immunizations	Yes	data on administered vaccines	SNOMED-CT
Diagnostics	Yes	Health problems and allergies identified by health centres	ICD-9 and ICD-10
Chronic markers	Yes	identification of chronic patients (PCC/MACA)	Propietary
Spirometry	Yes	collection of spirometry test data	SNOMED-CT
Cancer screening	Yes	data from breast and colon/rectal cancer screenings	SNOMED-CT
Agendas	Yes	information on visits planned by citizens in health centres	Propietary

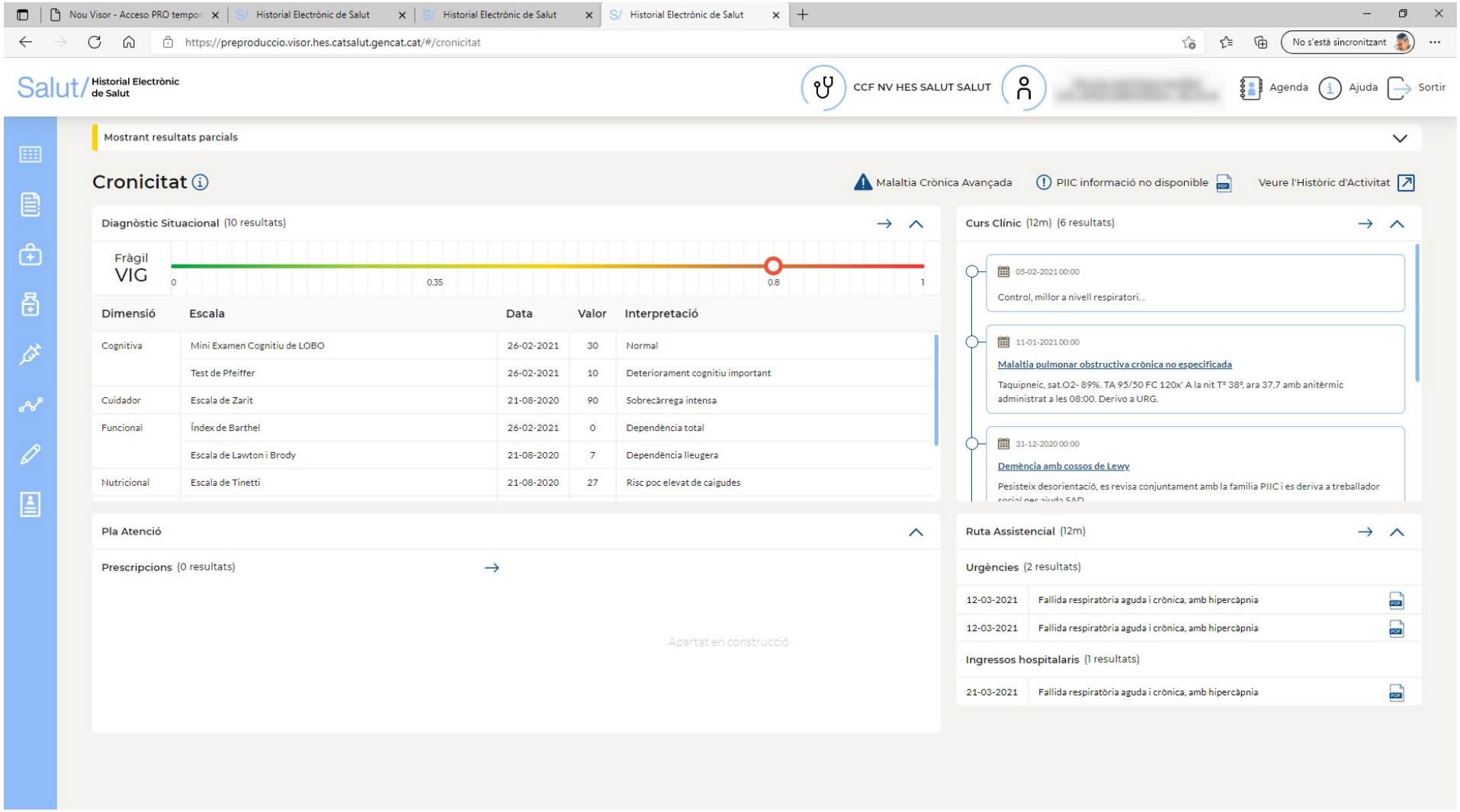
Shared Electronic Health Record of Catalonia (2)

