gaia-x

Health Data Space Event

4 APRIL 2022

#5 Data standards, the key to enable a European Health Data Space

Chapter 2a: Breakout Session

Chapter 2a: Breakout Use cases

- **#5 Data standards, the key to enable a European Health Data Space**

Welcome and Opening

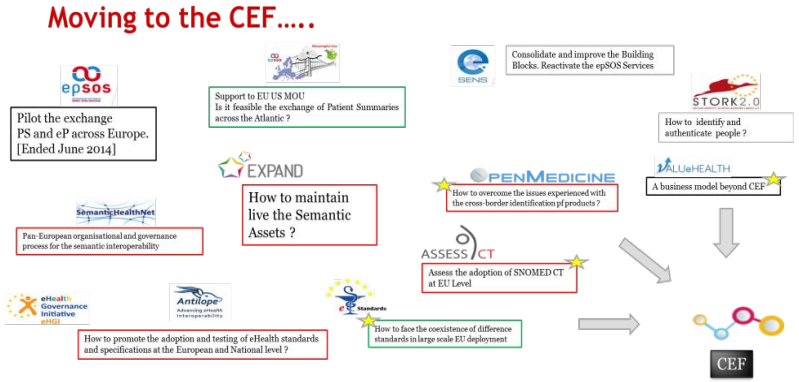
- **Enrique Bernal-Delgado MD PhD,** Senior Health Services and Policy Researcher, Data Science for Health Services and Policy Research Group, Institute for Health Sciences. IACS

- **Carlos Telleria,** Carlos Tellería, Biocomputing Unit, Aragon Health Science Institute

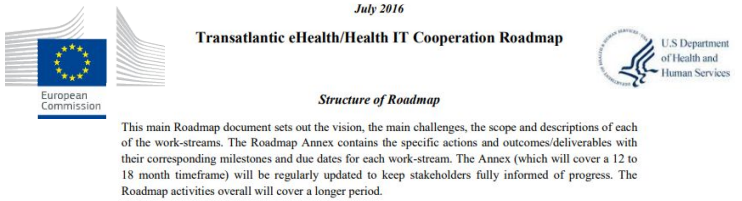
The International Patient Summary Data Model, 2nd edition

- **Stephen Kay,** IPS Project leader, CEN & ISO Health Informatics

The more recent part of a long history ..



The **epSOS projects**, cross-border pilot for PS and eP Exchange, 2009-2014... and several others ..to the **eHDSI**



July 2016

Transatlantic eHealth/Health IT Cooperation Roadmap

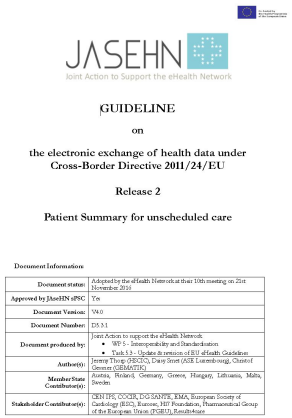
European Commission

U.S Department of Health and Human Services

Structure of Roadmap

This main Roadmap document sets out the vision, the main challenges, the scope and descriptions of each of the work-streams. The Roadmap Annex contains the specific actions and outcomes/deliverables with their corresponding milestones and due dates for each work-stream. The Annex (which will cover a 12 to 18 month timeframe) will be regularly updated to keep stakeholders fully informed of progress. The Roadmap activities overall will cover a longer period.

2010 EU US EU/US MoU: ONC Standards and Interoperability Framework (ONC S&I) EU/US eHealth Cooperation Initiative; EU Trillium Project; 2013 The INTERPAS Project, HL7
2015 Transatlantic eHealth/health IT Cooperation Roadmap: enforcement of the IPS concept.



JASEHN

Joint Action to Support the eHealth Network

GUIDELINE

on

the electronic exchange of health data under Cross-Border Directive 2011/24/EU

Release 2

Patient Summary for unscheduled care

Document Information

Document status:	Adopted by the eHealth Network at their 10th meeting on 25st November 2016
Approved by JAseHN sPSC	Yes
Document Version:	V4.0
Document Number:	D5.3.1
Document produced by:	Joint Action to support the eHealth Network • WP 5 - Interoperability and Standardization • Task 5.3 - Update & revision of EU eHealth Guidelines
Author(s):	Jeremy Thorp (NICTA), Davy Sevet (ASIP Luxembourg), Christof Gessner (GEMATIK)
Member State Contributor(s):	Austria, Poland, Germany, Greece, Hungary, Lithuania, Malta, Sweden
Stakeholder Contributor(s):	CEN TPE, COCIR, DG SANTE, EMA, European Society of Cardiology (ESC), Eurocat, HIT Foundation, Pharmaceutical Group of the European Union (PGEU), ResultsAware

eHealth Network Guidelines
2013-2016, 2021

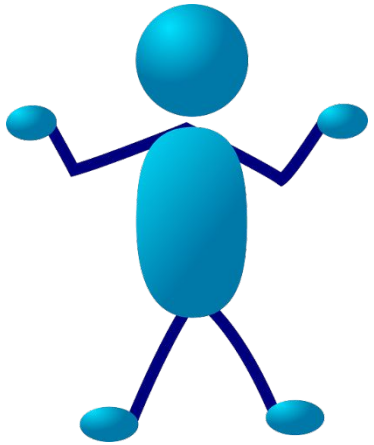
Expectations:
No Standard PS

Variants of a PS are implemented in all provider systems …

‘Local perfection’ is the enemy of the good!

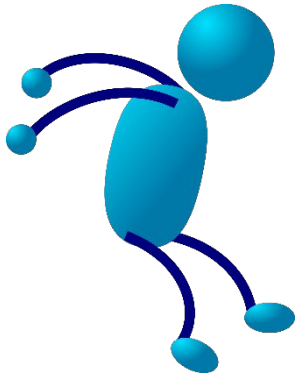
Expectations:
Stakeholders

The PS is perhaps more complex than first impressions would suggest



"A sum can be put right: but only by going back till you find the error and working it afresh from that point, never by simply going on."
-- C. S. Lewis,
The Great Divorce

"A summary can be put right: …"



Health Informatics TC251

*The International Patient Summary Standards Project**

*Funded by the European Commission

EUROPEAN COMMISSION

Expectations:
The 'new' IPS

"the separate elements already existed and floated through history, but they were never before assembled in this manner. Joining, assembling, the new will always consist of that."

-- A. Kleppe, Software Language Engineering

The IPS: An International Standard – ISO 27269: 2021

- Stand out from the crowd, 'international' was a goal but an aspiration too - now a reality.
- SDO collaboration on the shared vision of a single IPS from the start
- A 'new' abstract reference specification that comprises a dataset for IPS, with associated rules and reusable, scalable data blocks.

For local, regional and global use, for planned and unplanned care

Everyday Summarization

"We all summarize, very often, when reporting about the movie we saw yesterday or the negotiations during a meeting, recoding an accident, or writing a resume' of a stage play at school. *Everyday summarizing skills belong to everybody's communication competence.*"

Endres-Niggemeyer B. Summarizing Information. Springer-Verlag, Berlin Heidelberg, 1998.

The IPS Properties (1)

Provide an **healthcare summary** for a citizen at the point of care

It is **minimal and non-exhaustive**

It is **specialty-agnostic** and **condition-independent**……but still **clinically relevant**

The IPS Properties (2)

Designed to be **simple**

Usable **any time**, in **any place**; by **any one**

Multi-beneficiaries: Individuals, Healthcare Providers, Society

EN 17269: 2019
The IPS Use Case, and 4 Scenarios

- Original use case was to exchange a Patient Summary cross-border for unscheduled care at the point of care.
- The Scope was extended:
    - **IPS Scenario 1: Cross-Border, Unscheduled care**
    - **IPS Scenario 2: Local, Unscheduled care**
    - **IPS Scenario 3: Cross-border, Scheduled care**
    - **IPS Scenario 4: Local, Scheduled care**

Fast-tracked to ISO and superseded by EN ISO 27269: 2021, first edition

Change requests to IPS Datablocks

Patient attributes	Allergies & intolerances	Problems (incl. diagnosis)	Medication summary	Immunization (incl. Vaccinations)	Results	Vital signs
Cross-border (conditional)	History of procedures	History of past illness/ problems	History of pregnancy	Medical devices (incl. implants)	Functional status	Social history (incl. life style factors)
Provenance	Advance directives	Care plan	Address-book	Healthcare provider	...	

Non-Exhaustive dataset

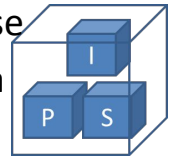
EN ISO 27269: 2021, 1st edition
Is the IPS Data Model

New Macro IPS Datablocks

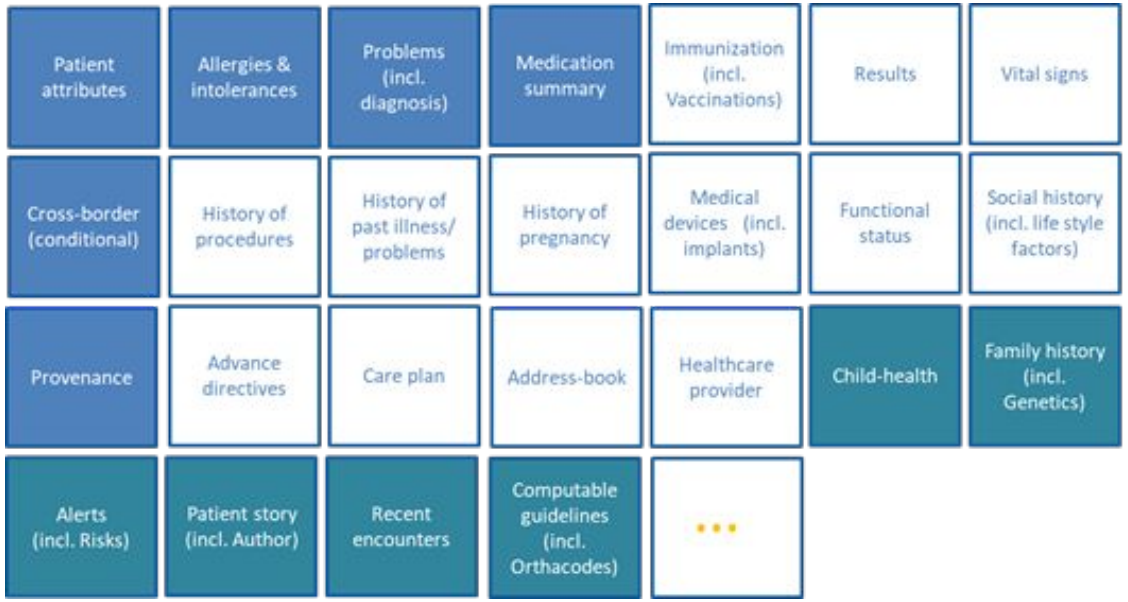
- Because
  - New use cases
  - New scenarios
  - New Requirements
  - …

Refinement of existing IPS Datablocks

- Because
  - More precision & examples required
  - New features for reuse
  - Conformance criteria
  - …



IPS DataBlocks for Rare Disease case? An example for testing inclusion …



Estimated 6-8000 Rare Diseases…

- Surely not 6-8000 datablocks required … but will six candidate IPS Datablocks suffice?
- Evidence for these six as opposed to others?
- Are the blocks of generic use?
- Assessment of relevance?

- Transparency via Inclusion Rules?

The IPS and the EHR

- The EHR is one source, perhaps other sources to for producing a summary. A summary is essentially a derivative.
- Although the IPS is extensible by design, the extensions are not there to create a full EHR.
- The IPS fulfils a fundamentally different purpose to an EHR.

Summarization and the IPS

- The reduction of information to its most essential points; it retains the relevant and discards the irrelevant for the purpose of effective, efficient communication.
- Determining what is important and assessing what is relevant is non-trivial.
- Both the producer and user of the summary actively engage in relevance assessment, which goes largely unnoticed.

The IPS … Critical and Challenging

"Patient summaries can be considered as clinical tools, providing unique support for clinical decision making."

– Sittig D F., et al. (2008) Grand Challenges in clinical decision support

The 'unscheduled care' scenario is stressful; the summary user is "expected to pick up the content, to restructure it with respect to their own prior knowledge, to integrate it into their own knowledge structure and finally to use it".

