

# VODAN & SOLID



# Speaker Information



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Outreach Coordinator

# Presentation subjects

1. Enabling OLR and resolving digital black holes using FAIR in the Africa Health Data Space

2. Responsible AI through FAIR-OLR data

3. Strengthening of global equity

# Africa Health Data Space

## Introduction

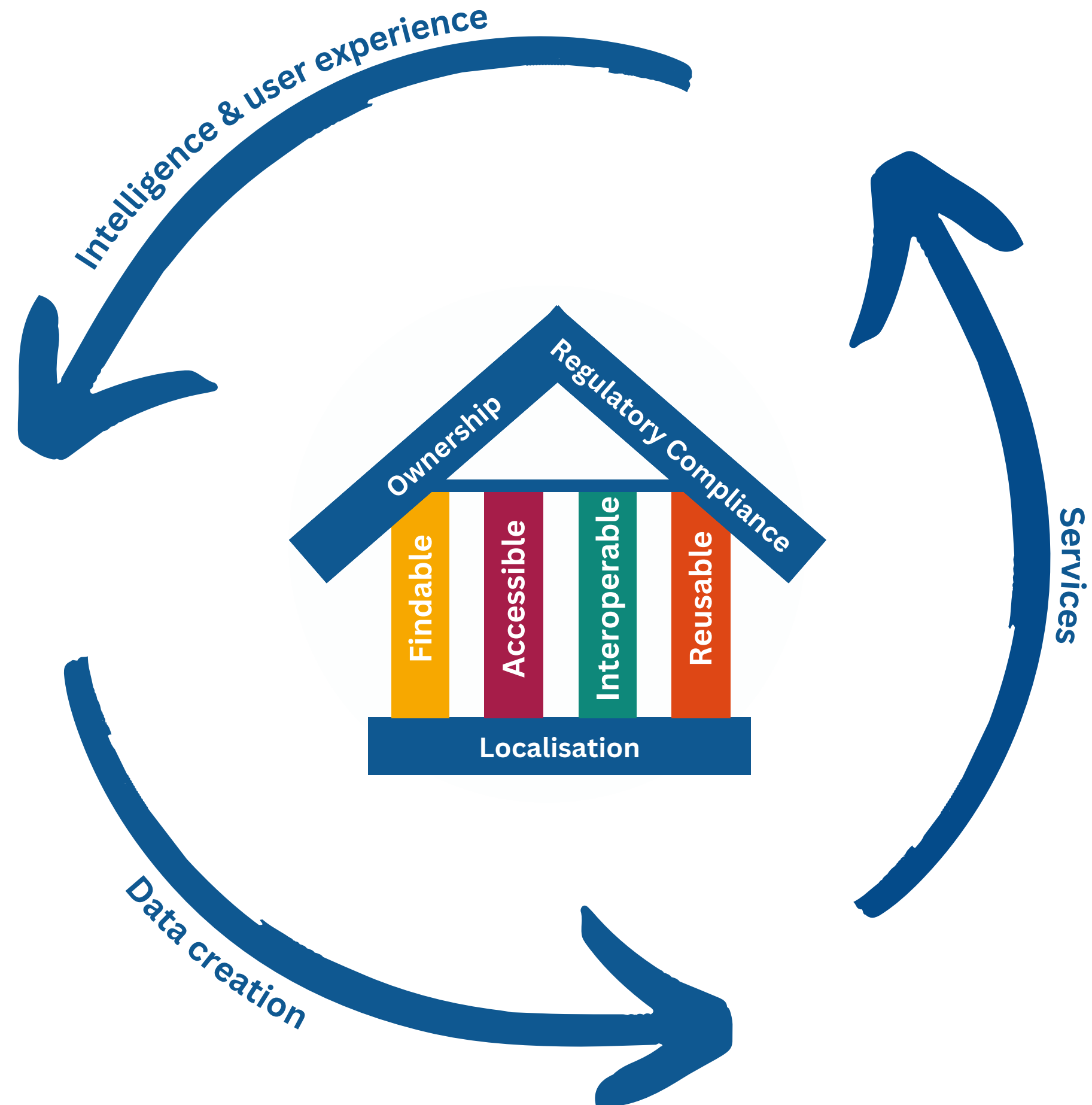
- The Africa Health Data Space is created by VODAN-Africa in 2020 in response to the COVID-19 pandemic
- COVID pandemic showed the problem of **digital data black holes** in Africa (and elsewhere)
- VODAN-Africa establishes a FAIR and ethical data pipeline produced and repositied in health facilities to strenghten point of care services



# Africa Health Data Space

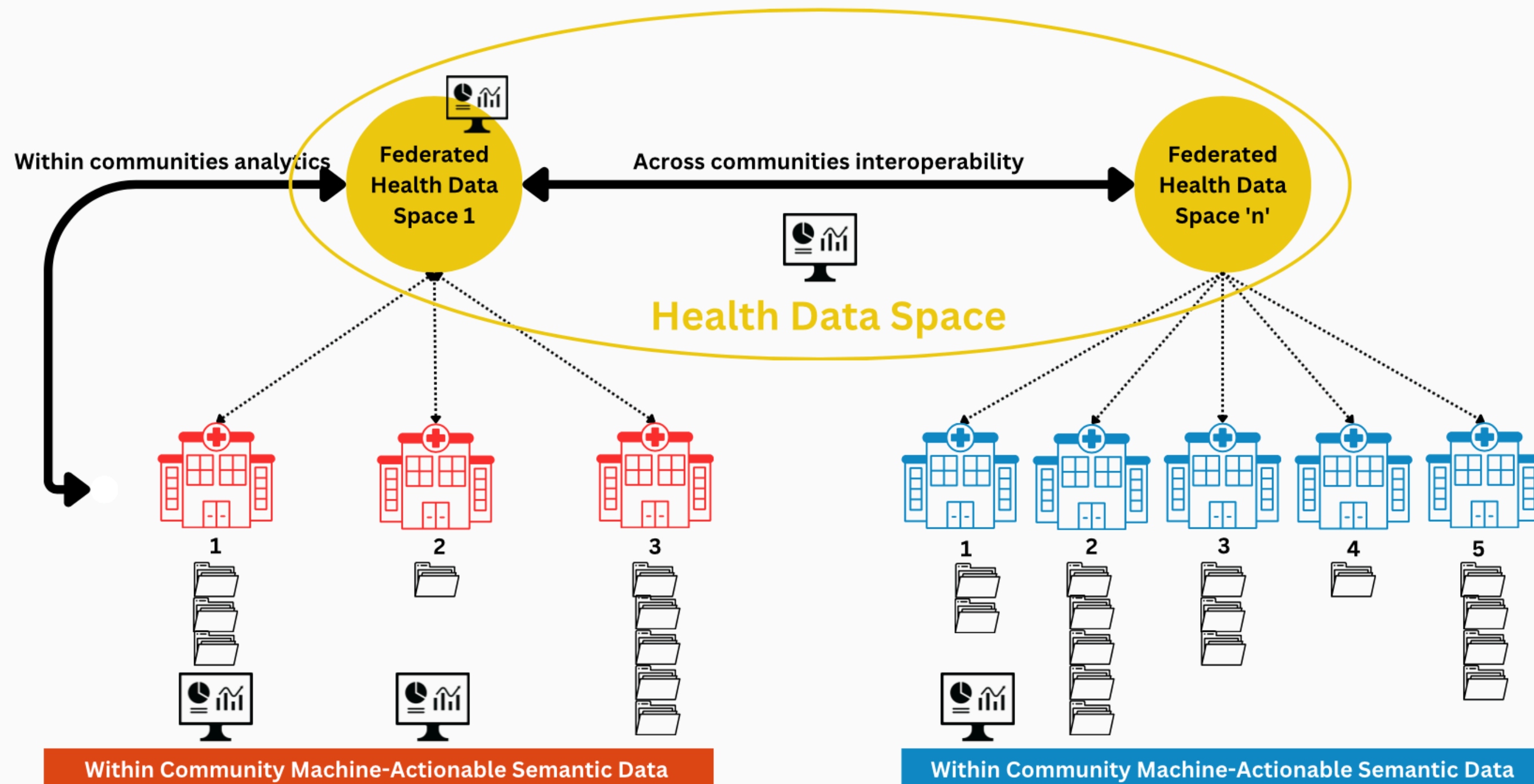
## Introduction

- VODAN realizes interoperable and reusable data in residence through **data visiting**
- Data residence (data resides where it is produced) requires federated FAIR-OLR
  - Findable, Accessible, Interoperable, Reusable
  - Ownership, Localisation, Regulatory Compliance

