

# LivingLab

## A Social-Technological Platform for Making Sense of (Medical) Data

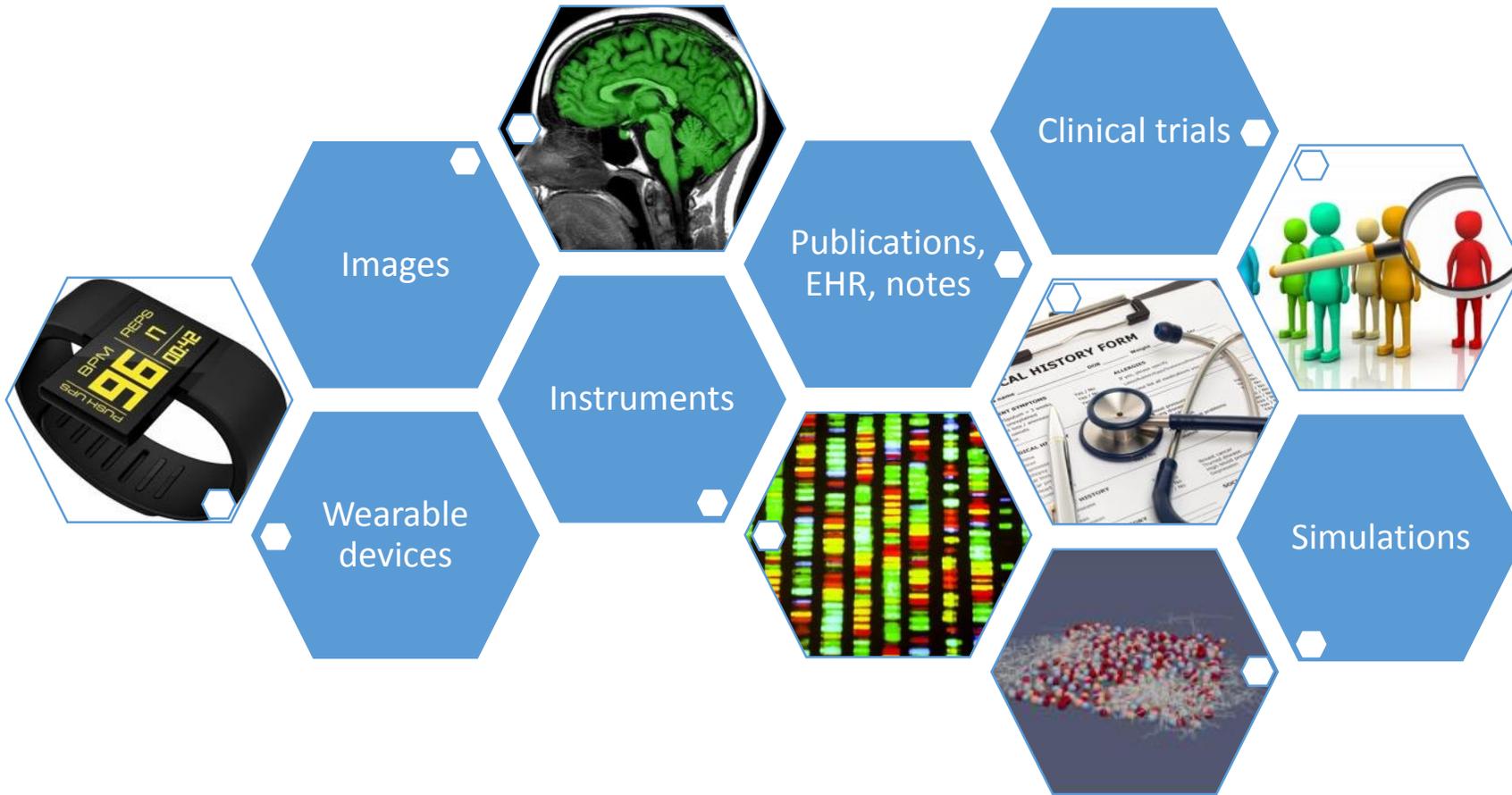
### *Status Update*

Alberto Di Meglio – CERN openlab Head

David Manset – Be-ys Board Member

23/01/2020

# Medical Data Deluge

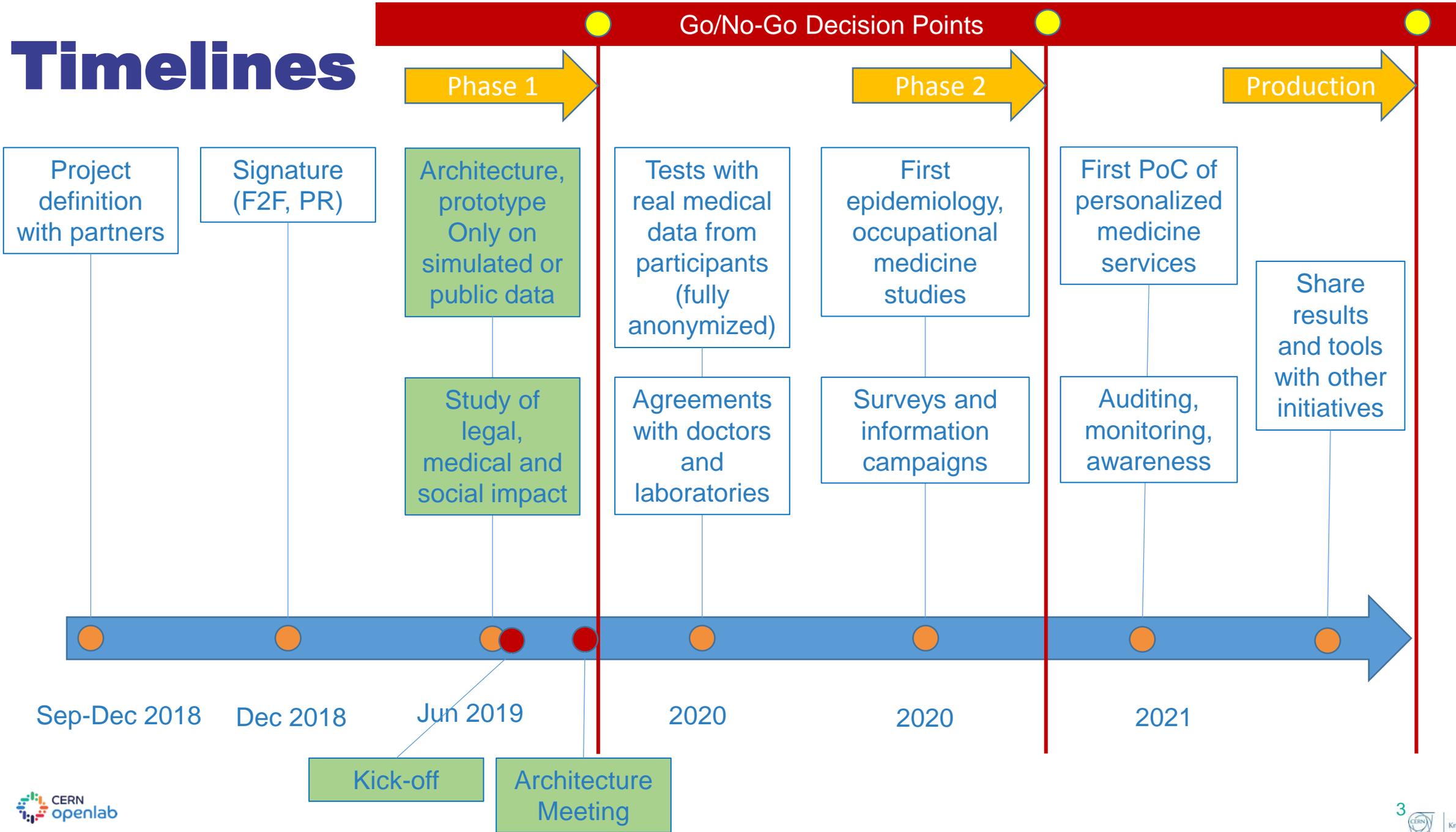


- “150 EBytes of medical data in the US, growing 48% annually” [1]
- Cost of instruments and laboratory equipment decreasing fast (e.g. **sub-1k\$ genomic sequencers**)
- Medical and fitness wearable devices on the rise, projected data produced in 2020 **335 PB/month** [2]