– Endres-Niggemeyer B. (1998) Summarizing Information. Springer-Verlag, Berlin Heidelberg

"The farther back you can look,
the farther forward you are likely to see."
Winston Churchill

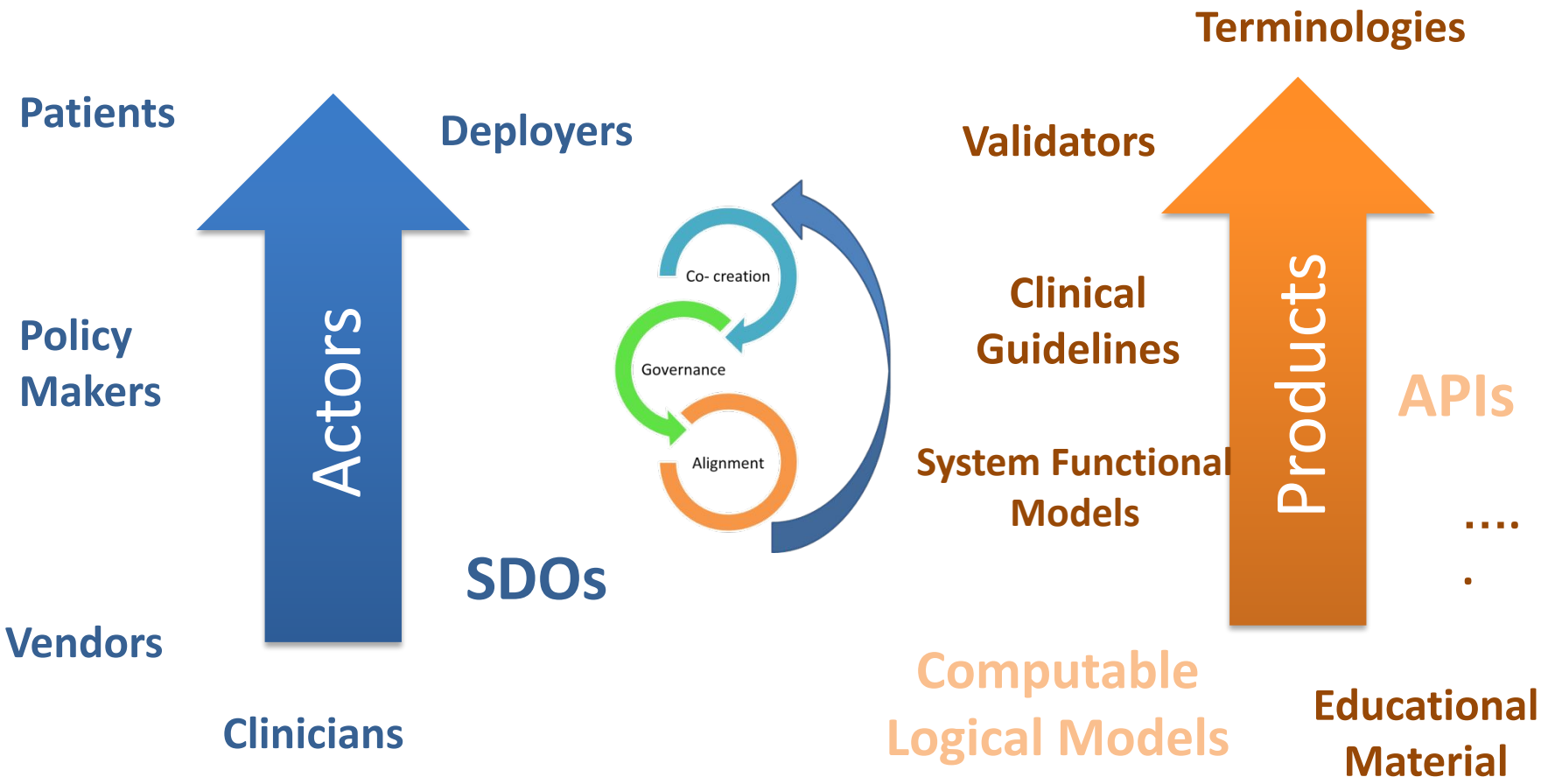
The IPS and G7

- The value of data is found in its use; “data by itself has no value. It’s the ever-changing ecosystem surrounding data that gives it meaning”.
  - Borgman C, L. (2015) Big Data, Little Data, No Data.

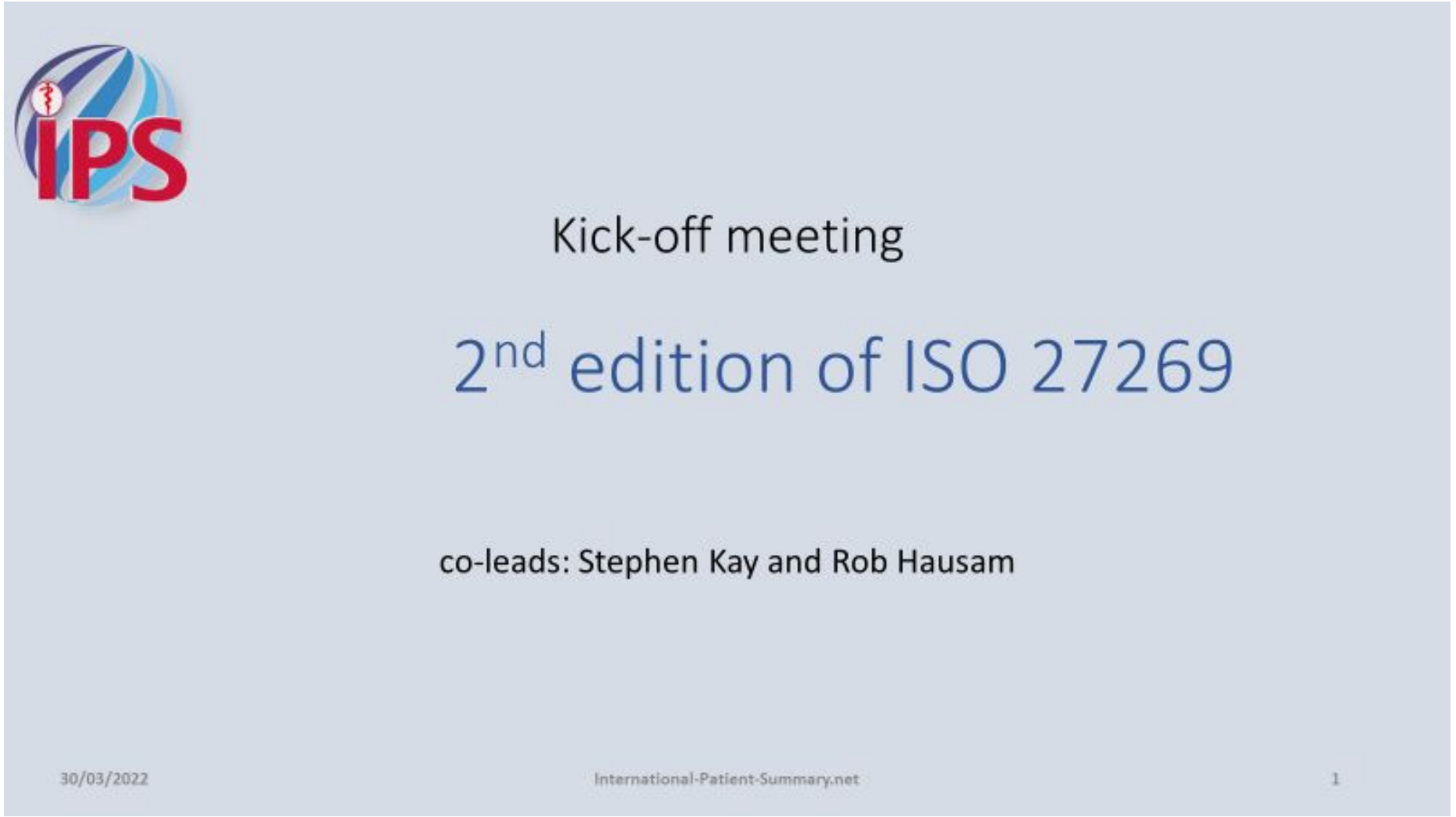
- There does seem to be momentum with respect to the IPS. In June 2021, the G7 health ministers made the following commitments in relation to digital health:

> “38. We commit to work towards adopting a standardized minimum health dataset for patients’ health information, including through the International Patient Summary (IPS) standard, with the shared objectives of facilitating health interoperability within and between countries, … To achieve this goal, we will work with the Global Digital Health Partnership (GDHP) as they are already advancing IPS efforts.”

Towards an «IPS ecosystem»



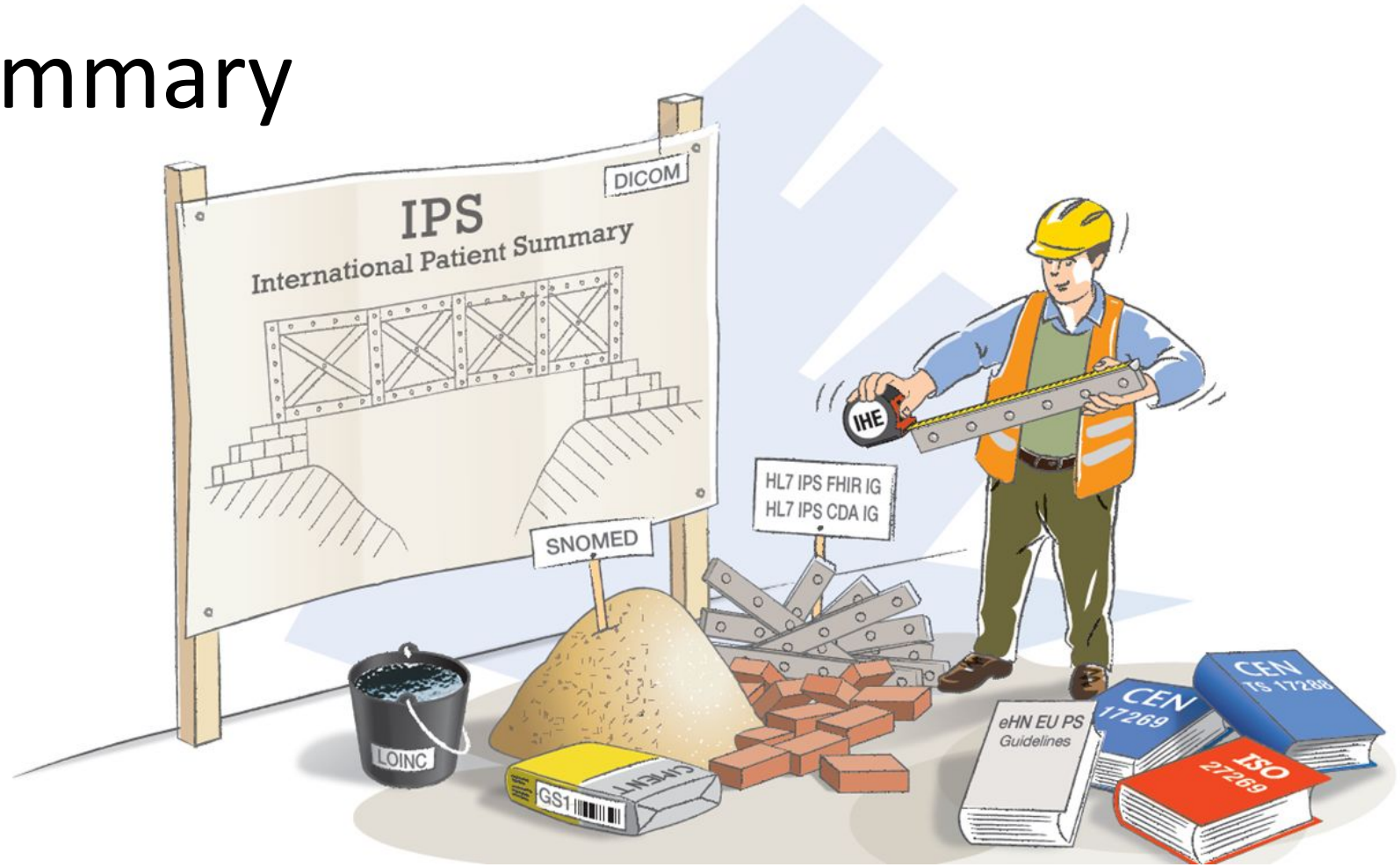
Up to Date News:



WEB-SITE:
International-Patient-Summary.net

Acknowledgements …

… a summary



EHDEN - OMOP and common data models

gaia-x

- **Sebastiaan van Sandijk,** Clinical Informatician, Odysseus Data Services

EHDEN: Vision and Mission

EHDEN

EUROPEAN HEALTH DATA & EVIDENCE NETWORK

Vision

The European Health Data & Evidence Network (EHDEN) aspires to be the trusted observational research ecosystem to enable better health decisions, outcomes and care

Mission

Our mission is to provide a new paradigm for the discovery and analysis of health data in Europe, by building a large-scale, federated network of data sources standardized to a common data model

Europe: an Ocean of Data, a Desert for Analysis

Pillars of the EHDEN Approach

Infrastructure

Creation of an **EU-wide** federated network architecture

Privacy by design

Data harmonisation to the OMOP common data model

Training & certification of **SMEs**

Research & Outcomes

Use cases to evaluate the EHDEN federated network

Collaboration on consistent **methodologies**

Collaboration with the global **OHDSI** research network

Incorporation of the **ICHOM** health outcome standards

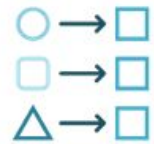
Education & Community

Establishment of an **EHDEN Academy**

Expansion of the **OHDSI network** in Europe

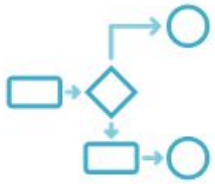
Collaboration on **collective memory** for research use cases

Enablers for Real-World Evidence (RWE)

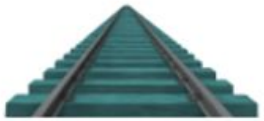


Data interoperability

Data network



Standardised analytics



Technical Infrastructure

Strong community

Clinical characterisation:

What happened to them?

description

Patient-level prediction:

What will happen to me?