Type of information	Structured?	Observations	Standard
Clinical parameters	Yes	data on clinical variables or functional assessment scales	SNOMED-CT
Clinical Course	Yes/No	it is semi-structured information because the content of each section of a clinical course is not structured information	Propietary
DAIA Warnings	No	Non-persistent information to HC3 of the alerts of files opened by the DGAIA - RSA	Propietary
Organ Donation Notice	No	Non-persistent information in HC3 of the official resgistre of organ donors - RSA	Propietary
Notice of last wills	No	Non-persistent information at HC3 official register - RSA	Propietary
Social consent	Yes	information of citizens who have given consent to intercavniate health and social data	Propietary
Social Data	No	Non-persistent information in HC3 of social data of the city councils	Propietary
Risk stratification	Yes	information on the GMA classification and the risk of mortality and urgent admission of citizens	Propietary

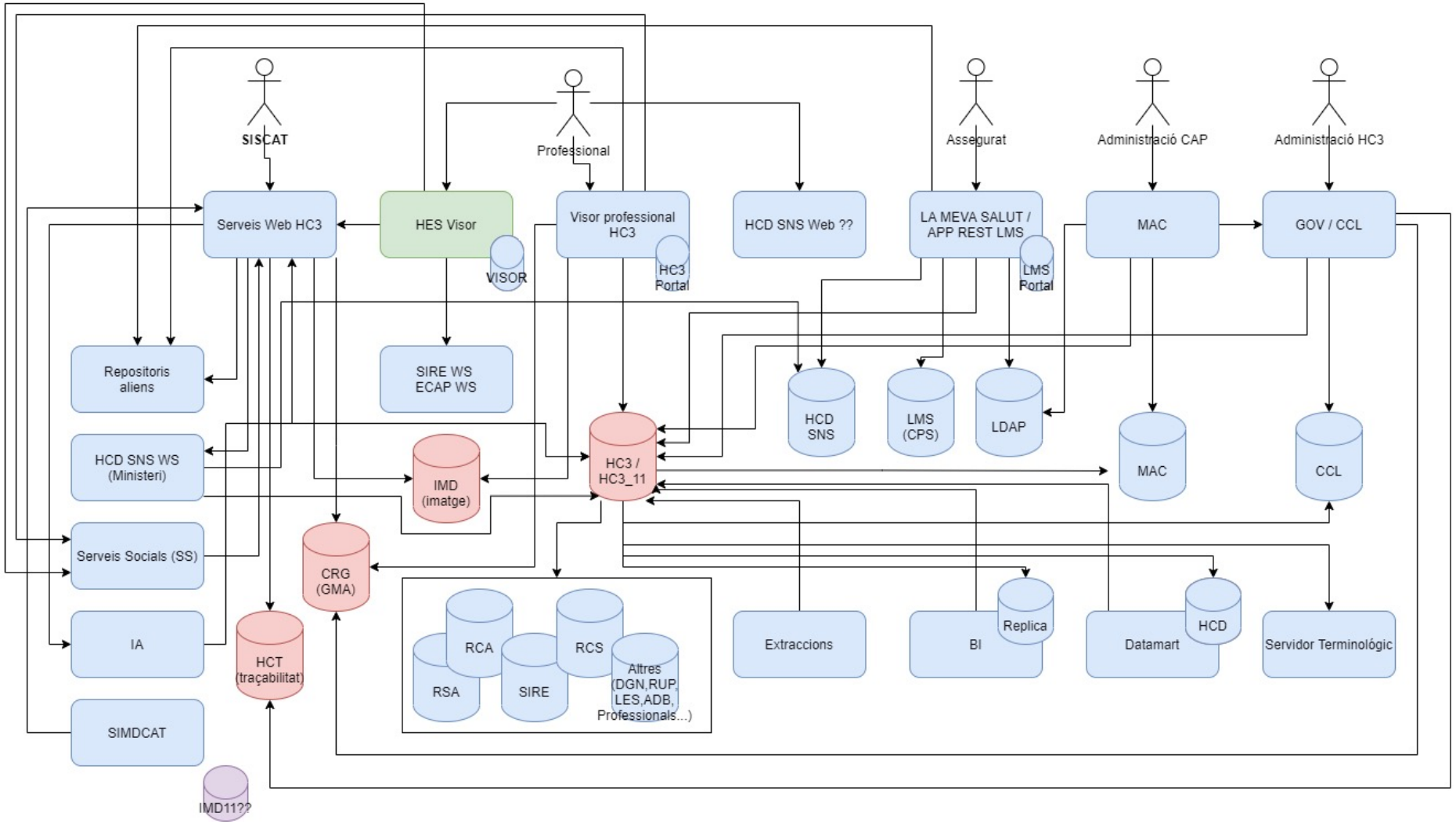
Shared Electronic Health Record of Catalonia (3)