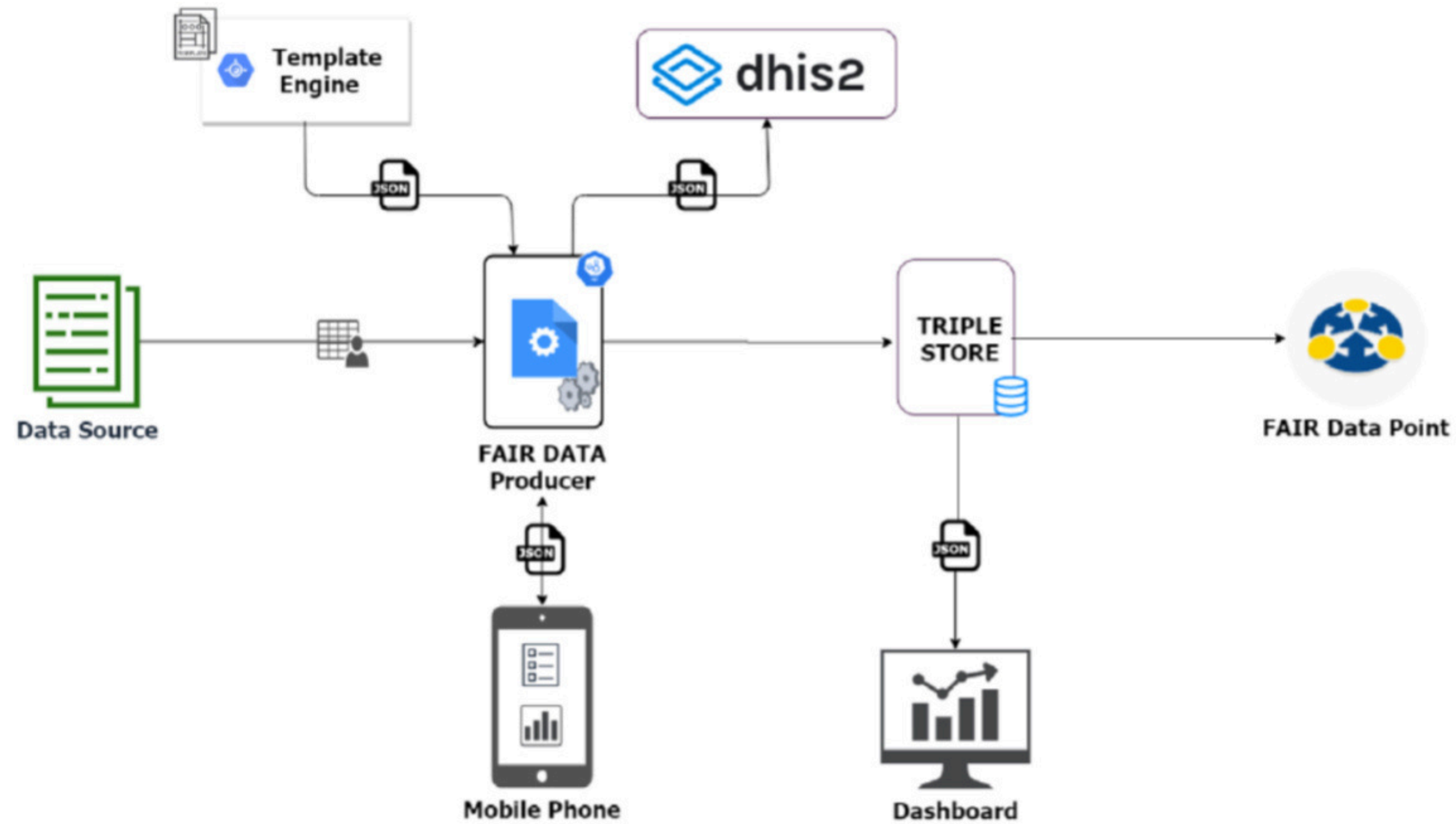


# Africa Health Data Space

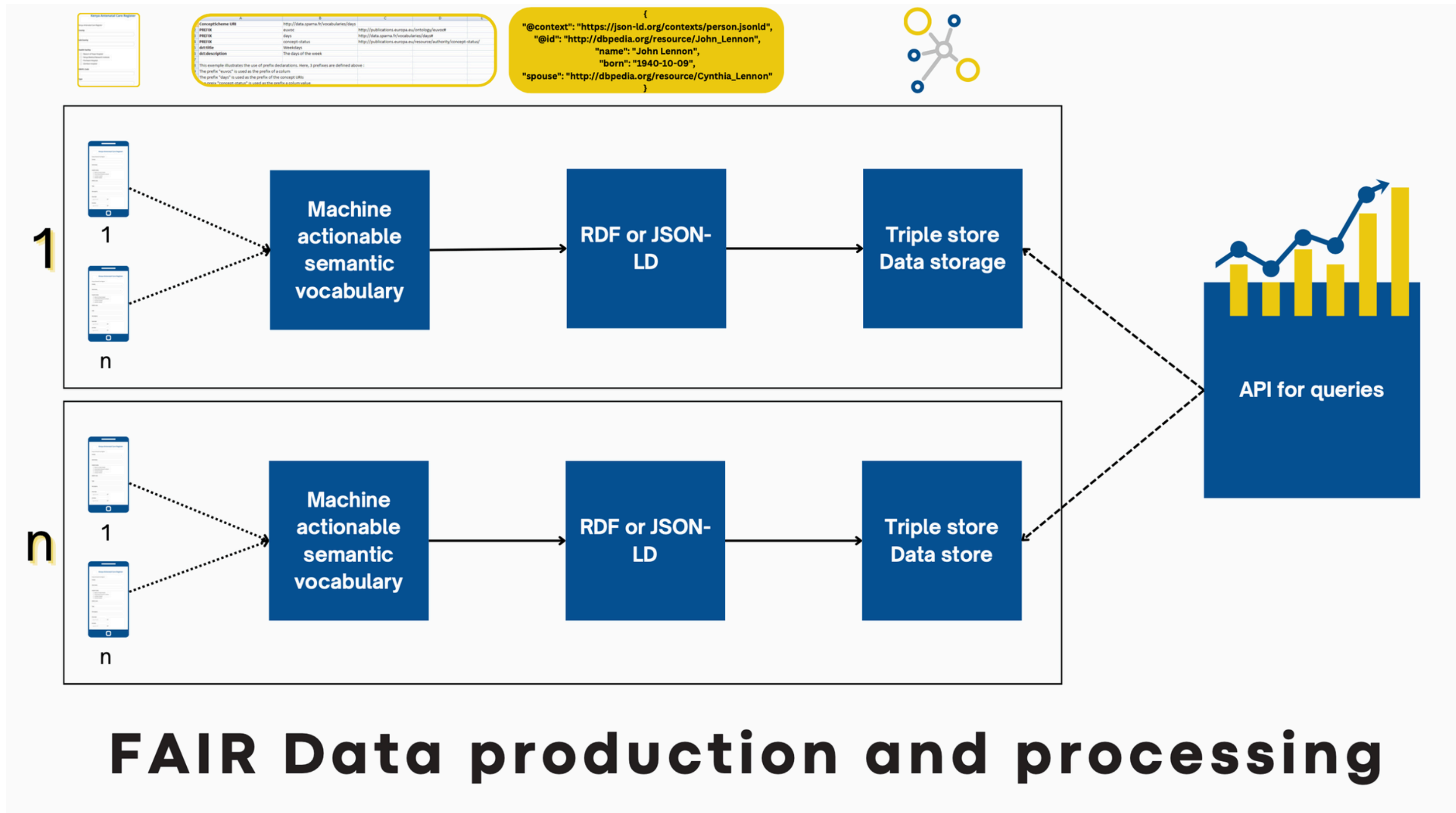
## FAIR-OLR Federated analysis & learning