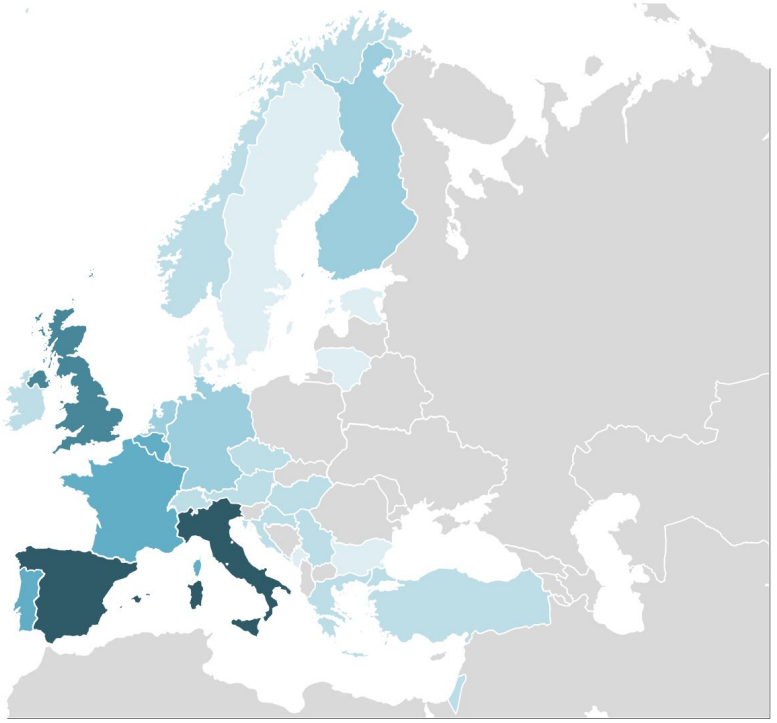
prediction

Population-level effect estimation:

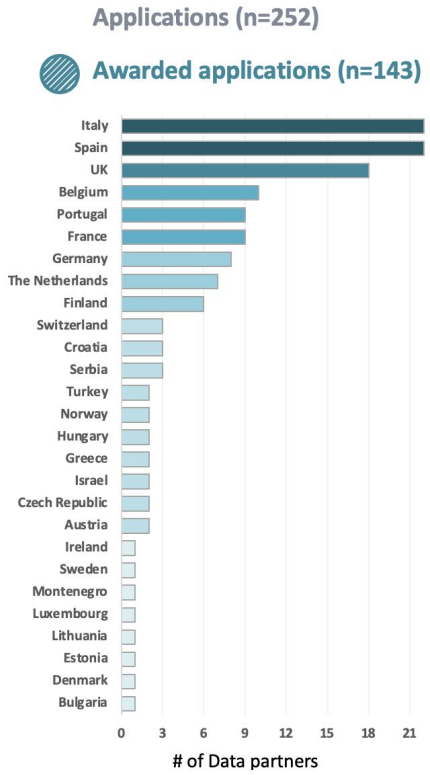
What are the causal effects?

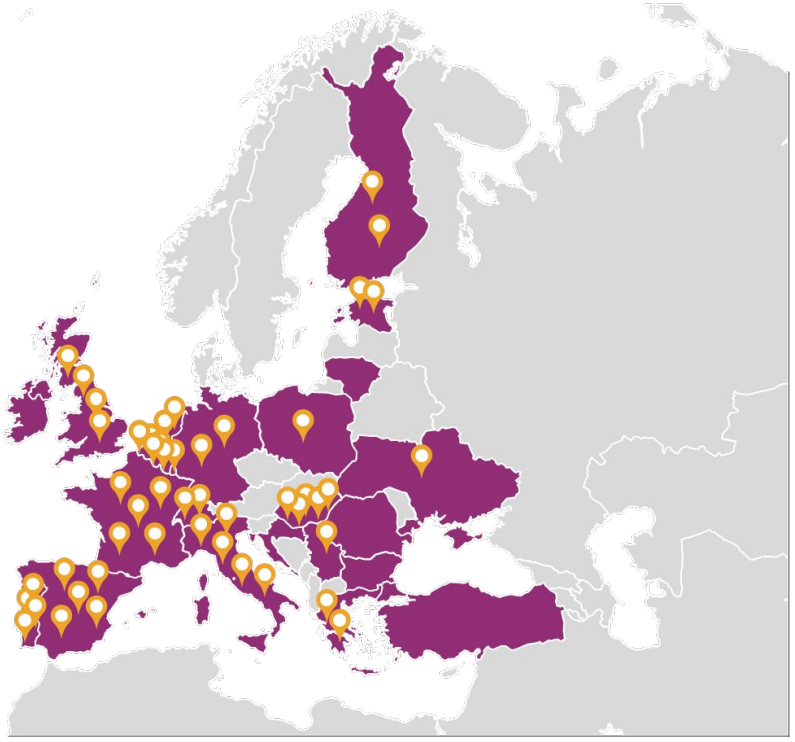
causality

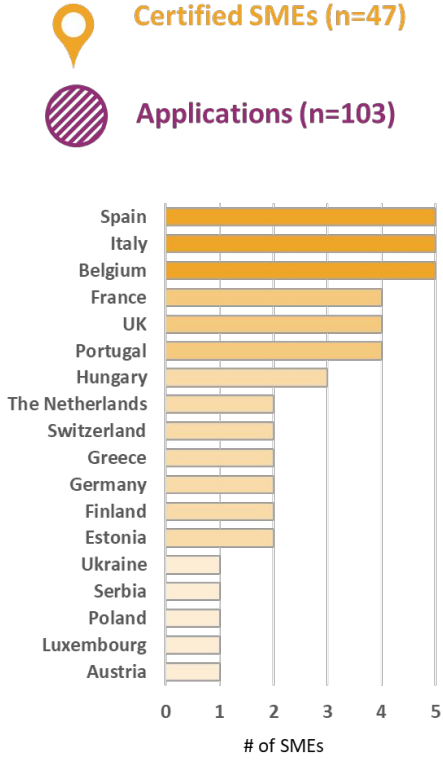
EHDEN Data Network and Support Network



Geographic spread of data partners. The shade of blue indicates the # of data partners in that country (darker = more)



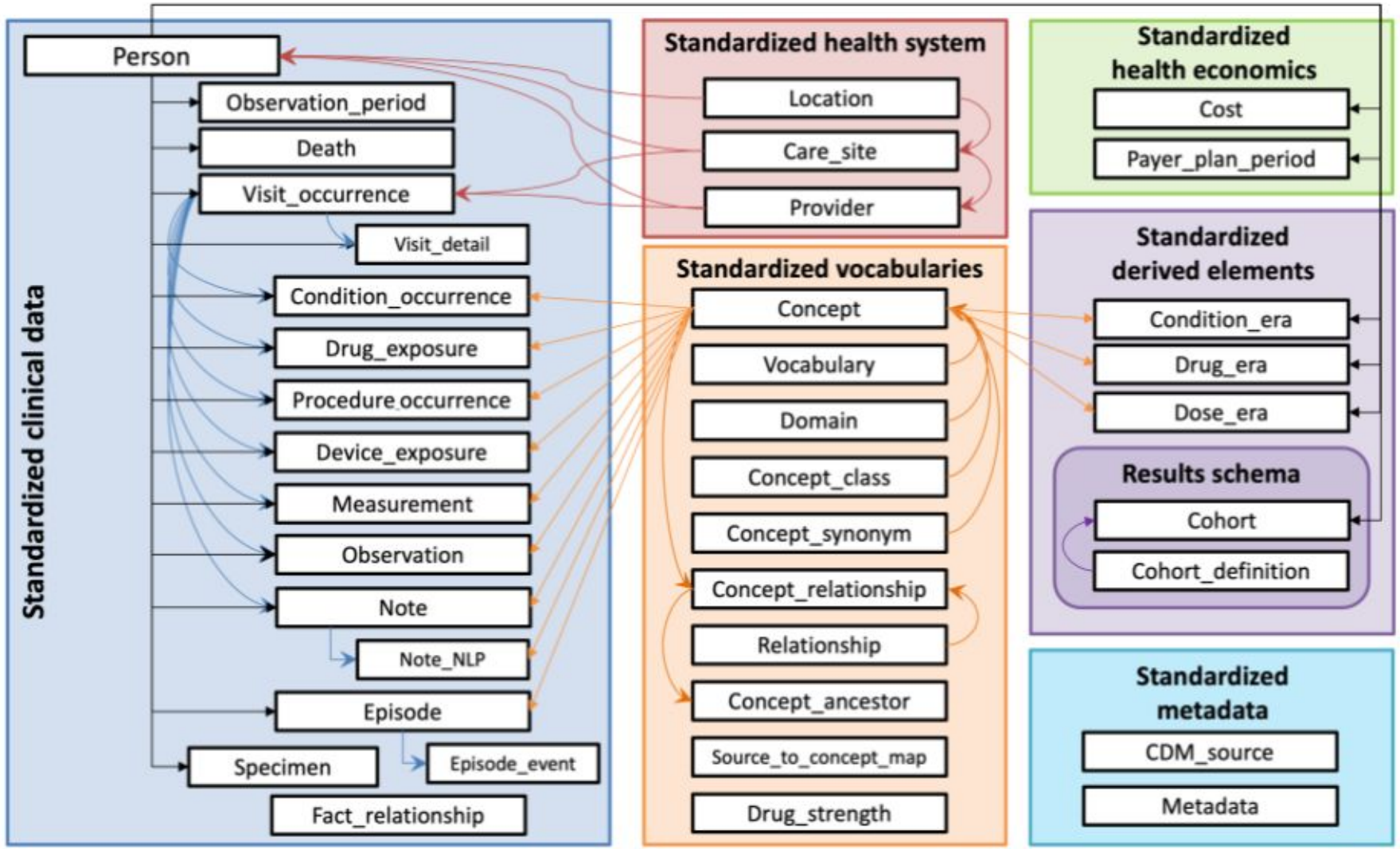




Global adoption of OMOP-CDM

Big Data for Better Outcomes
DARWIN EU
PIONEER
HTx
miracum
H2O HEALTH OUTCOMES OBSERVATORY
innovative health initiative
NICE National Institute for Health and Care Excellence
SOPHIA Stratification of Obese Phenotypes to Optimize Future Obesity Therapy
OECD
HDRUK Health Data Research UK
EHDEN EUROPEAN HEALTH DATA & EVIDENCE NETWORK