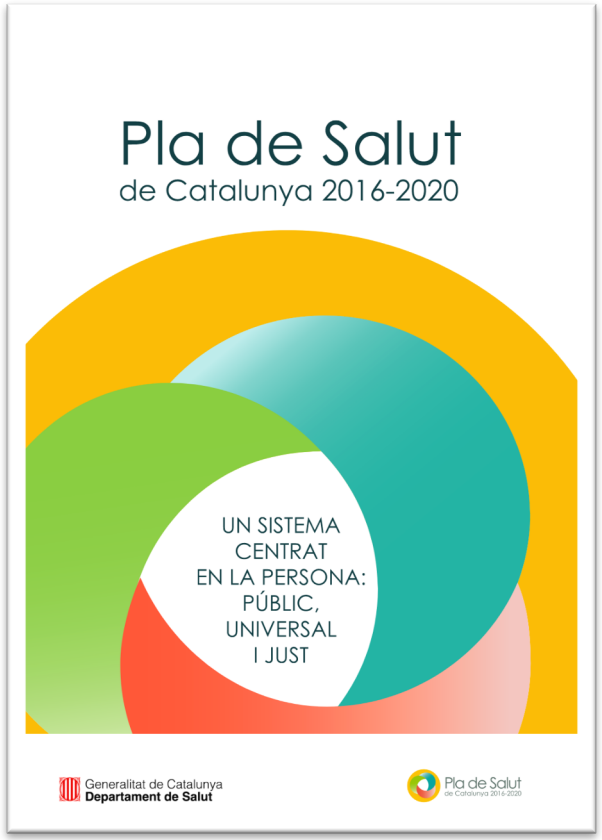
Shared Electronic Health Record of Catalonia (4)