# Data Production Architecture



# Data Production Architecture



## FAIR Data production and processing



# Data Production Architecture

## Data creation process

**Kenya Antenatal Care Register**

Kenya Antenatal Care Register

County

Sub-County

Health Facility

Beacon of Hope Hospital

Kenya Medical Research Institute

Pumwani Hospital

Zambazi Hospital

KMHFL Code

Type

Man Agency

Start date

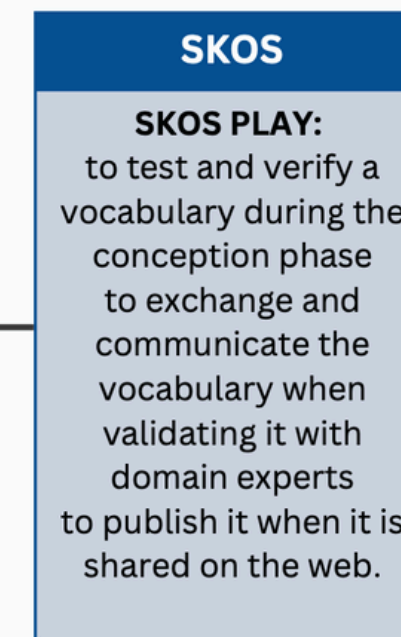
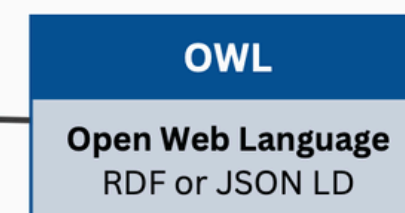
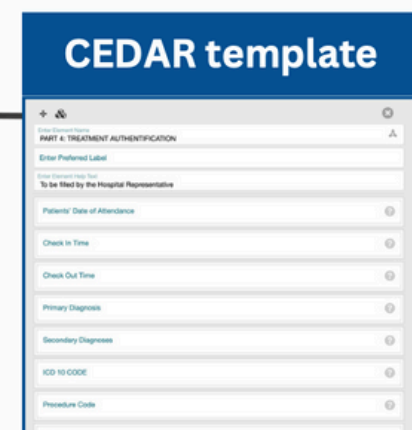
End date

\*Date of visit

Vocabulary does not exist

Vocabulary exists

	A	B	C	D	E
1	ConceptScheme URI	http://data.sparna.fr/vocabularies/days			
2	PREFIX	euvoc	http://publications.europa.eu/ontology/euvoc#		
3	PREFIX	days	http://data.sparna.fr/vocabularies/days#		
4	PREFIX	concept-status	http://publications.europa.eu/resource/authority/concept-status/		
5	dct:title	Weekdays			
6	dct:description	The days of the week			
7					
8	This exemple illustrates the use of prefix declarations. Here, 3 prefixes are defined above :				
9	The prefix "euvoc" is used as the prefix of a colum				
10	The prefix "days" is used as the prefix of the concept URIs				
11	The preix "concept-status" is used as the prefix a colum value				



Source: Haixia Li and Li Yan. 2021. A Temporal RDF Model for Multi-grained Time Information Modeling. In 2021 4th International Conference on Data Science and Information Technology (DSIT 2021), July 23-25, 2021, Shanghai, China. ACM, New York, NY, USA, 9 Pages. <https://doi-org.tilburguniversity.idm.oclc.org/10.1145/3478905.3478908>

Link: <https://more.metadatascenter.org/tools-training/cedar-template-tools>

# Data Analytics

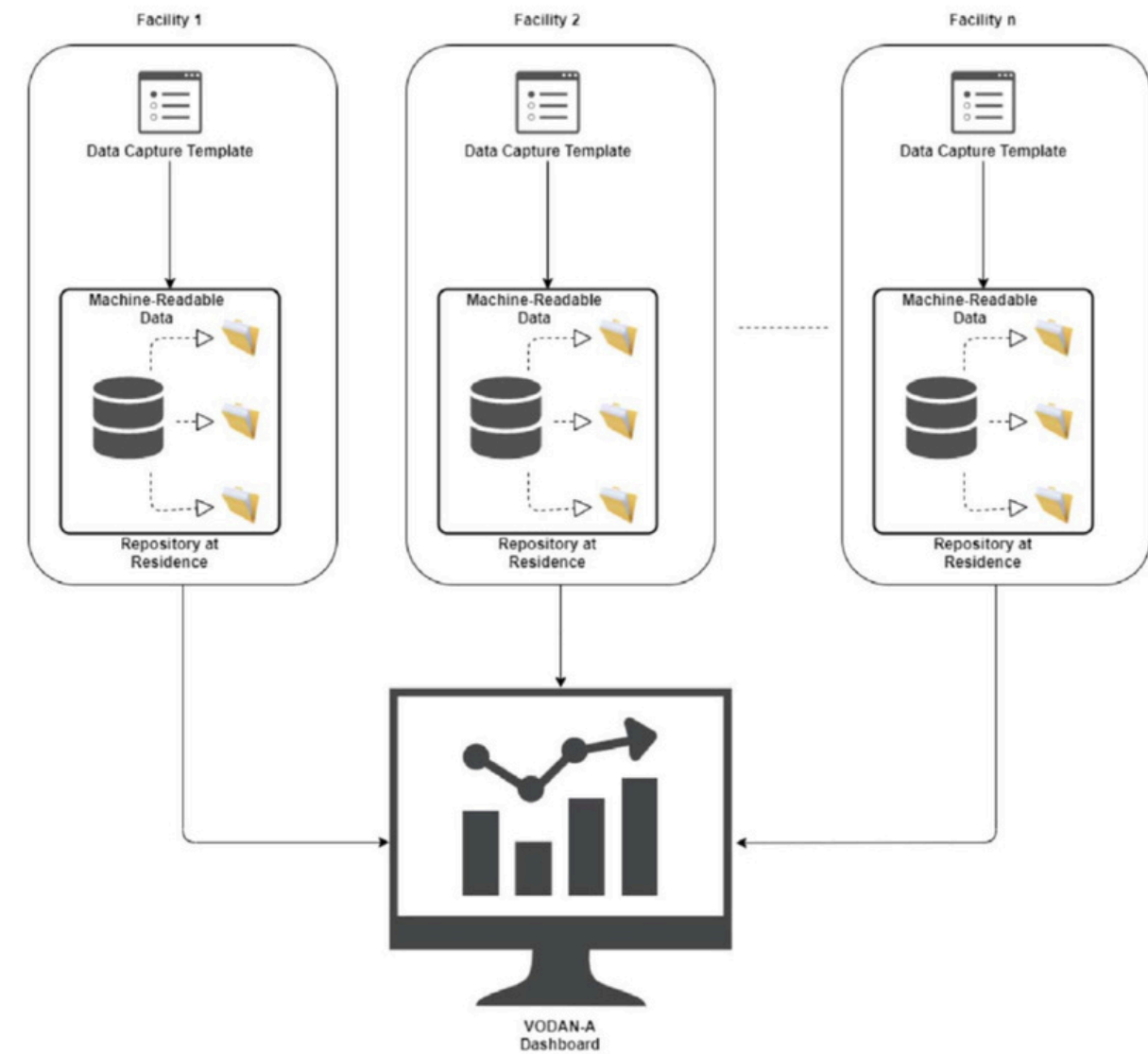
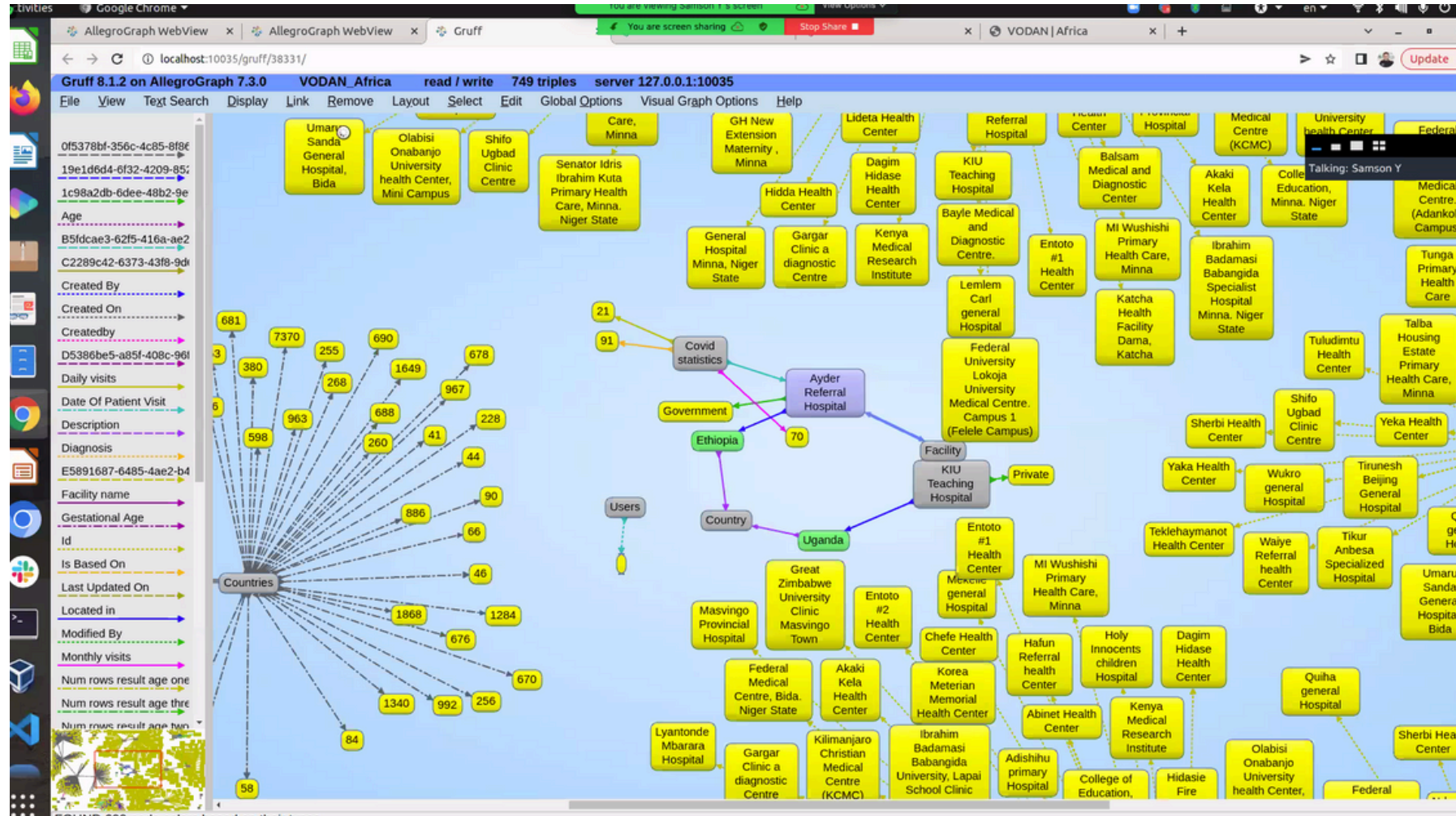