THE OMOP COMMON DATA MODEL



Patient-centric

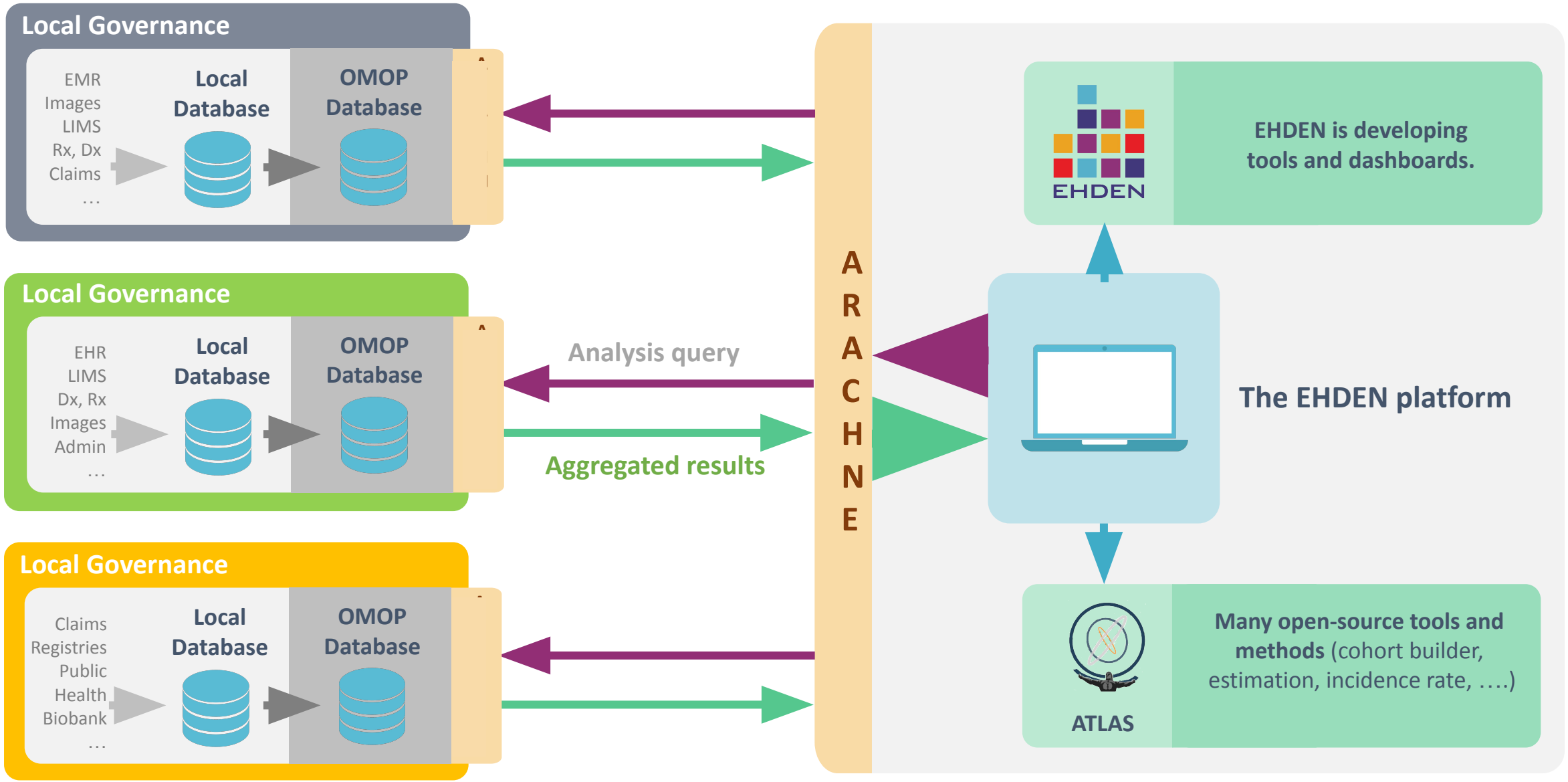
Tabular

Extendable

Relational design

Standardised analytics

EHDEN FEDERATED STUDY NETWORK: CROSS-BORDER, MULTI-SITE



EHDEN IN AN EVOLVING LANDSCAPE: EUROPEAN HEALTH DATA SPACE

- EHDEN is and will be aligned with EHDS, GAIA-X, …

- Network of federated networks, shared approach(es)
- Multiple nodes within a resilient international framework
- Interoperability via standards, systems and governance for cross-border networking

- Attitudinal change on the role of data for research

	Governance	Quality of Data	Infrastructure	Capacity building
Better Healthcare	Legislative and non-legislative measures on governance and rules for primary and secondary use of data, respecting GDPR	**Uptake and develop the EEHRxF**	**MyHealth@EU**	Digitalisation of healthcare systems
Better Policy Making	Free movement of digital health services	FAIR-ification of health data for primary and secondary use	**ERN-CPMS**	**NCPeH**
Better Research and Innovation	**AI framework/ White paper** (incl AI&liability)		**1+mil genomes**	Tele-health
			Darwin (regulators)	AI
			Link different repositories **(eg registries: cancer, ERN, transplantation, other national databases,** data permit authorities**)**	Digital skills
			Images database	
			Research infrastructures	

EHDEN IMPACT TODAY AND TOMORROW

- Project in fourth year. Ends in 2024, but to continue as new legal entity

- Building one of the largest international collaborative research networks on the planet
- EHDEN has contributed to understanding and response of COVID-19
- We are informing, educating and working with a remarkable network
- Numerous projects benefitting from our expertise, knowledge, skills

- We keep extending and enhancing capabilities for federated research / analysis
- Aligned with evolving data spaces and networks

www.ehden.eu

@IMI_EHDEN

IMI_EHDEN

github.com/EHDEN

This project has received funding from the Innovative Medicines Initiative 2 Joint Undertaking (JU) under grant agreement No 806968. The JU receives support from the European Union's Horizon 2020 research and innovation programme and EFPIA.

Data Standardisation

- **Rubén Villoria,** Head of Business Solutions for Health Evidence, Harmony Alliance

HARMONY ALLIANCE

Data Standardisation

Gaia-X Health Data Space Event 4 April 2022

Rubén Villoria. Head of Business Solutions for Health Evidence

AENOR ER Empresa Registrada UNE-EN ISO 9001
AENOR ER Seguridad Información UNE-ISO/IEC 27001
AENOR ER Gestión I+D+I UNE 166002
AENOR PRIVACIDAD INFORMACIÓN ISO 27701
ER-0 023/2003 SI 0003/2004 IDI-0003/2013 PI-0001/2020

CMMI DEV /3 SM
Exp. 2019-04-22 / Appraisal #26155

GMV SOLUCIONES GLOBALES INTERNET S.A.U.
© GMV 2022 All rights reserved

The information contained within this document is considered as "GMV-Unclassified". The receiver of this information is allowed to use and redistribute the information, referring the source of the information; observing legal regulations in intellectual property, personal data protection and other legal requirements when applicable.

gmv INNOVATING SOLUTIONS

HARMONY ALLIANCE

Public-Private Partnership for Big Data in Hematology

Accelerating better treatment of blood cancer patients

Community of approx. **400** professionals

Over **100** organizations from **18** countries

14 key targeted blood cancers

Big Data **analytic services**

Big Data Platform with **>70.000** patient records identified

Research and Multi- stakeholder projects

Funded by

Innovative Medicines Initiative

Support from

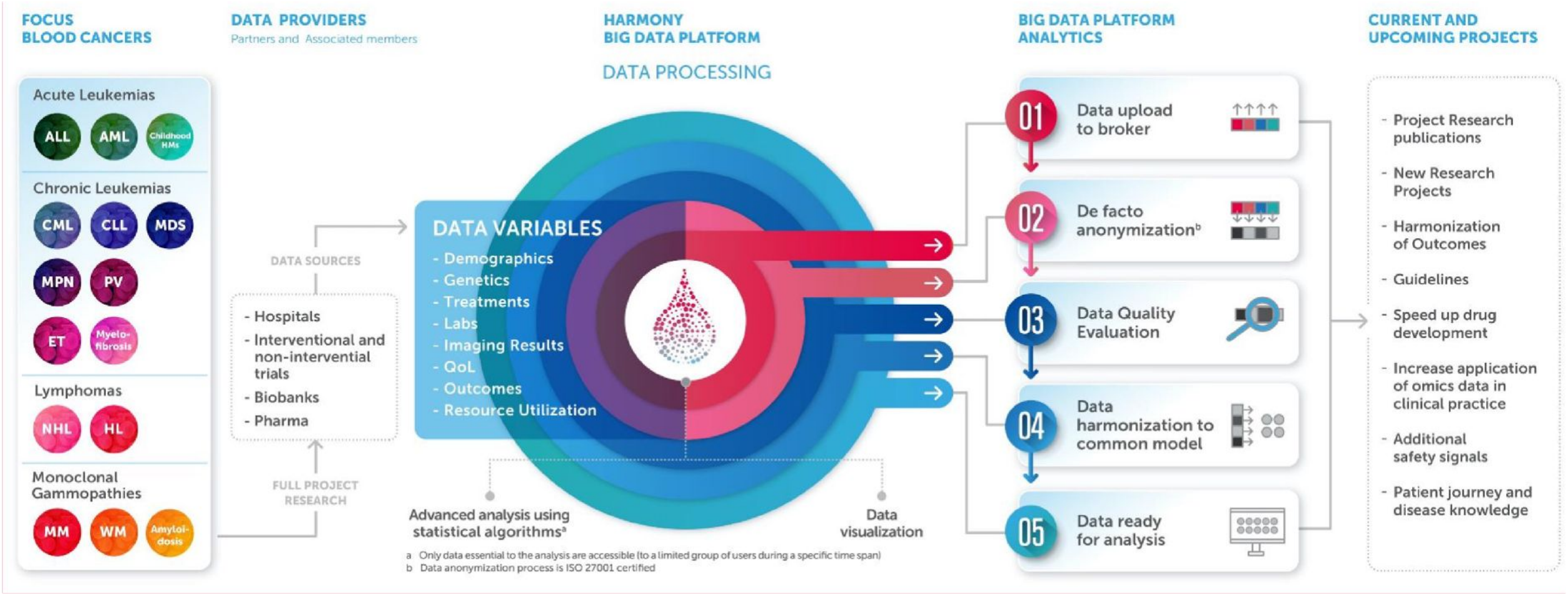
European Union's Horizon 2020 Research and Innovation Programme

European Federation of Pharmaceutical Industries and Associations

Part of

IMI Big Data for Better Outcomes (BD4BO)

Core elements of the HARMONY Architecture



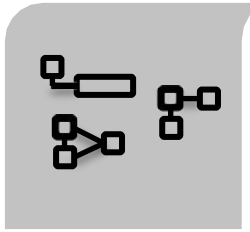
Data Standardisation in HARMONY

Data Standardisation in HARMONY

Challenges and Requirements

01 Multiple Data Providers

Hospitals, BioBanks, Cooperative Groups, Pharma Industry



02 Lots of different Structures

EHR, CRF, EMR, Cooperative Groups registries

03 Data Collected for different purposes

Primary Care, Secondary Care, Clinical Trials, investigation

04 Need to measure data quality

The data in the platform should be HIGH Quality data

05 Working with rare diseasses

Most of haematological Malignancies are rare diseases with specific types of OMICS Data

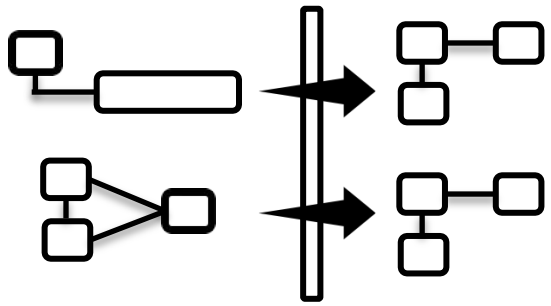
06 Support for diffrent analysis

The data should be used in different and diverse research proposals

Data Standardisation/Harmonisaition in HARMONY

We need to put together different structures different content meaning, with very specific variables, to allows to measure the quality of the data and to allow to use the date for different research Objectives

We need, we must, we have to harmonise data



HARMONY Standard selection

Needs

Vocabulary and structure extension, support different categories of data, quality, efficiency...

Standards

FHIR, i2b2, OMOP CDM, …

HARMONY Standard selection

Needs

Vocabulary and structure extension, support different categories of data, quality, efficiency...

Standards

FHIR, i2b2, OMOP CDM, …

Look around

Look at other projects: EMIF, EHR4CR, BigData@Heart, Pioneer, EHDEN...

Tools

Tools available to standardization, analysis, etc…

HARMONY Standard selection

Needs

Vocabulary and structure extension, support different categories of data, quality, efficiency ..

Standards

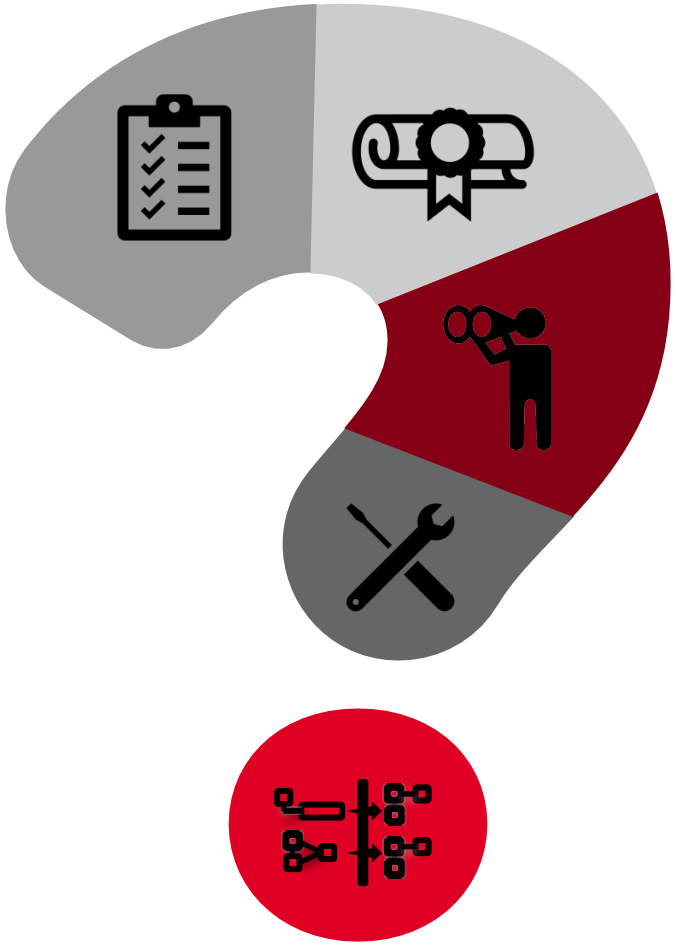
FHIR, i2b2, OMOP CDM, …

Look around

Look at other projects: EMIF, EHR4CR, BigData@Heart, Pioneer, EHDEN...