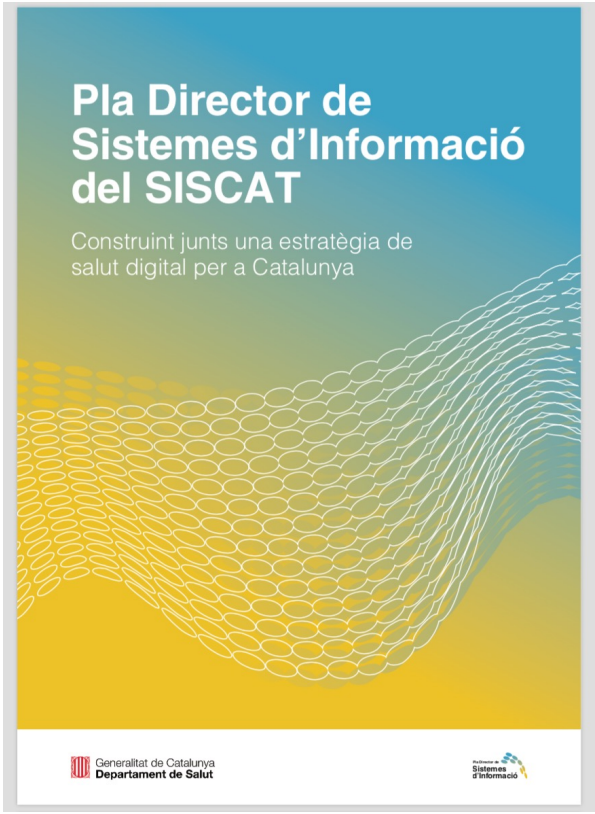


The Shared Electronic Health Record of Catalonia – Systems Architecture



Catching up the time: Digital Health Strategy for Catalonia





Limitations of the current information systems model

Broad ecosystem of applications with buried business logic and data models.

Old-fashioned solutions and a dramatic increase in technical debt.