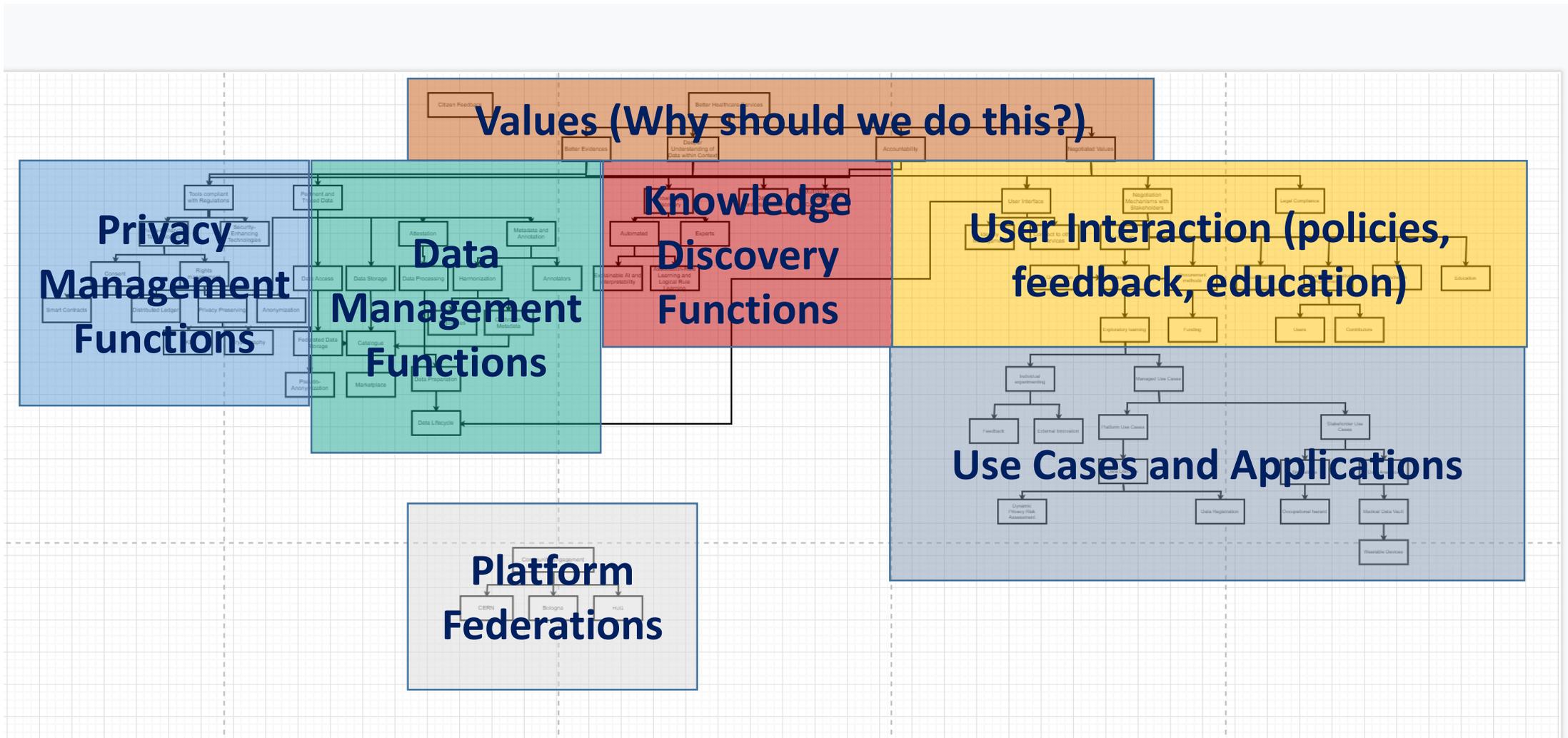
[1] Esteva A. et al., A Guide to Deep Learning in Healthcare, in Nature – Medicine, Vol. 25, Jan 2019, 24-29

[2] <https://www.statista.com/statistics/292837/global-wearable-device-mobile-data-traffic/>

# Timelines



# Current plans



# Projects in 2020

- Set up different “sister” LivingLab platforms in a few different locations
  - CERN platform based on the Analytix cluster managed by IT-DB
- Focus on 2-3 core platform projects and a number (at least 2) of use cases or demonstrators
  - Core 1: Data lifecycle with privacy constraints with specific attention to data ingestion
  - Core 2: Privacy-preserving analysis methods (differential privacy, homomorphic encryption)
  - Core 3: Dynamic assessment of privacy handling requirements
  - UC 1: Deep-learning-based classification/anomaly detection of Parkinson’s symptoms from wearable devices
  - UC 2: Privacy-compliant data aggregator from multiple sources
- Start an information campaign to collect feedback and raise awareness
  - How is sharing of personal data for research purpose perceived?
  - Under which conditions would you do it?
  - Do we comply with all necessary regulations?
- Start from anonymous, non-sensitive data, move from there

# Background Research

MyHealthMyData [www.myhealthmydata.eu](http://www.myhealthmydata.eu)