Fig. 3. Interoperability across health facilities in VODAN Africa.

**Realization in 2023:** Quality data pipeline of 12 health facilities, generating data on > 20,000 patients representing > 350,000 triples



- [Overview](#)
- [OPD Statistics](#)
- [COVID-19 Statistics](#)
- [ANC Statistics](#)
- [Login](#)

### VODAN-A Dashboard

Welcome to VODAN-Africa Dashboard

### OSF

VODAN-Africa Resources

### FIP

VODAN-Africa FAIR Implementation Profile

**8**

Countries

**67**

Facilities with Patient Instances

**8452**

Patient Instances

#### Participating Countries

Ethiopia	30 Facilities
Kenya	3 Facilities
Liberia	1 Facility
Nigeria	21 Facilities
Somalia	19 Facilities
Tanzania	1 Facility
Uganda	6 Facilities
Zimbabwe	7 Facilities

#### Facility Overview

**UGANDA**  
6



# African Health Data Space

## Generic connective capabilities - users

Ecosystem APIs

Intelligence



User Experience

## Infrastructure services

Data storage and hosting

Hosting & operations

Hybrid in location & local cloud

## Generic Data Capabilities - services

Federated data management

Regulatory Compliance,  
Privacy & Protection

Data Visiting &  
interoperability

Digital IT & Customer  
service

## Data layer-single copy, machine actionable data creation

Machine-actionable and semantically linked clinical, operational & research data at point of creation  
(produced for instance : in point of care, point of service, or at research data collection)

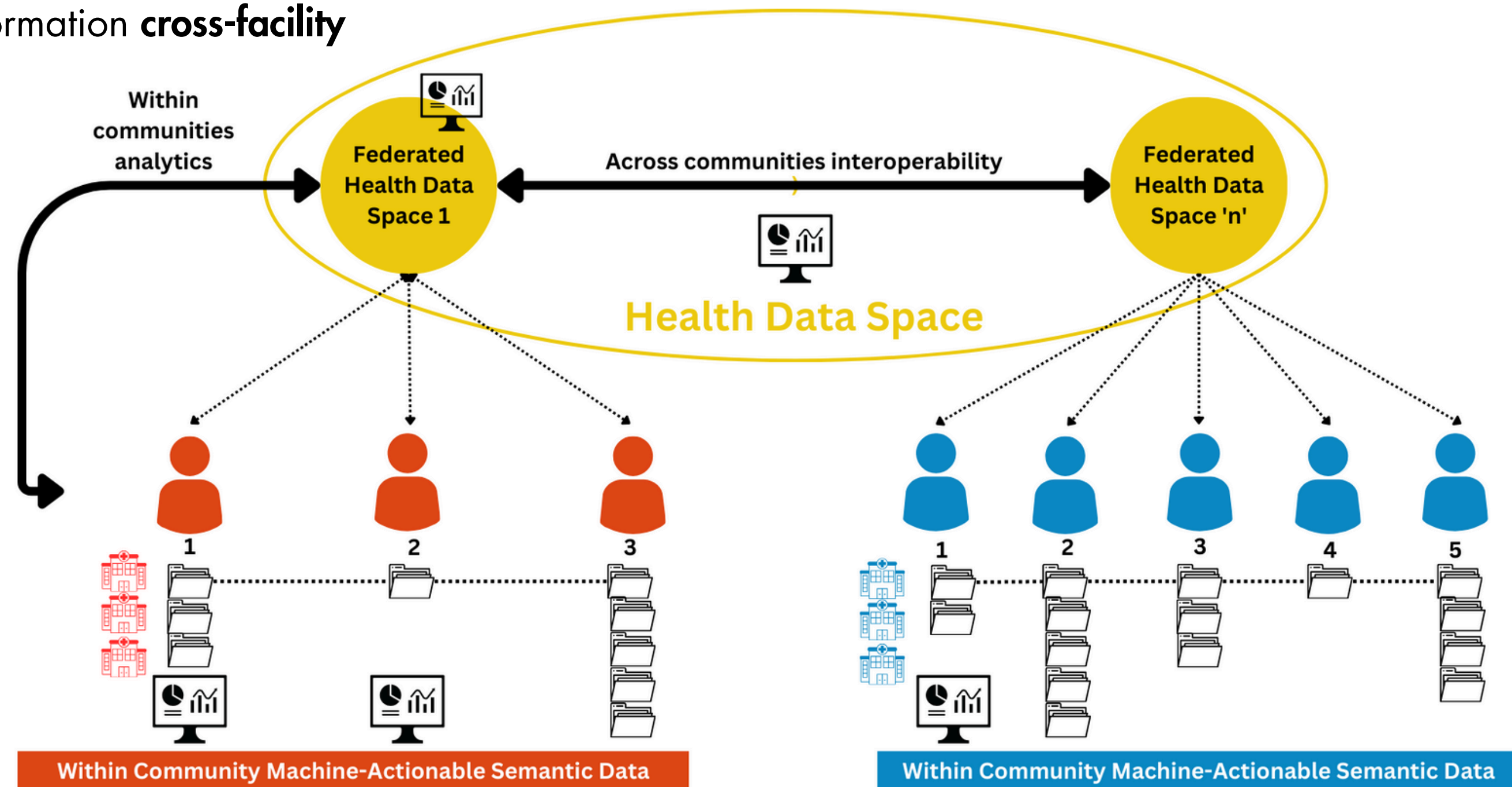
# Personal Data Stores

- **Decentralized** nature of VODAN and **sensitive data** means data pod technology is a perfect fit
- VODAN is **operational** - real-world testing ground
- No implementations yet, but **researching** the possibilities
- Current use-cases:
  - Cross-clinic patient information pods
  - Refugee data pods