Communication between service providers and the NHS through static and incoherent interoperability solutions.

High costs for maintenance, corrective and evolutionary development.

Difficulties to scale-up innovations and best practices.

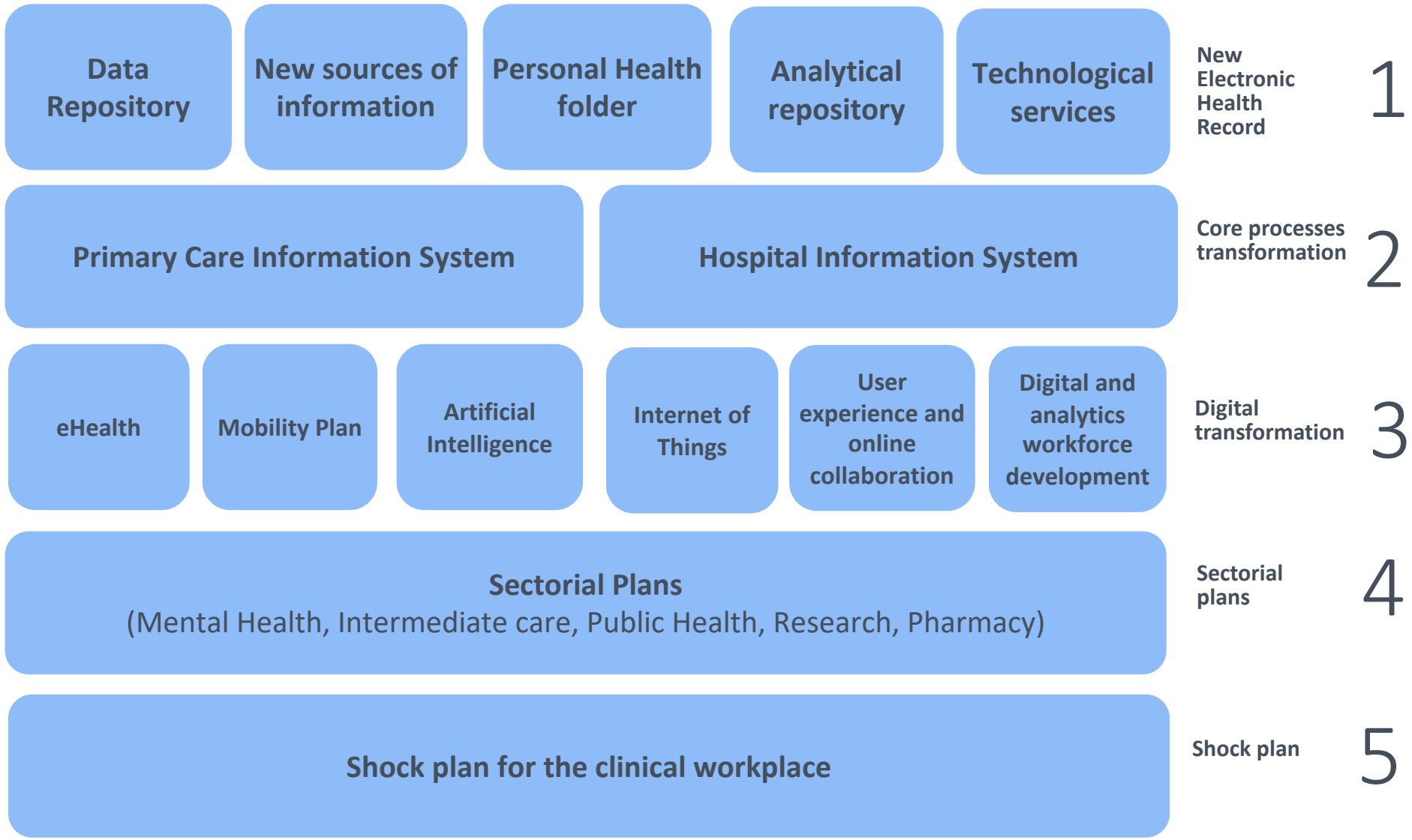
Rigid model that does not foster adaptation to change.