Tools

Tools available to standardization, analysis, etc…



OMOP CDM

Worldwide multi stakeholder open community,

Supports standard a non standar vocabularies

Specific working groups: OMIC data, Oncology working group

Robust analytical tools for research and quality improvement

OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

HARMONY Standardisation problems/solutions

Different Data source Structures and content

Lack of use of standard vocabularies

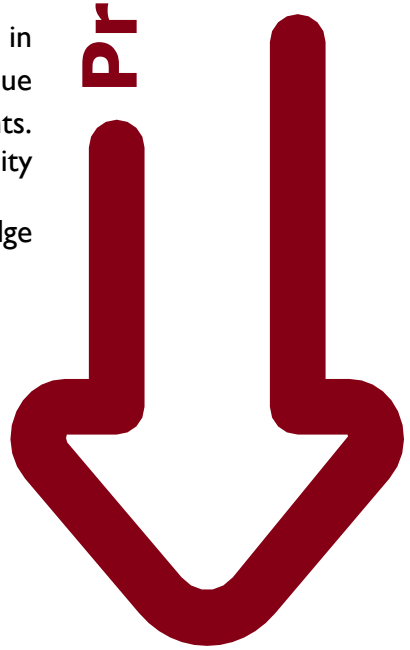
Lack of resources with knowledge of OMOP and standards

Understanding of the data. Difficulties in communicating with the data provider due to privacy requirements.

Variability in data quality

Domain Knowledge

Problems



HARMONY Standardisation problems/solutions

Different Data source Structures and content

Lack of use of standard vocabularies

Lack of resources with knowledge of OMOP

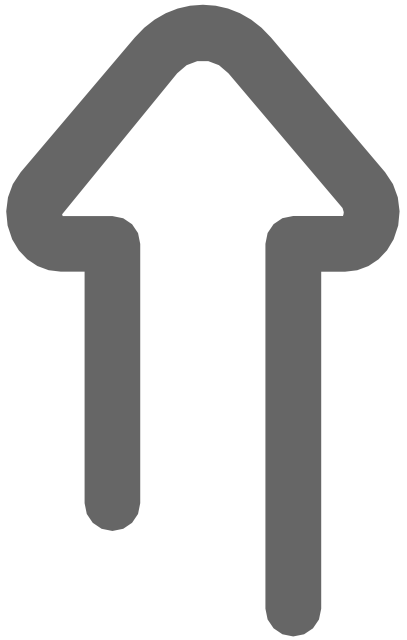
and standards

Understanding of the data. Difficulties in communicating with the data provider due to privacy requirements.

Variability in data quality

Domain Knowledge

Problems



Solutions

Establishing new processes and communication channels.

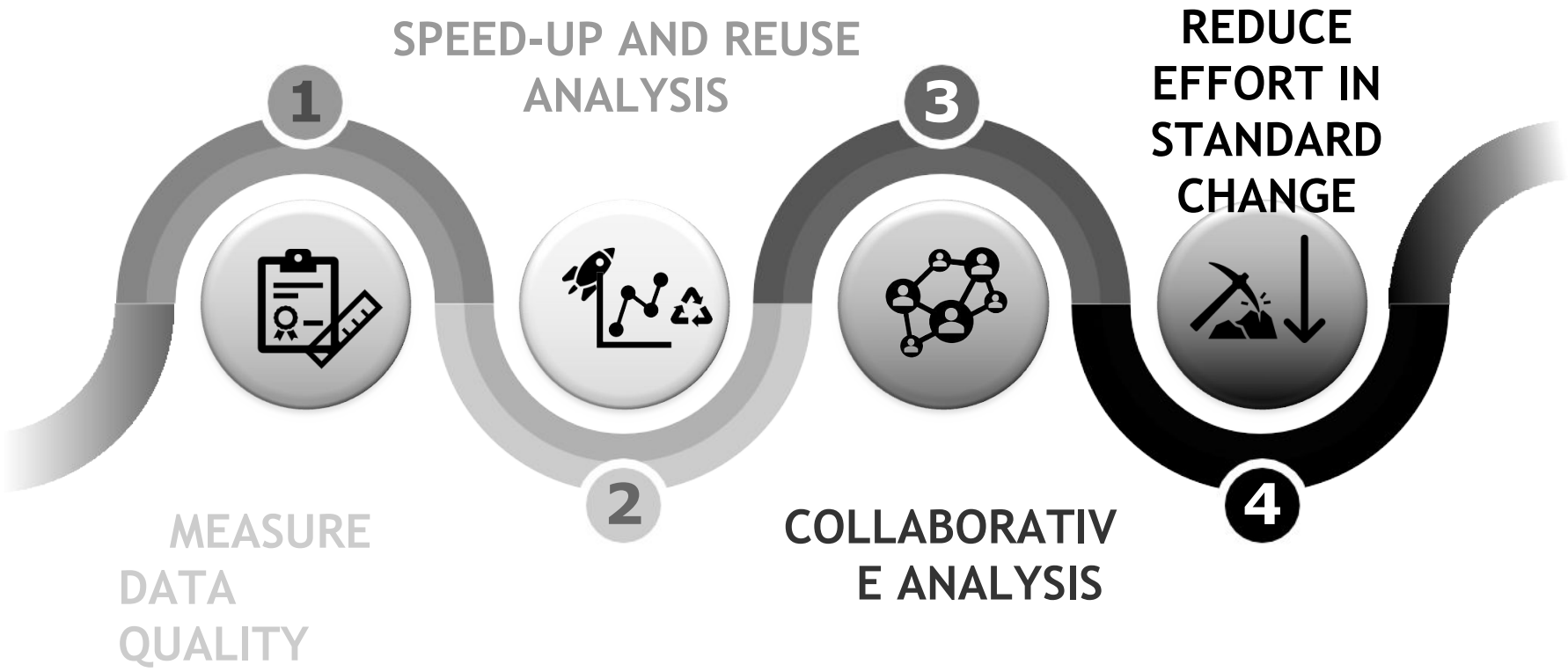
Prioritising the harmonisation based on type and quality of data.

Creation of tools and processes

Include clinical experts at some points in the process (Key Opinion Leaders)

Collaboration with OHDSI community

Why do we have to use STANDARDS?



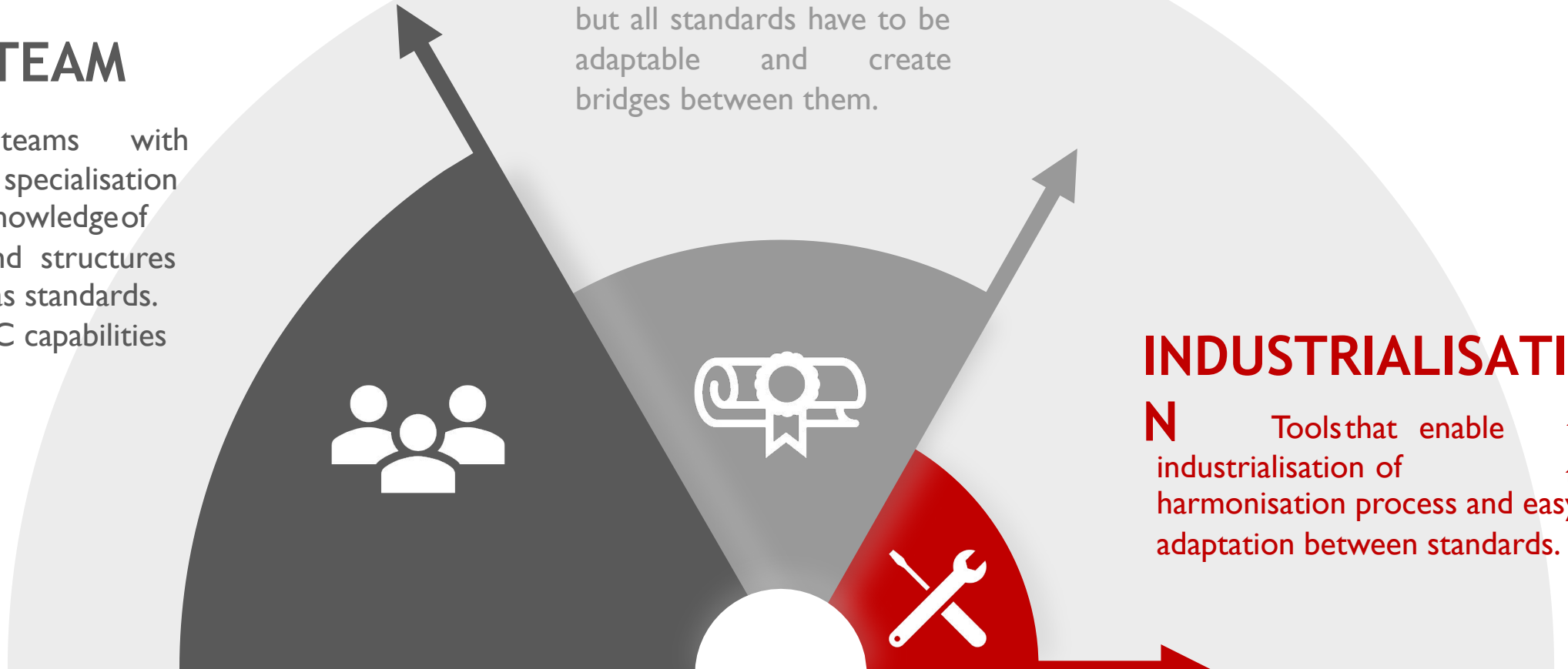
Challenges we need to address in the short term

STANDARDS

Each standard has a purpose and its structure responds to a specific use, but all standards have to be adaptable and create bridges between them.

TEAM

Build teams with high specialisation and knowledge of data and structures as well as standards. BIO-TEC capabilities



INDUSTRIALISATION

Tools that enable the industrialisation of the harmonisation process and easy adaptation between standards.

Health-RI & clinical data standards

- **Jan-Willem Boiten,** Program Manager, health RI

health RI

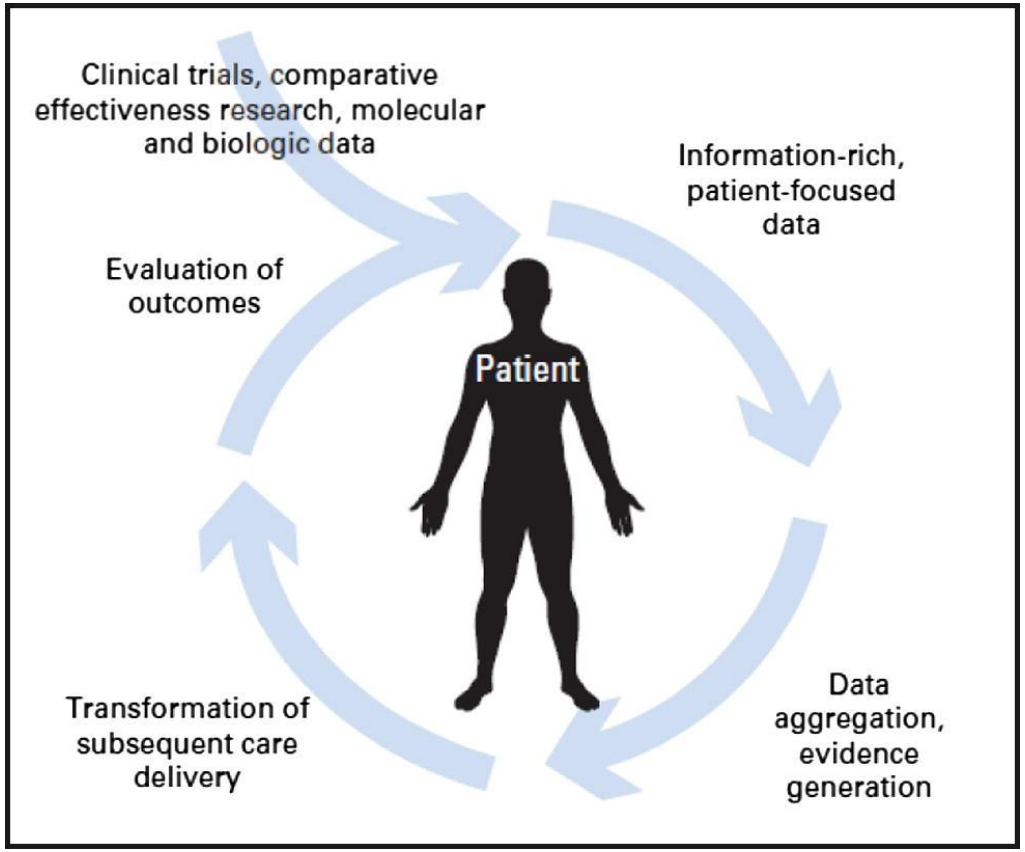
enabling data driven health

Health-RI & clinical data standards

Jan-Willem Boiten; April 6th 2022

janwillem.boiten@health-ri.nl

Goal - Learning health system
Real time evidence from real world data



Copied from Radiotherapy and Oncology 109, 159-164, 2013

Why do we need Health-RI?