# Personal Data Stores

## Personal Data Stores in VODAN

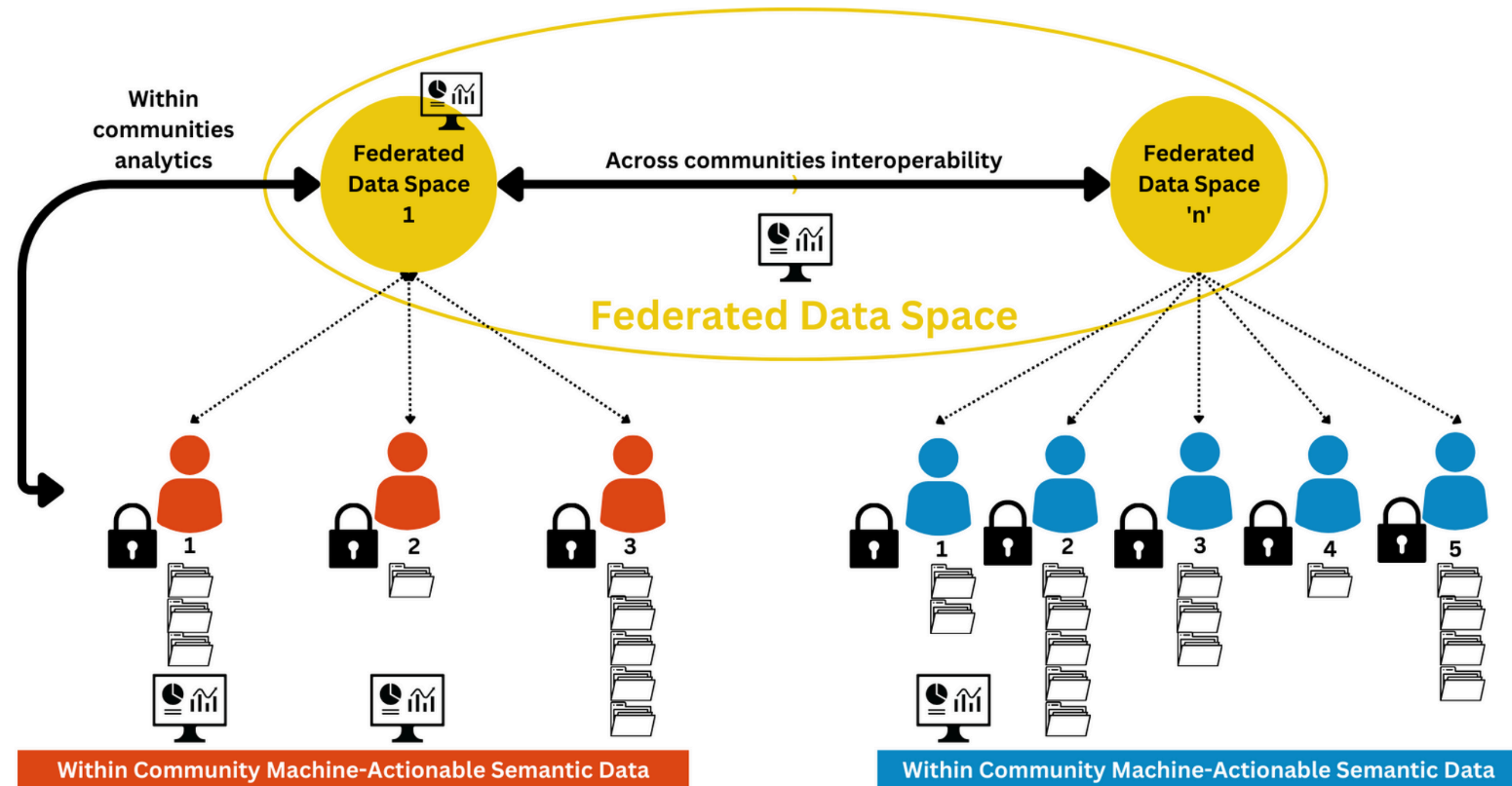
- Data recorded in a facility **never leaves** it
- Patients can access own information **cross-facility**



# Personal Data Stores

## Personal Data Pods in VODAN

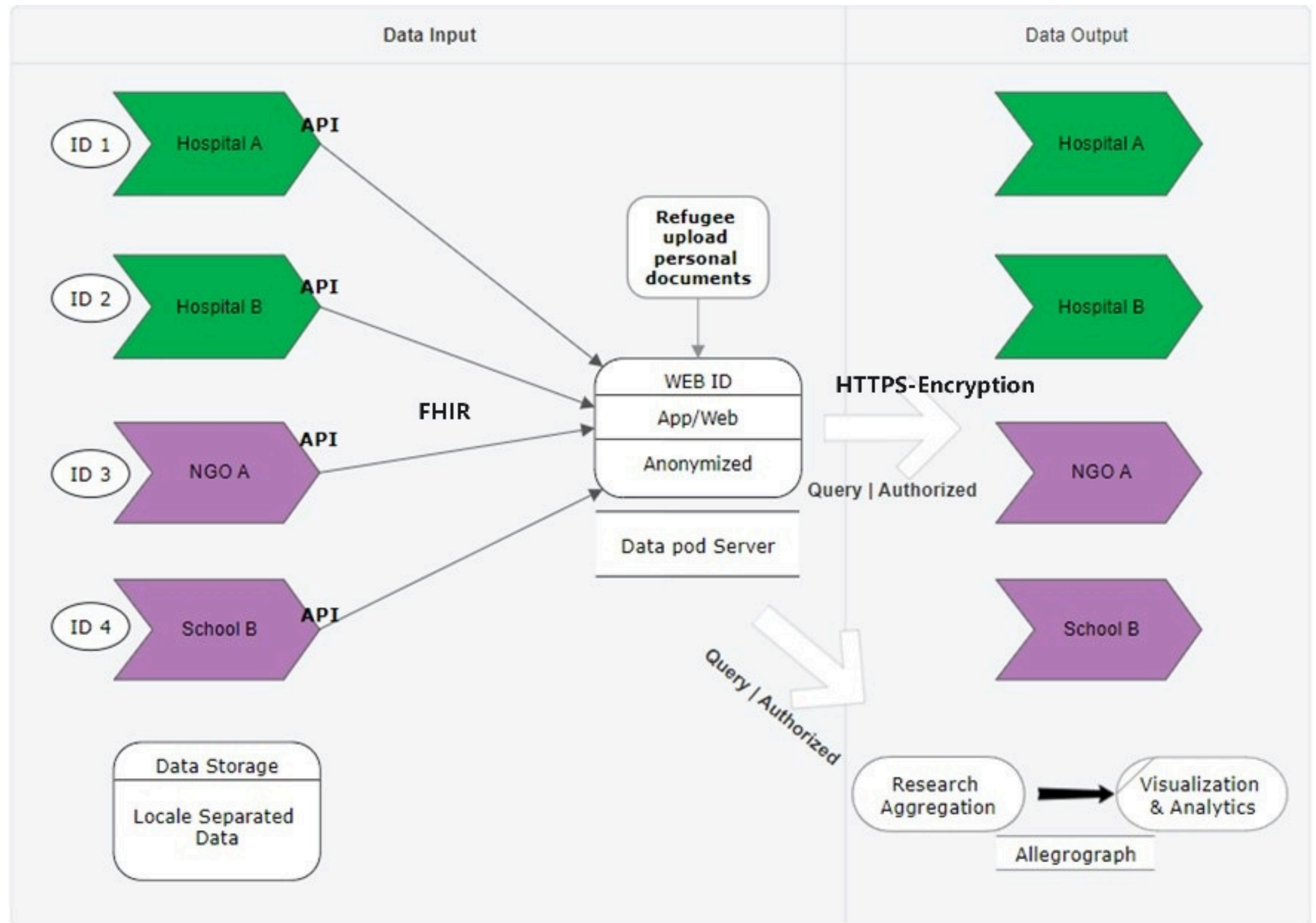
- In data pods, data subjects can **control access** to their own information



# Personal Data Stores

## SecuRePod

- FAIR-based personal data pods for refugees on the move [2]
- Data stored at its producer.
- Relevant data accessible from the refugee pod