Master Plan Goals

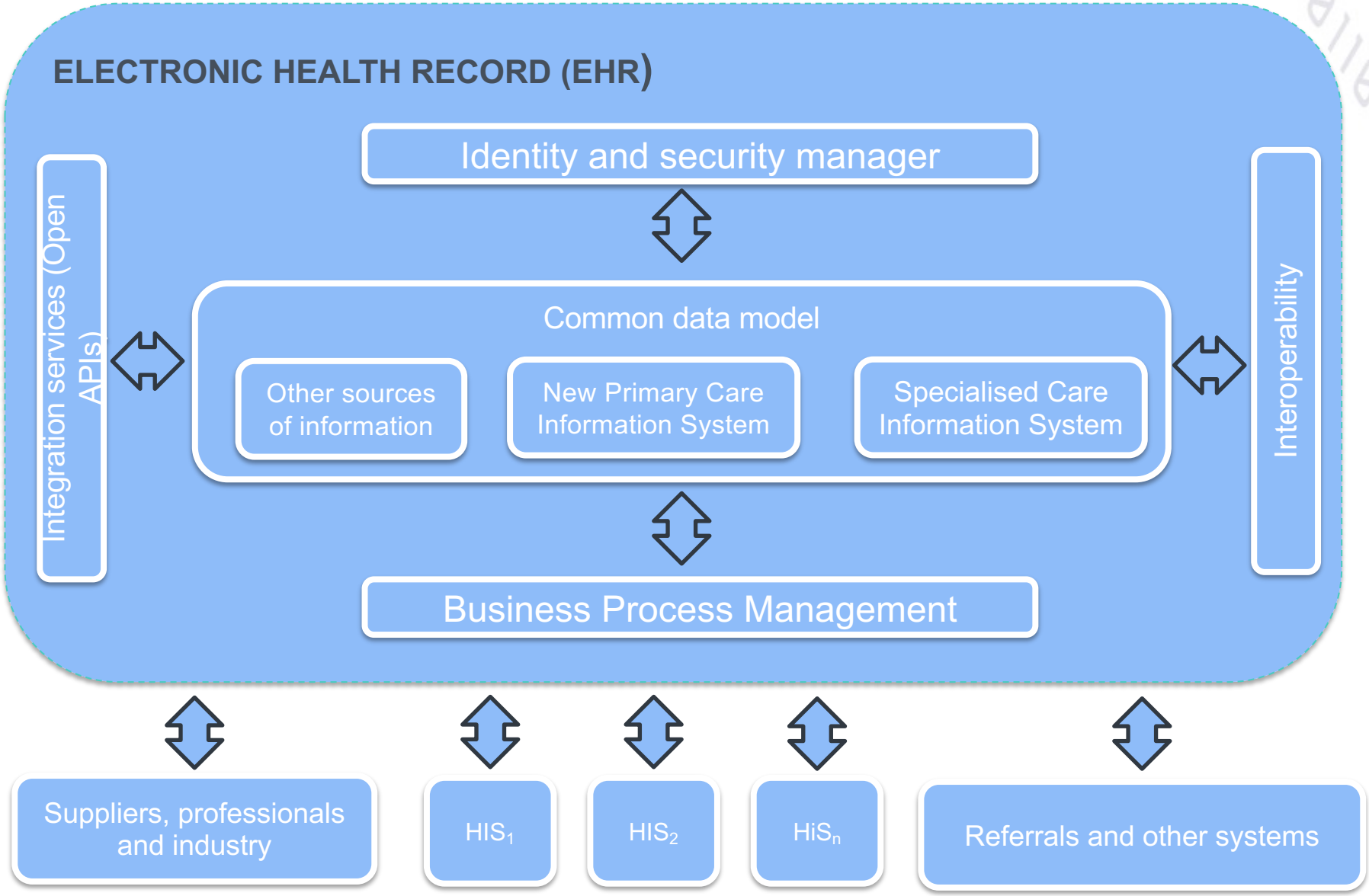
- Consolidate a **person-centred model** of information systems that enables clinical and managerial decision-making across the care cycle.
- Establish a **governance model** of information systems with a solid community support while ensuring care continuity.
- Set out a **financing framework** to ensure implementation and sustainability over time.