- Optimally profit from Big Data, AI & Deep learning for Personalized Health asks for **focus and pooling of expertise**
- Maximize utilization of **real world data**
- Momentum for unlocking healthcare vs. research data asks for a **collective voice**
- Many initiatives and infrastructures, often with overlapping scope and people **defragmentation** is desirable
- **Collaboration and convergence** requires a national partner

Point solution

← News

Dutch Government has pledged 69 million euros investment to Health-RI

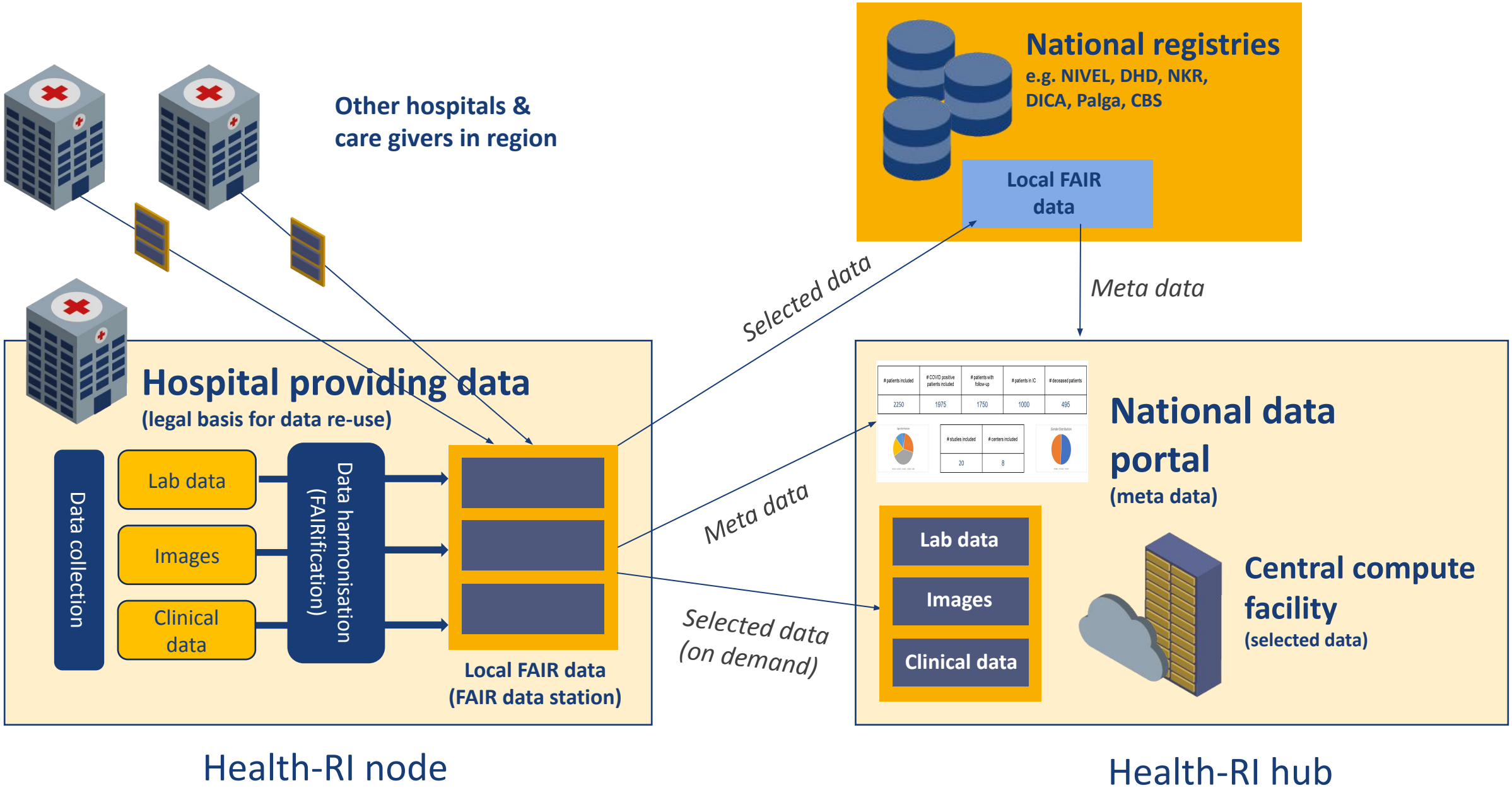
News | 9 April 2021

Collective infrastructure

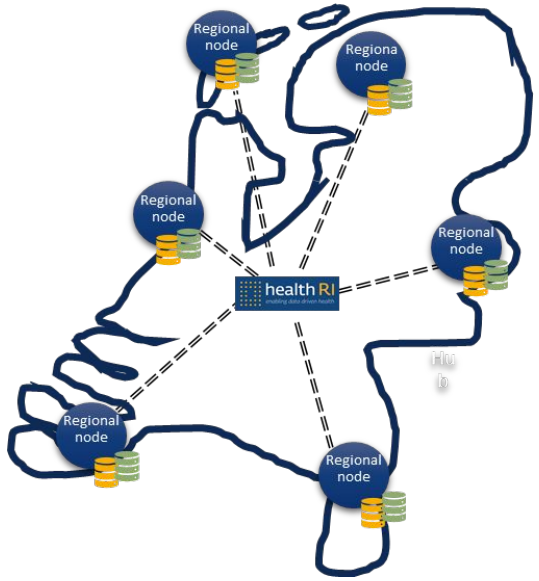
HOW - Hub and nodes model

- Network of regional nodes
- Leave data at the source whenever possible
- Resource for AI and machine learning
- Four focus areas building a network nationally & regionally in every node
    1. ELSI Compliance by design
    2. FAIR Data Implementation FAIR at the source
    3. Architecture & implementation
    4. Biobanking & registries
- Use cases should provide demonstrators for any solution from these networks

Architectural landscape – making data available



Think big – start small – act now: COVID-NL portal



***Think big**: national health data infrastructure*

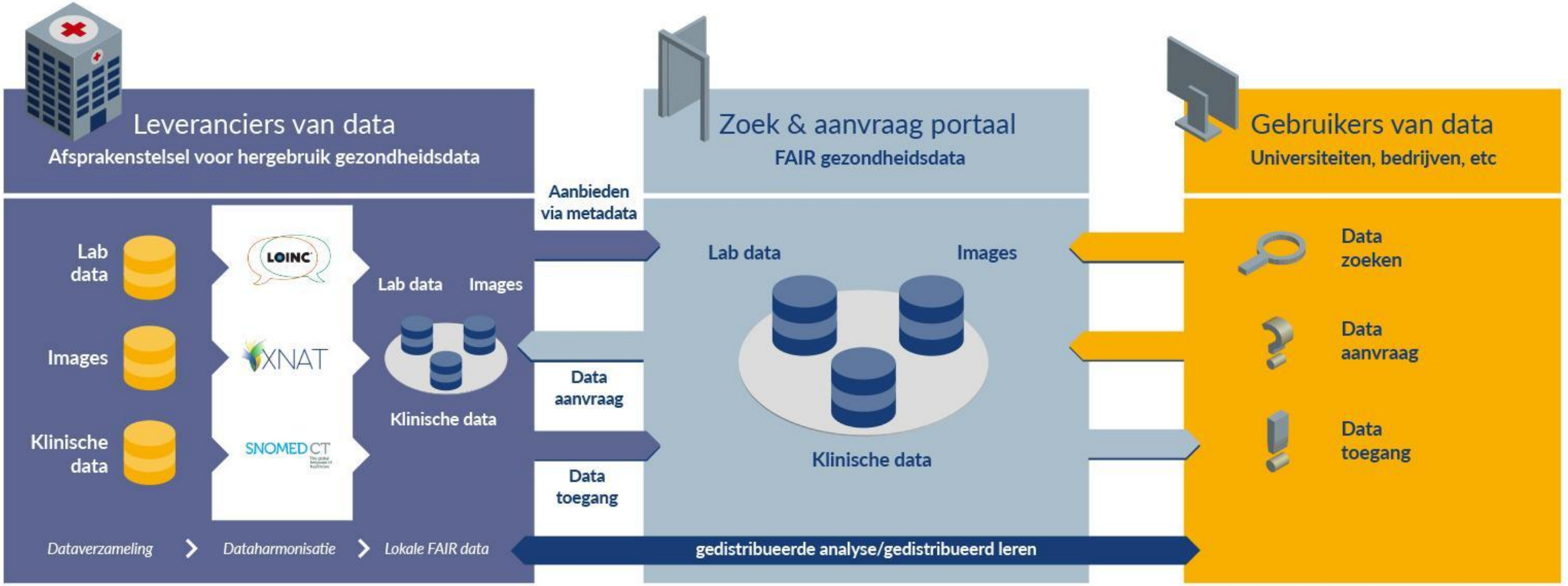
1 Connecting communities

2 Expertise, tools & services

3 Best practices

***Start small**: national COVID-19 portal*

A Health-RI demonstrator - a national COVID-19 observational data portal



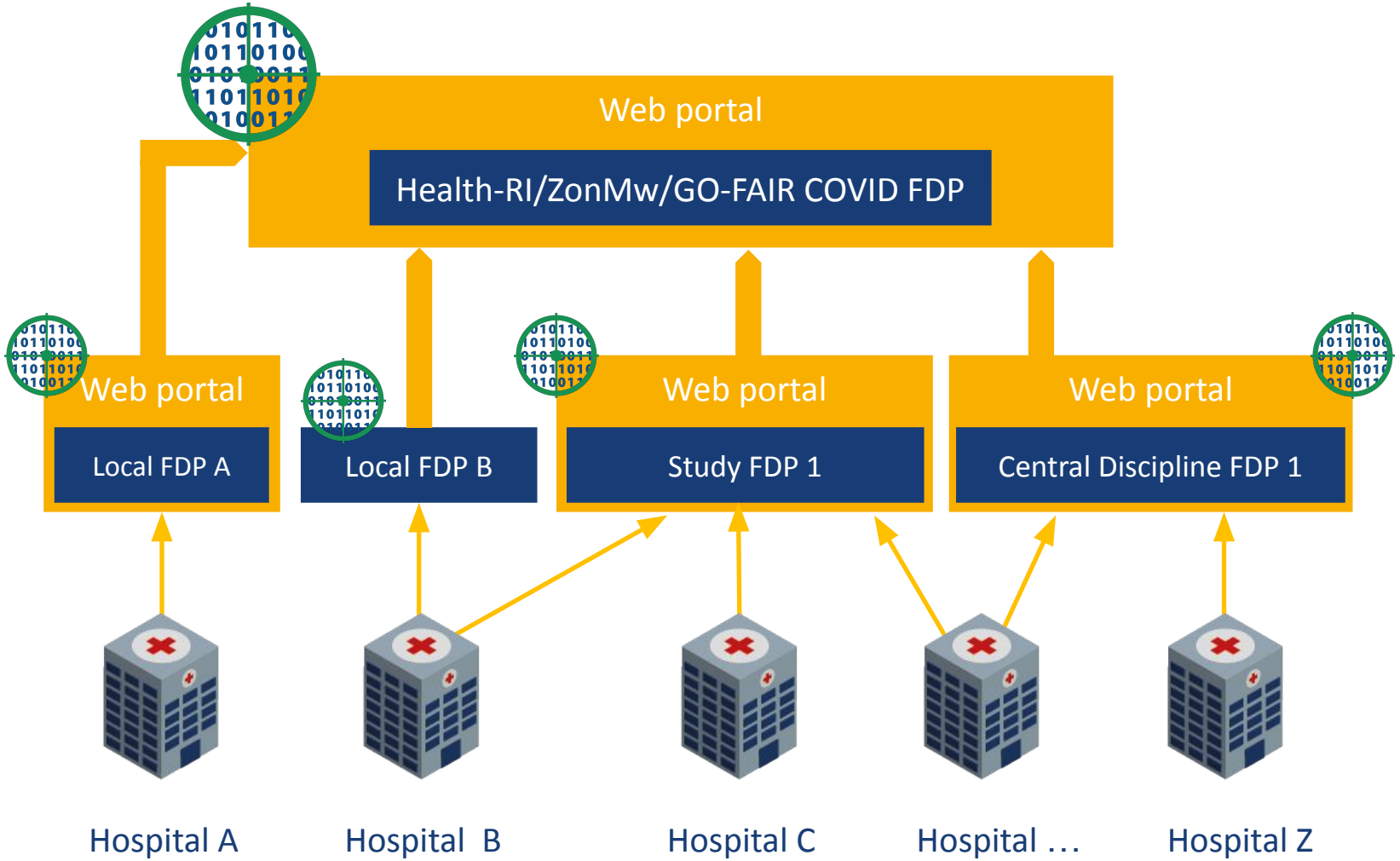
The hospitals - data contributors: Legal basis, data harmonization

The national portal - data discovery & accessibility

Users – controlled access & data reuse

Integrating local data portals into one national portal

Different portals requiring specific meta data standards ("sunflower" principle*)