PROJECT ▾ CONSORTIUM NEWS & EVENTS ▾ CONTACT US



## MyHealthMyData (MH-MD)

Patient-Controlled and Blockchain-Enabled  
Data Privacy in Healthcare

Horizon 2020  
Call: ICT-18-2016

Topic: Big data PPP: privacy-preserving big data technologies



## Project Facts

- Budget: 3'455'190,00 euros
- Blockchain platform to handle personal data transactions
- Duration: 36 months
- 15 partners : SIEMENS, 5 EU SMEs, 4 hospitals, 3 research centers and 3 universities
- Started in November 2016

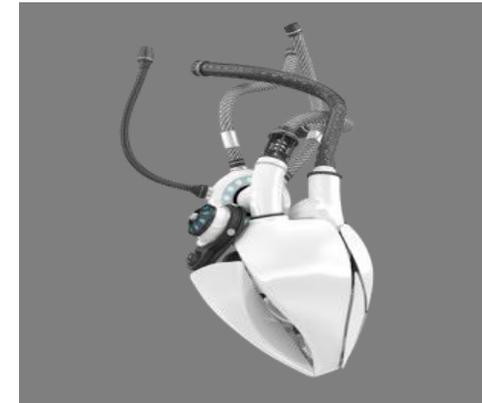
## Project Results

- EU pilot deployed in 4 sites
- Unique GDPR blockchain model
- Technology transfer to industry
- Extension to cybersecurity and privacy assessment : EU H2020 CUREX

# Core Concept & Model

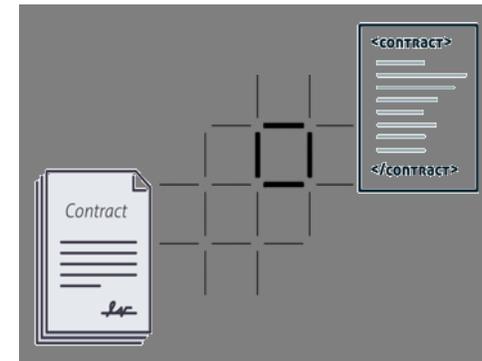
## GDPR Blockchain

[3] M.Koscina, A. Bayle, D. Manset, O. Perez. **When Blockchain Meets the Right to be Forgotten: Technology Versus Law for the Healthcare Industry.** In IEEE/WIC/ACM Intl Conference on Web Intelligence, Santiago, Chile, 3-7 December 2018.



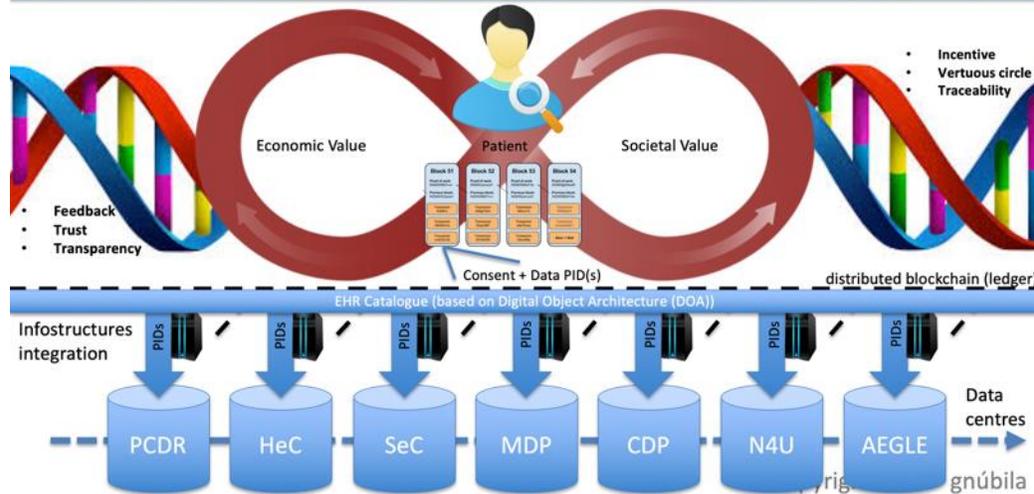
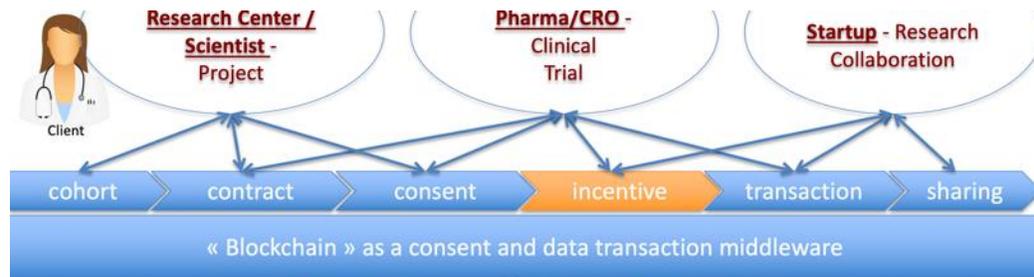
### A unique blockchain model