- Create environments and opportunities to design and **implement innovative person-centred ICT-based care services**.
- Set out an ambitious **roadmap**, yet realistic, which will allow a long-lasting, successful and safe implementation of the new model.

Strategic initiatives



Information Systems Model



The vision: A unique Electronic Health Record

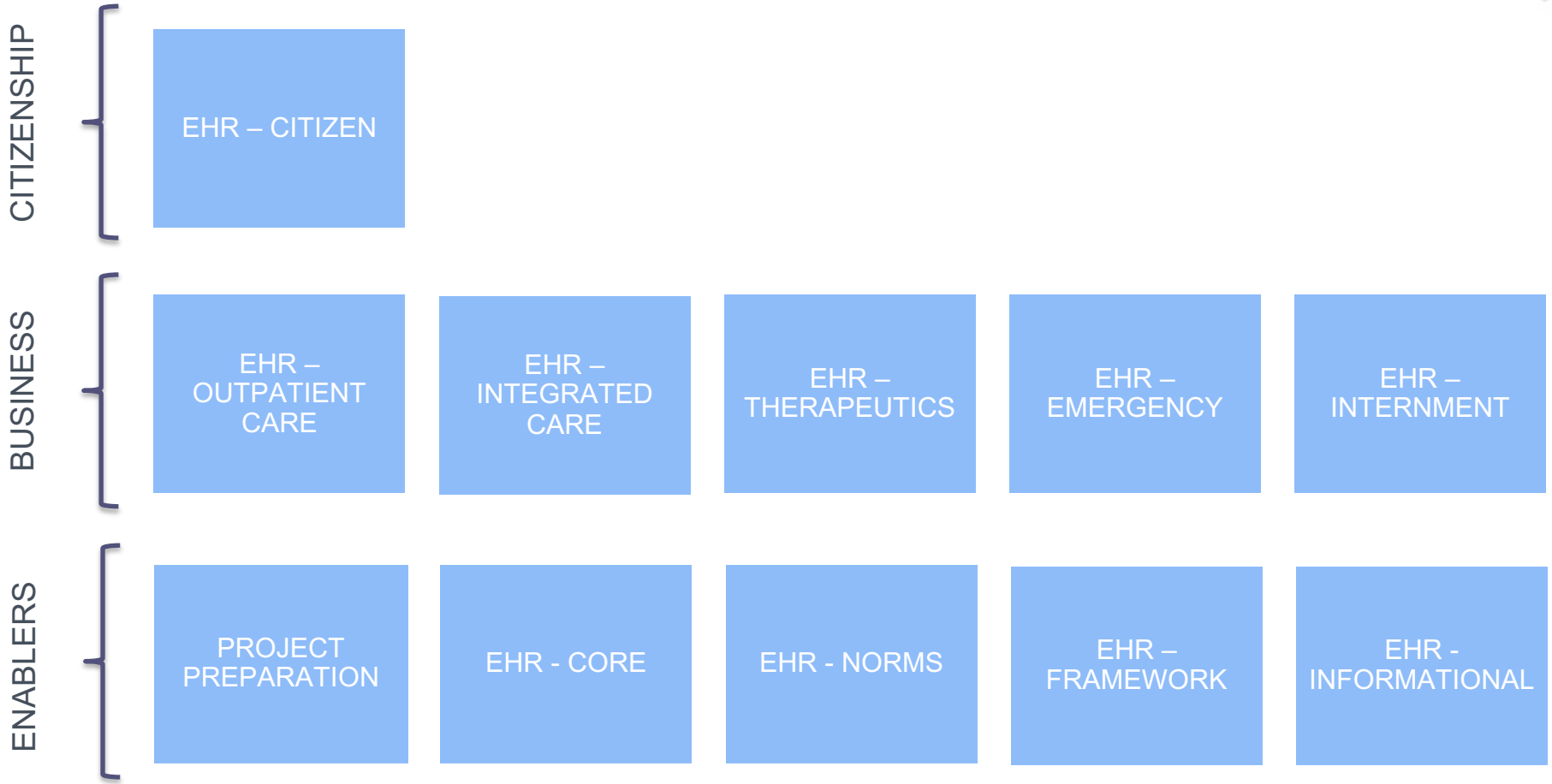
The longitudinal Electronic Health Record (HES) is the main piece of the new Digital Health Strategy and represents the functional and technical repository of all the information of the citizen that must be registered and shared throughout the health system.