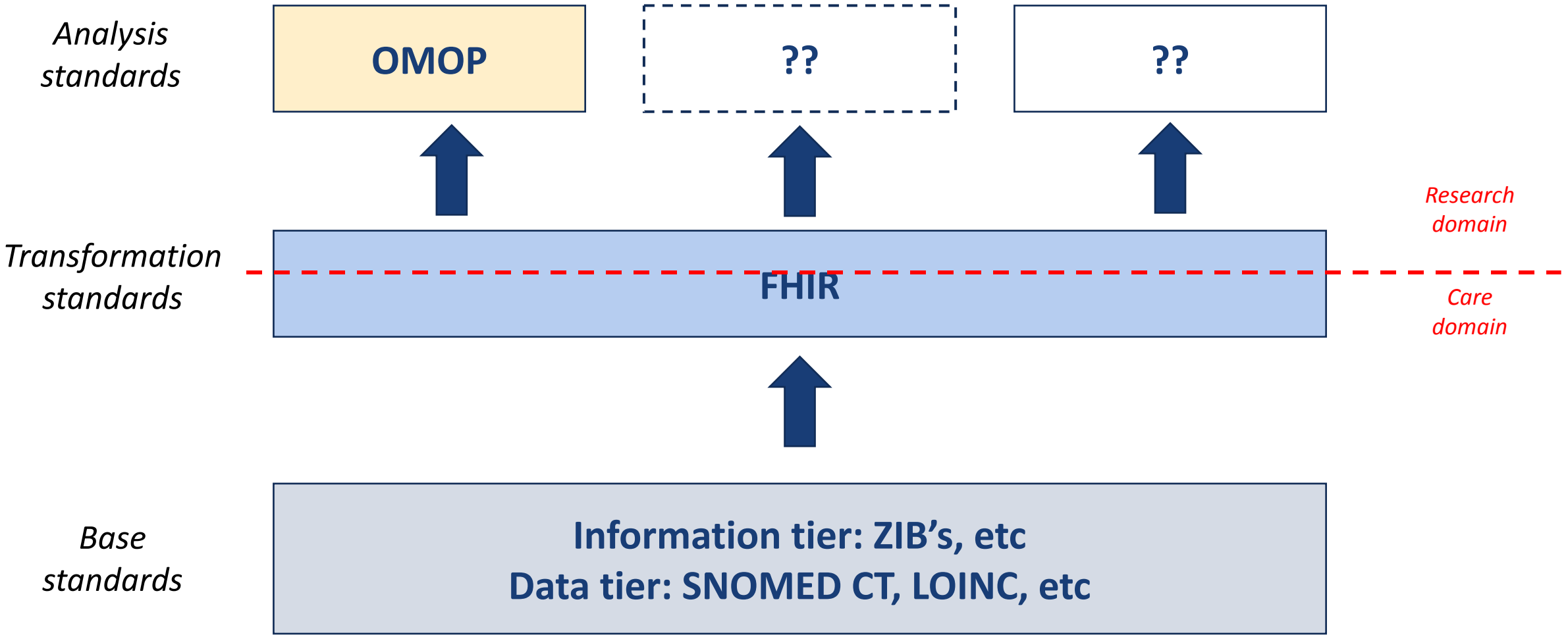
Administrative and descriptive metadata to facilitate data discovery & accessibility

Data at patient/record level

Pseudonymisation keys

**) Metaphor copied from Vincent van Pelt (NICTIZ)*

Clinical data standards – results from first workshop



COVID-NL - Challenge of scaling towards a national health data hub

DATA

Rare Disease Data in Health Data Spaces

gaia-x

- **Tala Haddad,** Scientific Project Manager, Orphanet Inserm US-14

orphanet
Inserm

The specific challenges of rare disease data

Rarity!

International is the right scale

Domain evolutivity

New RD are frequently described

Heterogeneity

Need for cross-domain harmonisation

Portability

For a consistent healthcare pathway

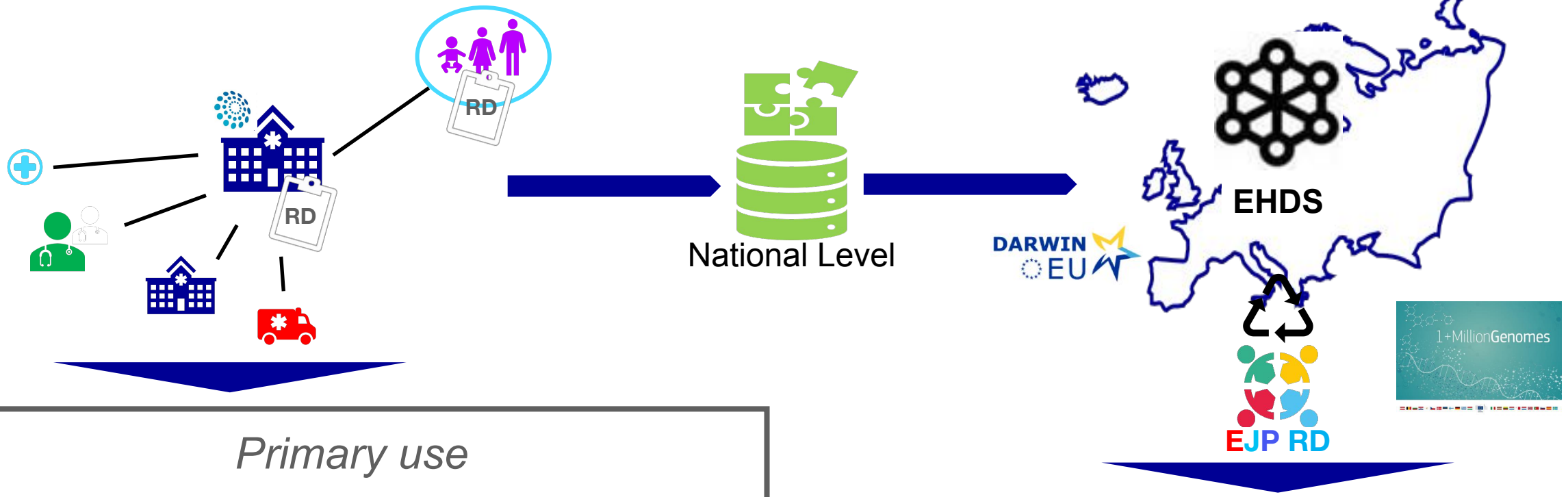
Reusability

For knowledge generation based on data

Invisibility

RD are ill-represented in health terminologies: need for codification

The ideal life of rare disease data



Primary use

- *Better knowledge, best practices*
- *Continuity of care*
- *Better disability evaluation and compensation*
- *Adequate cross-border and primary care*

Secondary use

- *Research*
- *Evidence-base decision-making*

ORPHANET NOMENCLATURE IN DETAIL

[A MEDICAL TERMINOLOGY SPECIFIC TO RARE DISEASES (<1 in 2000 cases)]

Improved rare disease codification is a European priority since the Council Recommendation on the field of rare diseases in 2009.

ordo

orphadata

ORPHACODES

Fanconi-Bickel syndrome — **PREFERRED TERM**

Suggest an update

Disease definition — **DEFINITION**

A rare glycogen storage disease due to a deficiency in solute carrier family 2, facilitated glucose transporter member 2 and characterized by hepatorenal glycogen accumulation leading to severe renal tubular dysfunction and impaired glucose and galactose metabolism.

ORPHA:2088 — **ORPHAcode**

Classification level: Disorder

Synonym(s):

GSD due to GLUT2 deficiency

GSD type 11

GSD type XI

Glycogen storage disease due to GLUT2 deficiency

Glycogen storage disease type 11

Glycogen storage disease type XI

Glycogenosis due to GLUT2 deficiency

Prevalence: Unknown

Inheritance: Autosomal recessive

Age of onset: Infancy, Neonatal

ICD-10: E74.0

OMIM: 227810

UMLS: C3495427

MeSH: -

GARD: 2268

MedDRA: -

SYNONYMS

elixir Core Data Resource

gaia-x

CC BY

RD General interoperability

ORPHA CODES

International Classification of Diseases (ICD)