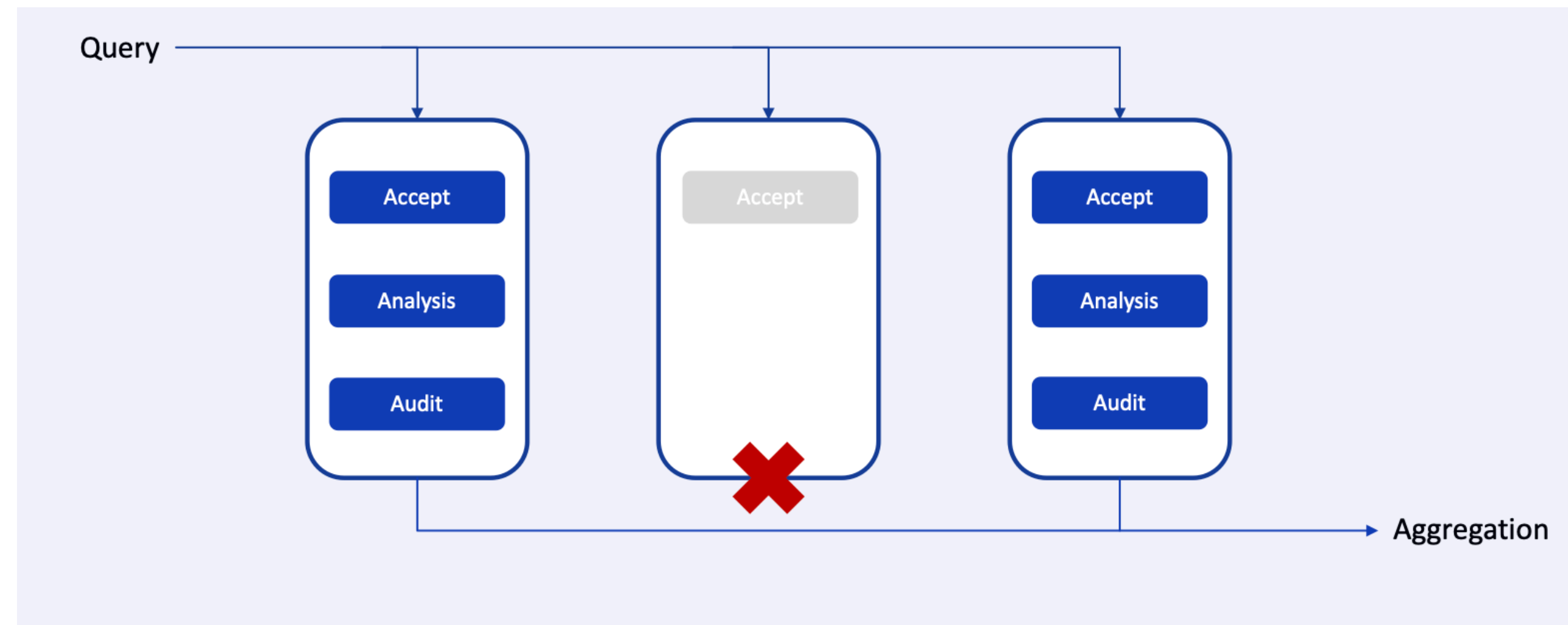




# Personal Data Stores

## Data Visiting Algorithm

- **Federated querying** through the data visiting algorithm [1]
- Access control based on personal, **informed consent** (GDPR)
- Data **never leaves** the pod, only query results
- Foundation for **responsible AI**



# Contributing towards an ethical global internet

## Towards a global interoperable environment

- Enabled with data visiting
- VODAN is a network, so we work closely with institutions in Africa, Europe, and the US.
- One solution => Data Pods



# Contributing towards an ethical global internet

## Global Interdependency

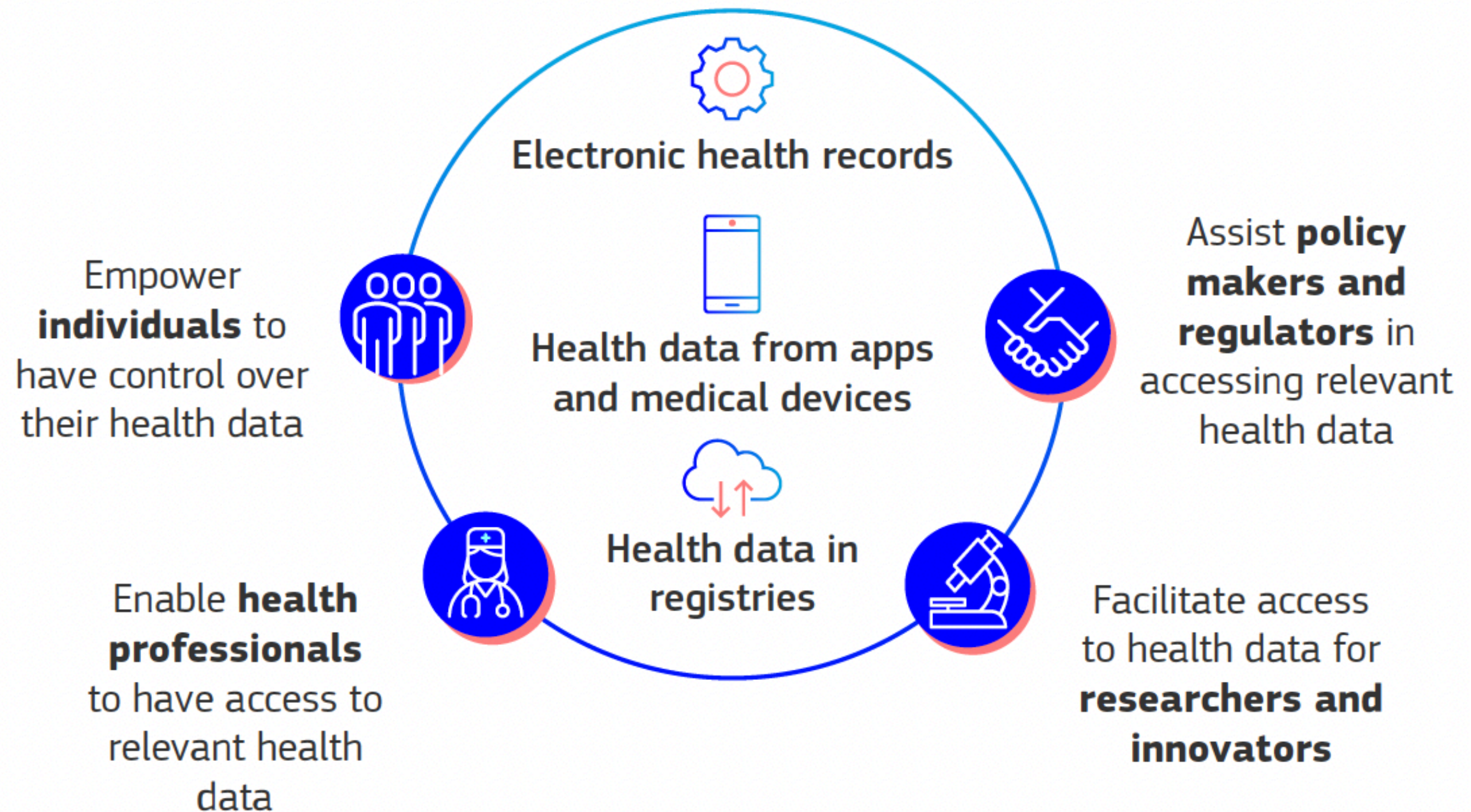
- Health
  - Pandemics
  - Infectious diseases
  - Effectivity of vaccinations
- Energy Transition
- Climate
- ...