It is not just, or mainly, a technological update, but a **model for data management and an architecture of information systems that corresponds to and anticipates the changes that are taking place in the healthcare model in:**

- citizen's relations with the healthcare system
- work processes
- relations between the professionals themselves

Mechanisms are also envisaged to intensify collaboration between the different actors in the healthcare system, to define semantic and technical standards and to share and take advantage of technological innovation.

Program distribution



Which is the project?

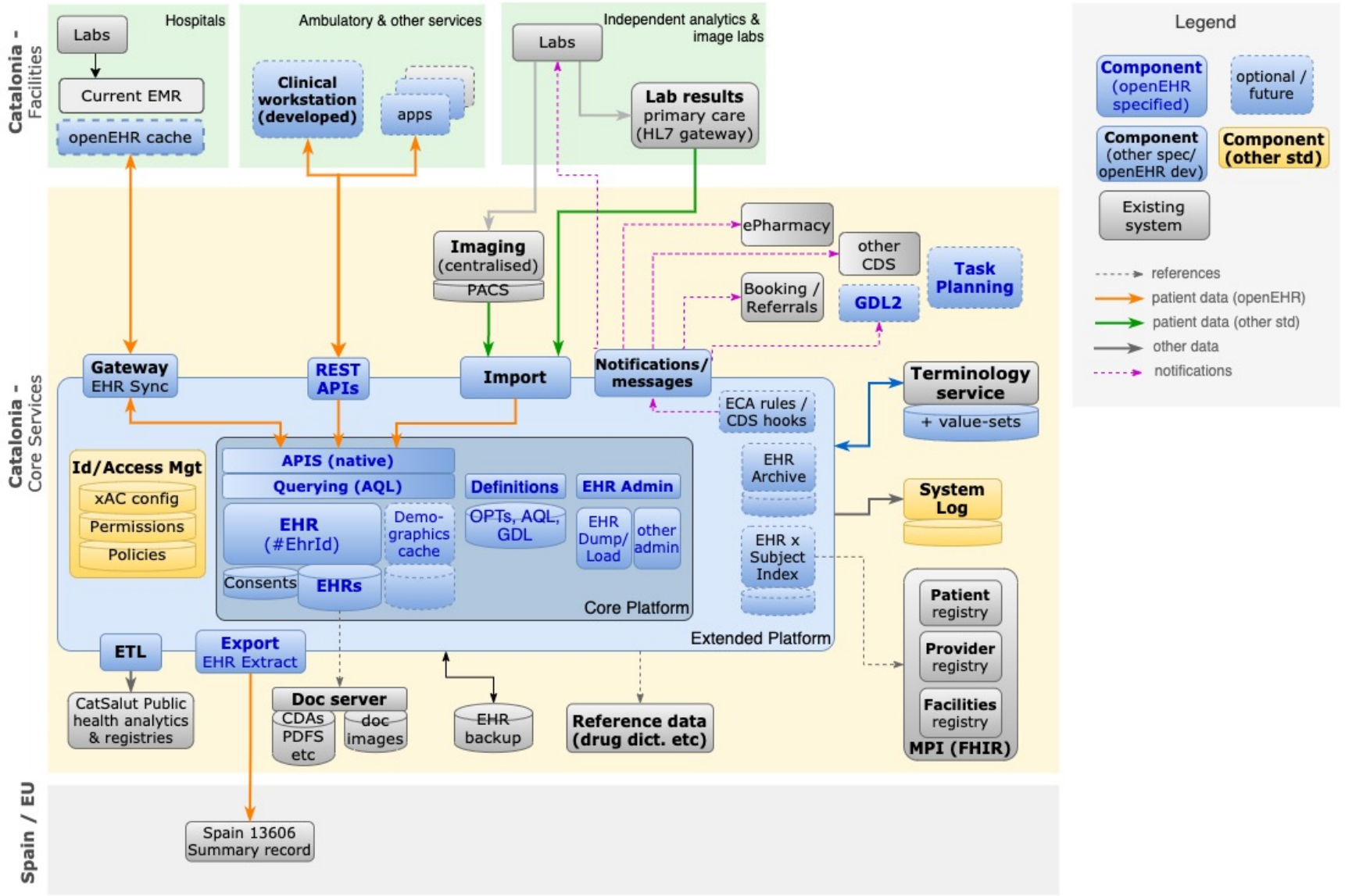
- Phase 1 of the Project: next 4 years == 40 million euros budget
- Development of the foundations of the new EHR
- Both informational and transactional
- **Starting in ambulatory care (+community mental health, +residential care, +integration with social care) + merge with the Shared EHR**
- Establishing a new relation model with specialised and intermediate care

How to approach the challenge?

- **Our proposal is:**
  - Transfer of core services, data and capabilities to a new paradigm based on a knowledge-driven platform, within a service infrastructure and a modern application development environment.

- **Discarded alternatives:**
  1. Purchase a commercial mega-suite (monolithic approach)
  2. Purchase of different commercial parts (best-of-breed), followed by integration according to the desired standards
  3. A technological update of current products with the aim of improving the UI / UX and, potentially, solving the problems of databases and interoperability

Future view (3 years..)



openEHR and FHIR in our project (1)

- We are establishing the foundations of a full EHR
- Our project is an INTRAoperability project
- The standard selection criteria have been:
  - Strong governance of clinical data models
  - Strong international community support
  - Unlocking clinical data models, thus enabling innovation
  - Persistence of data
  - Maximum granularity
  - Includes care pathway support

openEHR and FHIR in our project (2)

- We acknowledge the benefits of using FHIR for exchange purposes with external systems
- We also acknowledge the usage FHIR resources to build some applications (i.e., Master Patient Index)
- openEHR has been selected to build the new EHR
- We will use FHIR to communicate with external systems where applicable
- We think both are complementary

Thanks!

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