- ✓ GDPR compliant
- ✓ Innovative combination of 3 cryptos
  - ✓ Proof of Existence
  - ✓ Proof of Matching
  - ✓ Proof Of Privacy
- ✓ Anonymous GDPR registry



### Legal automation

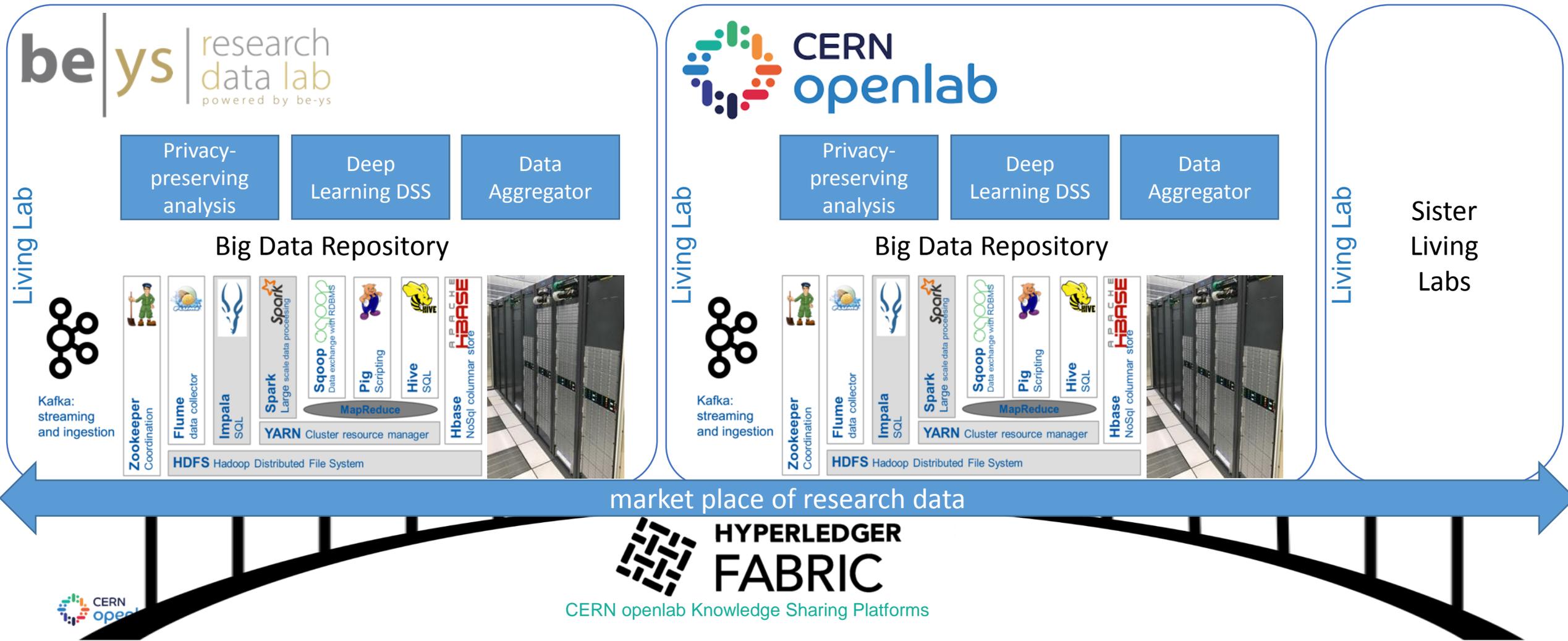
- ✓ Smart contracts
  - ✓ Transparency
  - ✓ Code is law
- ✓ Extensible to cope with evolving regulations
- ✓ Value data economically and societally



Original Concept

# Reference Architecture

CERN Openlab, CERN IT-DB and Be-ys



# Future Plans

**Further collaboration** with EU H2020 MyHealthMyData and EU H2020 CUREX projects



**Approach the French Health Data Hub** to co-devise a European strategy and roadmap to interconnect national hubs



**Apply to OpenQKD** call as a possible use-case for health data exchanges across EU





# Thanks!

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