# Federated system

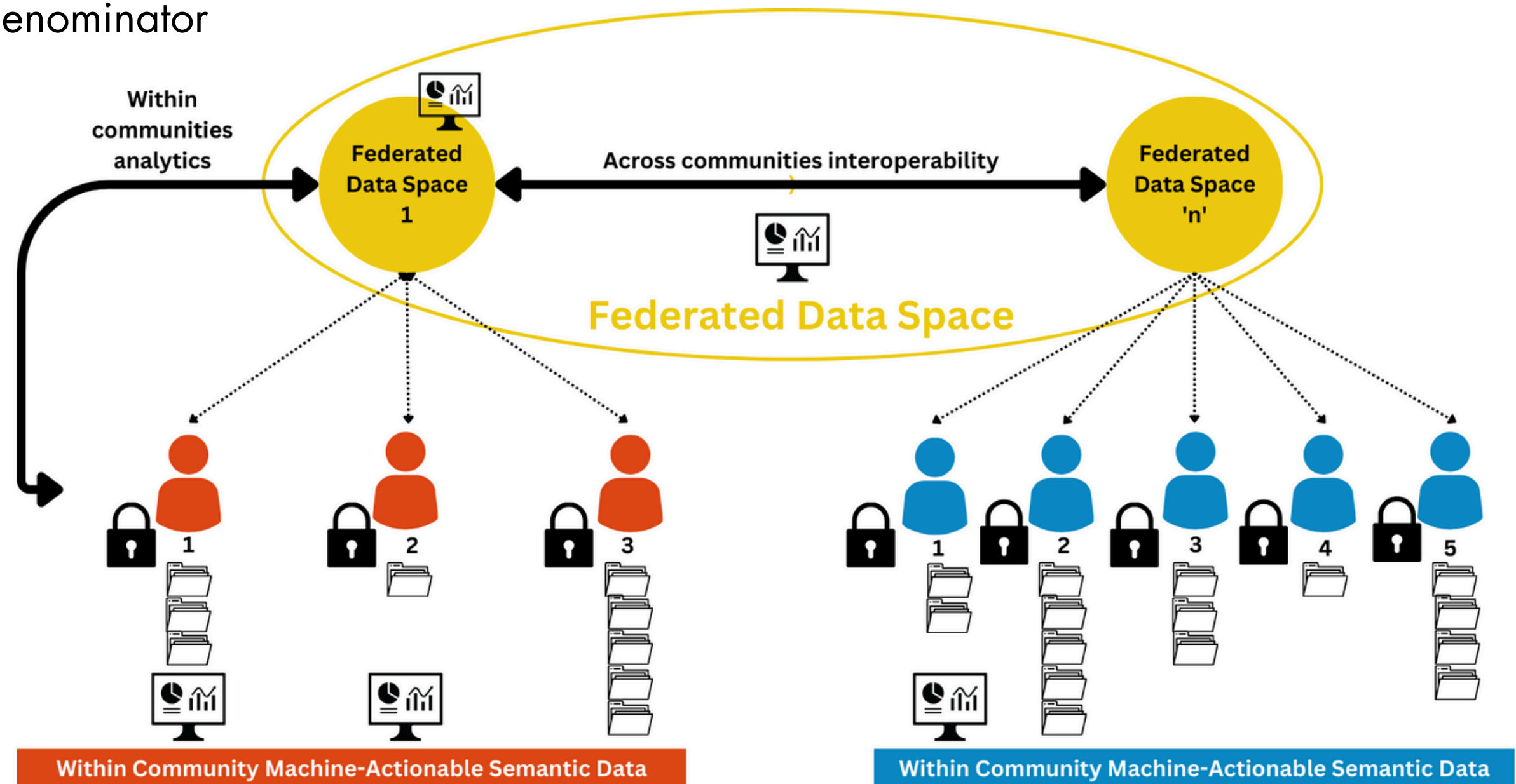
## Local regulations and practices

- European Health Data Space
- Strong GDPR & privacy regulations
- Autonomy and sovereignty



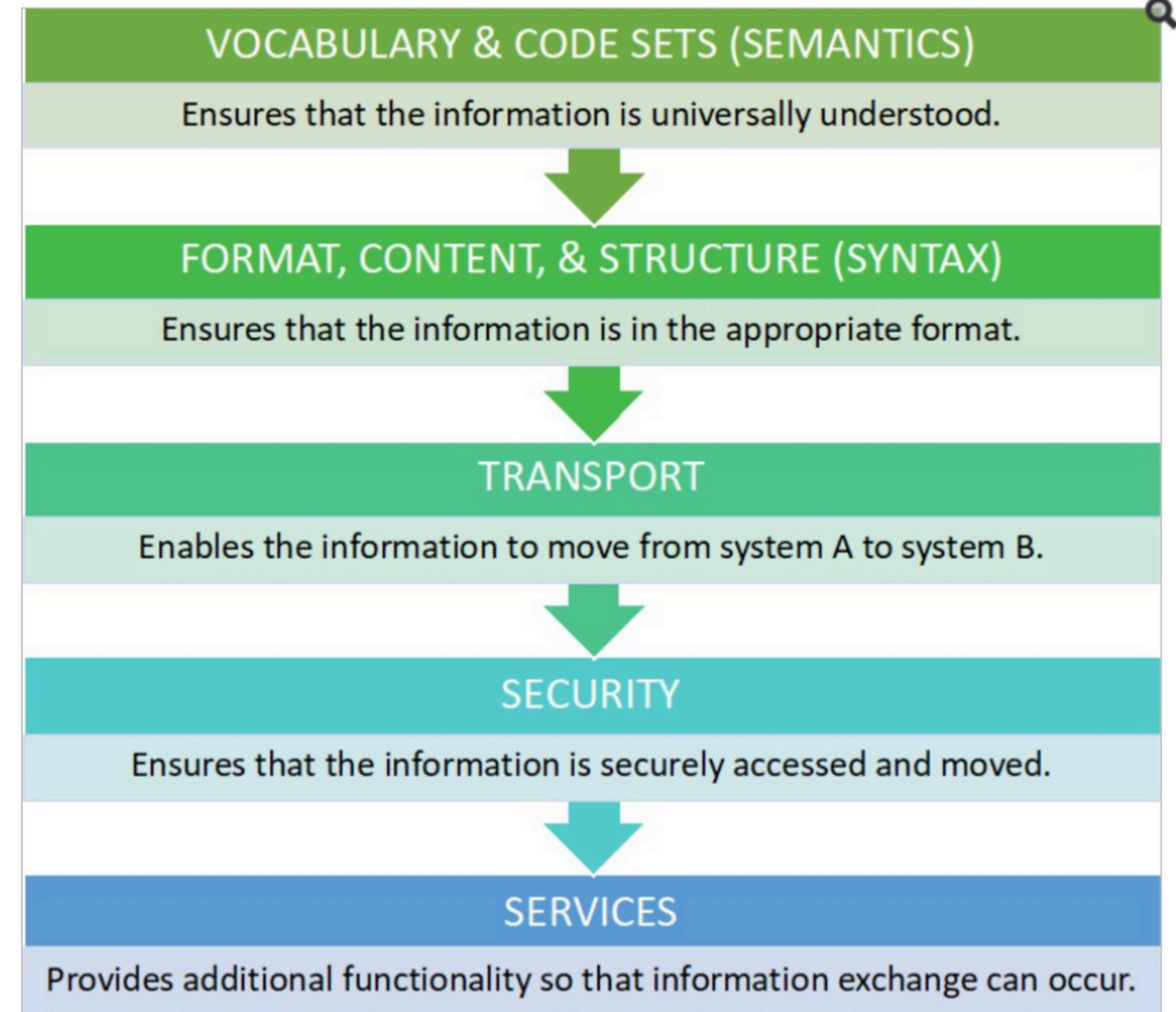
# Federated system

- Allows **ownership** of the data
- Define conditions of access
- Doesn't require a weakest common denominator



# Federated system

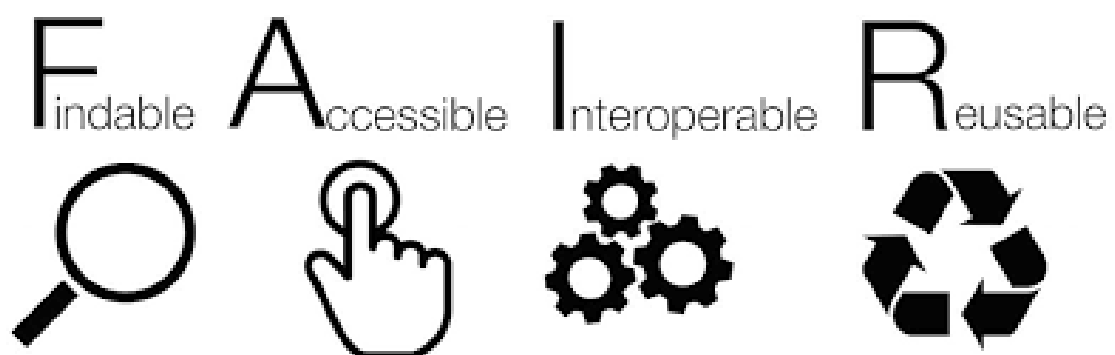
- Start **alignment** and **standardization** now
- If we do this in retrospect:
  - More **complicated**
  - More **time-consuming**
  - More **expensive**