SNOMED CT

GSD due to GLUT2 deficiency

Choroba spichrzania glikogenu z powodu niedoboru GLUT2

ORPHA:2088

Fanconi-Bickel syndrome

Syndroom van Fanconi-Bickel

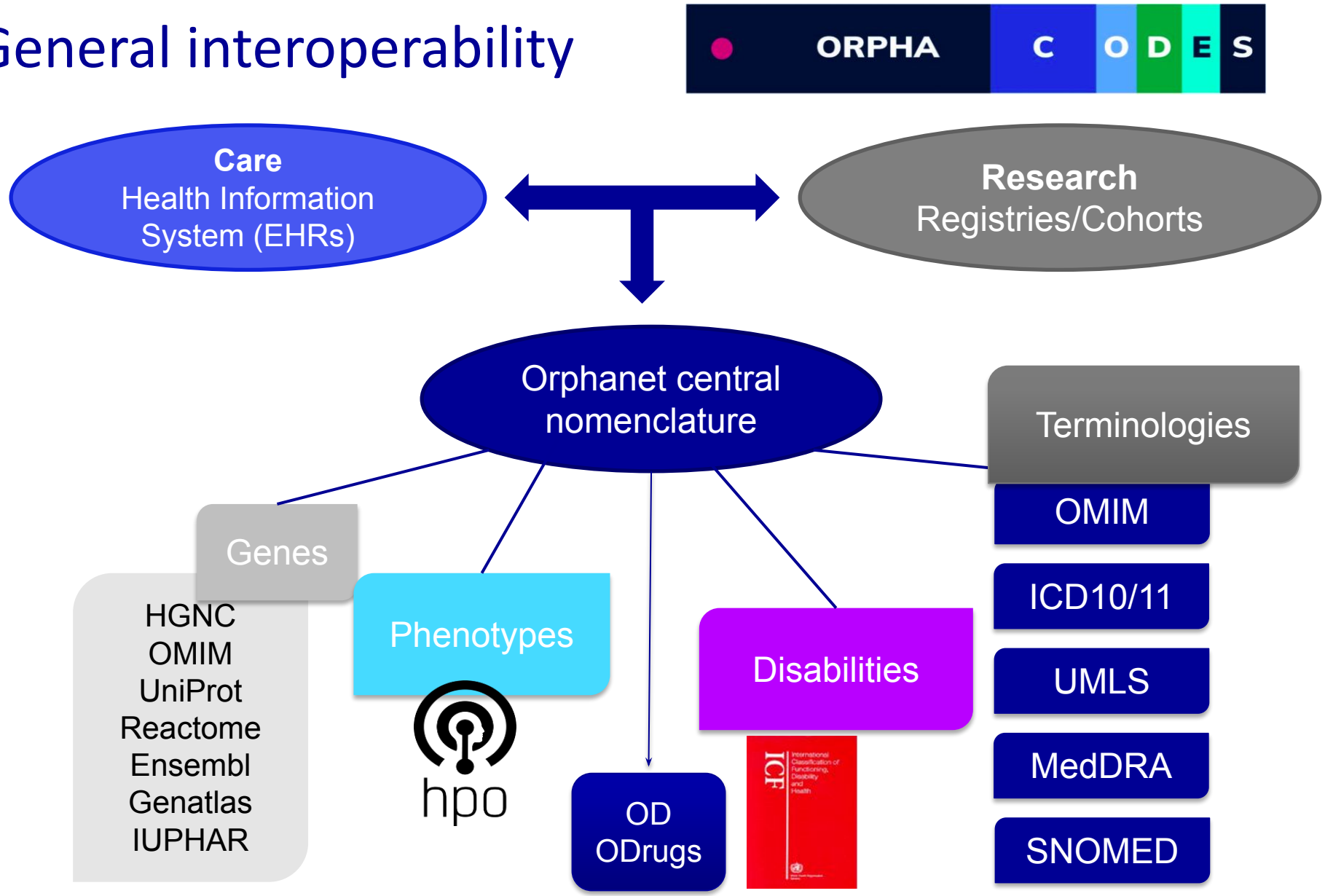
Care

Health Information Systems

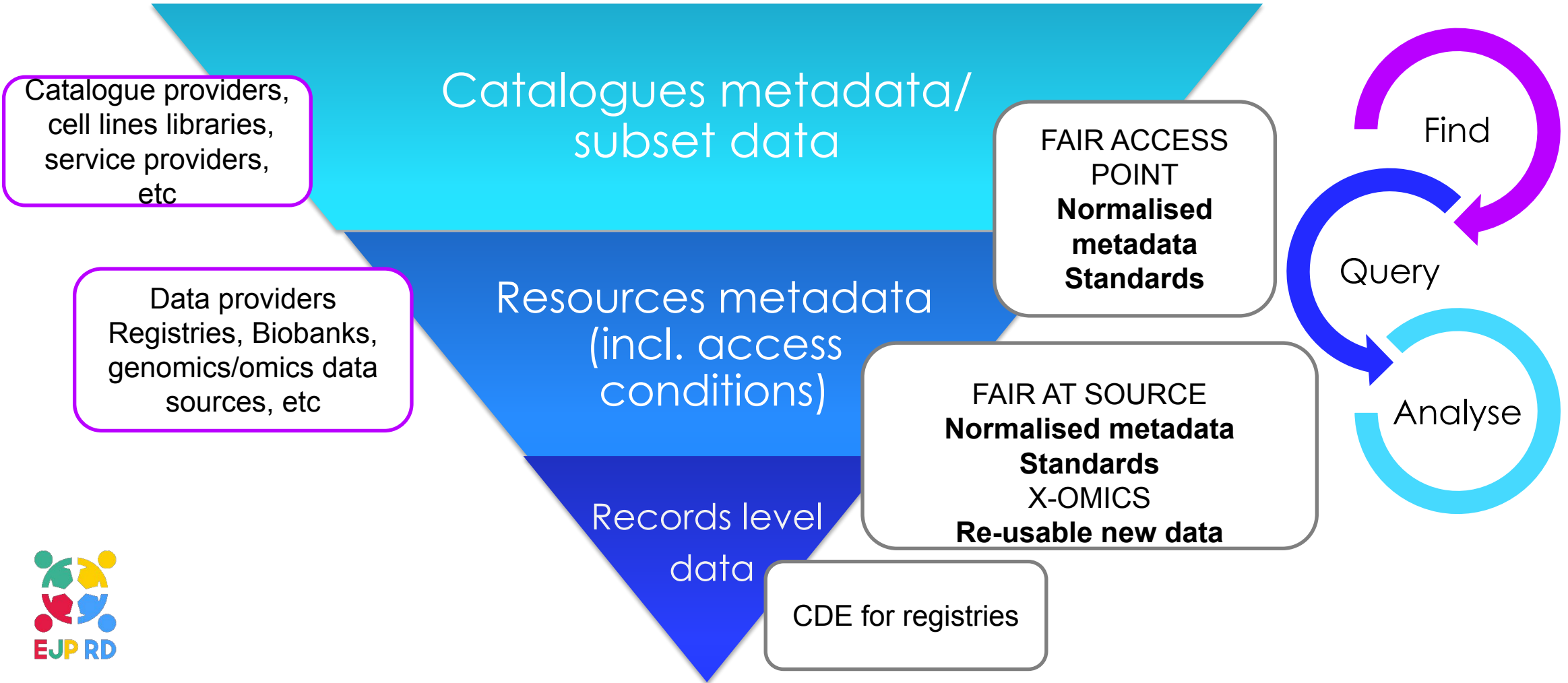
Research

- Registries, - Cohorts, - Biobanks

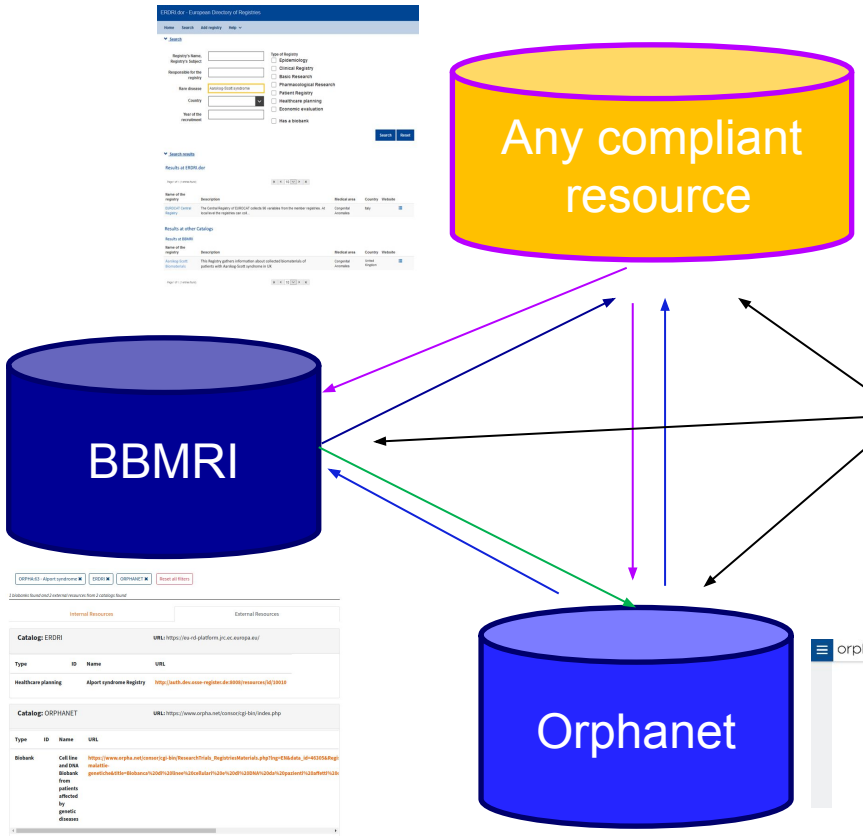
RD General interoperability



European Joint Programme on Rare Diseases. “Virtual” Platform discoverability layers

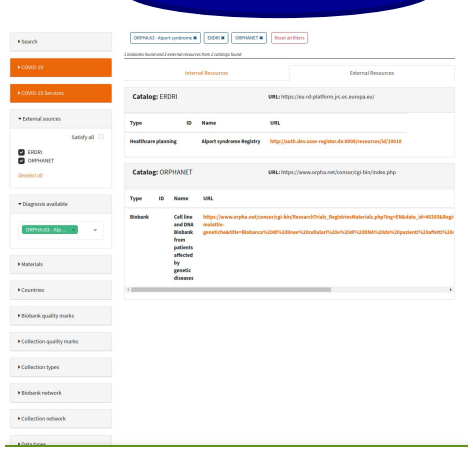


European Joint Programme on Rare Diseases



Queries accross resources in a **federated** manner.
Based on metadata alignements and common API

EJP-RD Query Builder - Federated Resource Discovery



Search for rare disease orphacode ...

Search Options

Included	Source Name	Resource Type(s)	Availability
☑	BBMRI	Biobanks	
☑	Orphanet	Registries Biobanks	
☑	ERDRI.dor	Registries	

European Joint Programme on Rare Diseases

- **Catalogs and resource metadata description based on DCAT 2.0**
- **Rare Diseases registries specific “CDE” (common data elements)**
- **Ontologies & controlled vocabularies** Provides a consistent way to describe dataset **ORDO**, **HPO**, LOINC, ICD…
- Mappings services
  - Semantic (ORDO ⇔ ICD, Snomed...)
  - Models (HL7, OMOP, FHIR...)

Building an ecosystem for RD data exchanges.
Not reinventing the

List of Ontologies in the model

Edit | New Page

brunasv edited this page on 21 Dec 2021 · 3 revisions

This table has a list of all the ontologies used in the CDE semantic model. The first column has links to either download the ontology or to browse it. The prefix links are not all resolvable. Some comments on the usage of ontologies or the prefixes of the ontologies as used in the model are also given.

Disclaimer: This table is outdated (version from 2020) and it will be updated in 2022.

Ontology name	Prefix link	Prefix	Comments
Ontology for Biomedical Investigations (OBI)	http://purl.obolibrary.org/obo/	obo	
RDConnect Ontology	http://rdf.biosemantics.org /ontologies/rd-connect/	rdc-meta, rdc	In the images the prefix is *rdc-meta* but in the ShEx and Turtle files the prefix is *rdc*.
NCBI Taxon	http://purl.obolibrary.org/obo/	ncbi, obo	In the images the prefix is *ncbi* but in the ShEx and Turtle files the prefix is *obo*.
National Cancer Institute Thesaurus (NCIT)	http://purl.obolibrary.org/obo/	ncit, obo	In the images the prefix is *ncit* but in the ShEx and Turtle files the prefix is *obo*.
SNOMED CT	http://purl.bioontology.org /ontology/SNOMEDCT/	snomedct	
HL7	http://purl.bioontology.org /ontology/HL7/	hl7	
The Phenotype and Trait Ontology (PATO)	http://purl.obolibrary.org/obo/	pato, obo	In the images the prefix is *pato* but in the ShEx and Turtle files the prefix is *obo*.
Orphanet Rare Disease Ontology (ORDO)	http://www.orpha.net/ORDO/	orpha	ORDO is only used in the image and not in the ShEx and Turtle files.
Logical Observation Identifier Names and codes (LOINC)	http://purl.bioontology.org /ontology/LNC/	loinc	

Pages 26

- Home
- Modelling Process
  - List of Ontologies used
  - License information for ontologies
- Modules (v0.1.0)
  - Person
  - Pseudonym
  - Personal information
  - Patient status
  - Care pathway
  - Disease history and diagnosis
  - Genetic diagnosis
  - Undiagnosed
  - Consent
  - Biobanks
  - Disability
- Modules(v0.2.0)
  - Core Model
  - Pseudonym
  - Personal information
  - Patient status
  - Care pathway
  - Disease history and diagnosis
  - Genetic diagnosis
  - Undiagnosed
  - Consent
  - Biobanks
  - Disability

Clone this wiki locally

https://github.com/ejp-rd-vp/CDE

HL7 Interoperability lessons learned

- **Lloyd McKenzie,** Management Consulting Principal Director - Healthcare Standards

HL7 Interoperability lessons learned

Gaia-X – Enable the future of Health

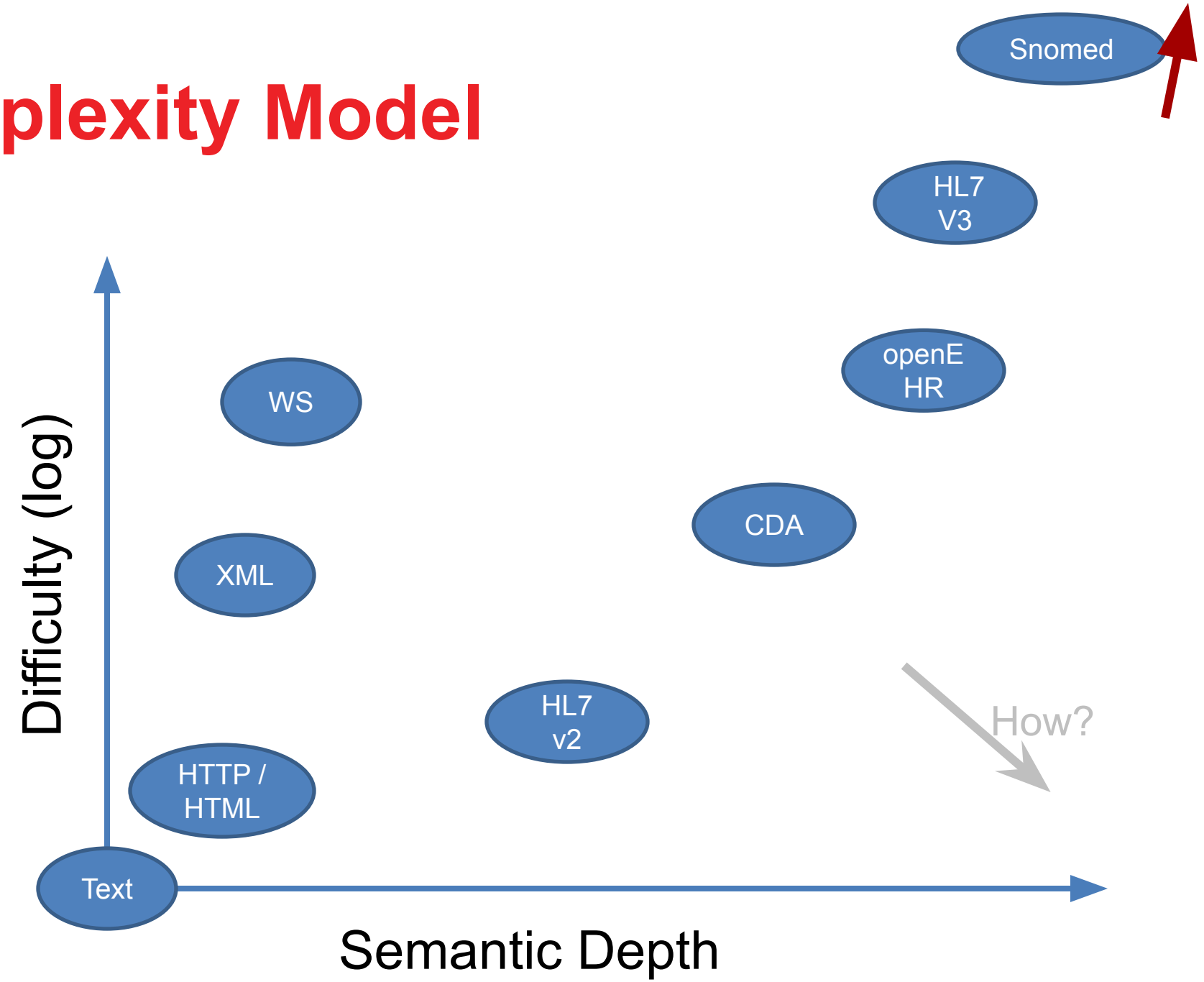
Lloyd McKenzie
Apr. 4, 2022

HL7® International

FHIR®

CC BY

Complexity Model



FHIR – Key differences

- Focus on **Implementers**
- Target support for **common scenarios**
- Leverage cross-industry **web technologies**
- Require **human readability** as base level of interoperability
- Make content **freely available**
- Support multiple **paradigms** & architectures
- Demonstrate best practice **governance**

Other keys to modern interoperability

- Extensibility
- Discoverability
- Provenance
- Data tagging
- Computable profiling
- Shared registries
- Flexibility in sharing approaches

HL7 International
© 2020 Health Level Seven ® International. All Rights Reserved. Published under the Creative Commons 3.0 Attribution Unported license

Contact me

- lloyd.mckenzie@accenture.com

- Or, better yet, http://chat.fhir.org

Q&A

gaia-x

Session Summary