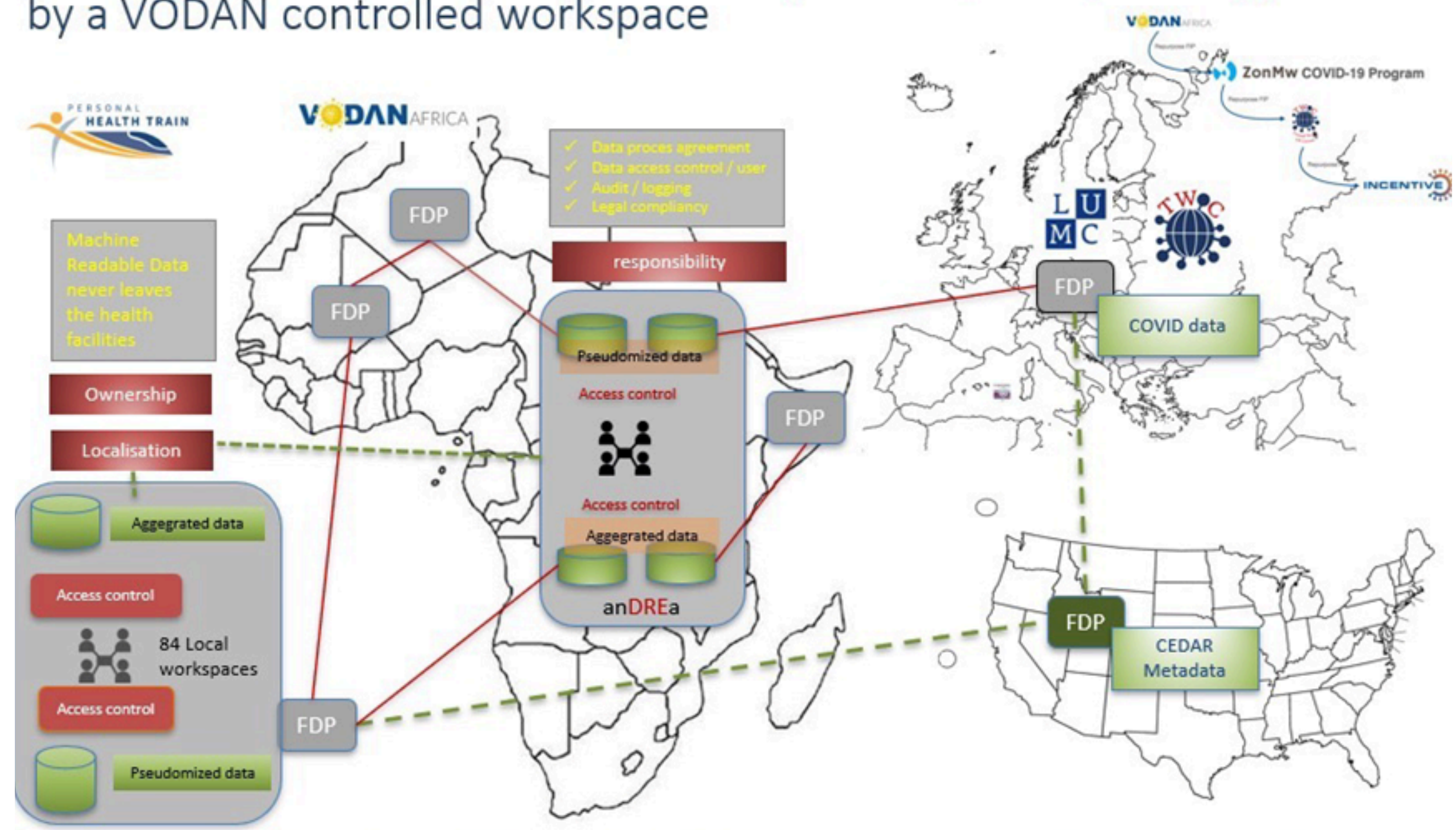
# VODAN's vision

## Common Standard

- Common Standard => FAIR
- Non profit
- Equitable access
  - Accessible and achievable by all



by a VODAN controlled workspace

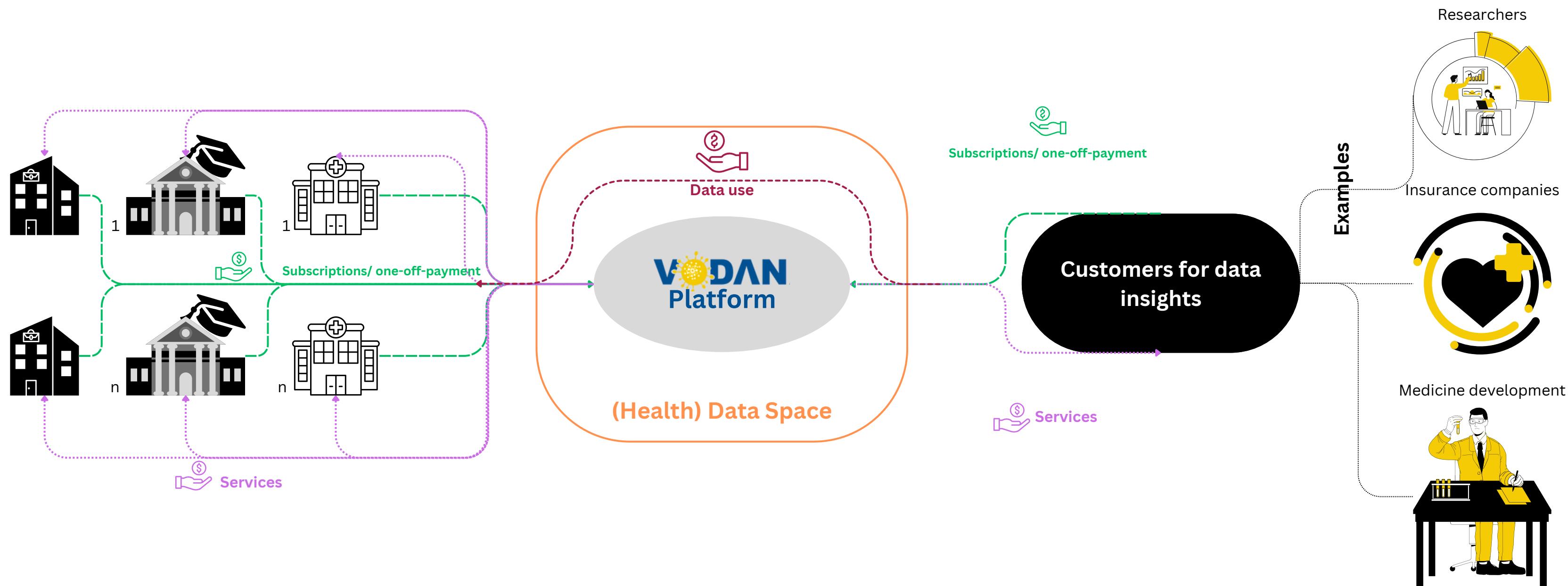


# VODAN's vision

Customers data stewardship

Services

Customers third party data re-use





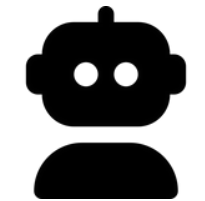
# VODAN's Aims



Enable Ownership, Localization & Regulatory Compliance (OLR) through machine-actionable semantic data



Resolve digital black holes



Use FAIR-OLR data for responsible AI



Strengthen global digital equity

THANK  
YOU



 <https://vodan-totafrica.info>

 [info@vodan-totafrica.info](mailto:info@vodan-totafrica.info)

# References & Acknowledgments

[1] Plug, R. et al. (2022). *FAIR and GDPR Compliant Population Health Data Generation, Processing and Analytics*. CEUR-WS.

[2] The SecuRePod project was started in the Leiden Institute for Advanced Computer Science (LIACS) course Data Science in Practice, and is currently being expanded as LIACS MSc. thesis.

Van Reisen, M., Amare, S.Y., Nalugala, R., Taye, G.T., Gebreselassie, T.G., Medhanyie, A.A., Schultes, E. & Mpezamihigo, M. (2023). Federated FAIR principles: Ownership, localisation and regulatory compliance (OLR). In: *FAIR Connect*, 1(1), 1-7. IOS Press. DOI: <https://doi.org/10.3233/FC-230506>

All publications related to VODAN can be found on <https://vodan-totafrika.info/vodan-africa.php?i=13&a=publications>