PHIRI
Population Health Information Research Infrastructure

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

What population health researchers need, and how PHIRI federated research infrastructure can help?

Enrique Bernal-Delgado
on behalf of the PHIRI team

EUPHA
EUROPEAN PUBLIC HEALTH ASSOCIATION
PUBLIC HEALTH MONITORING AND REPORTING

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

The Population Health Information Research Infrastructure for COVID-19:

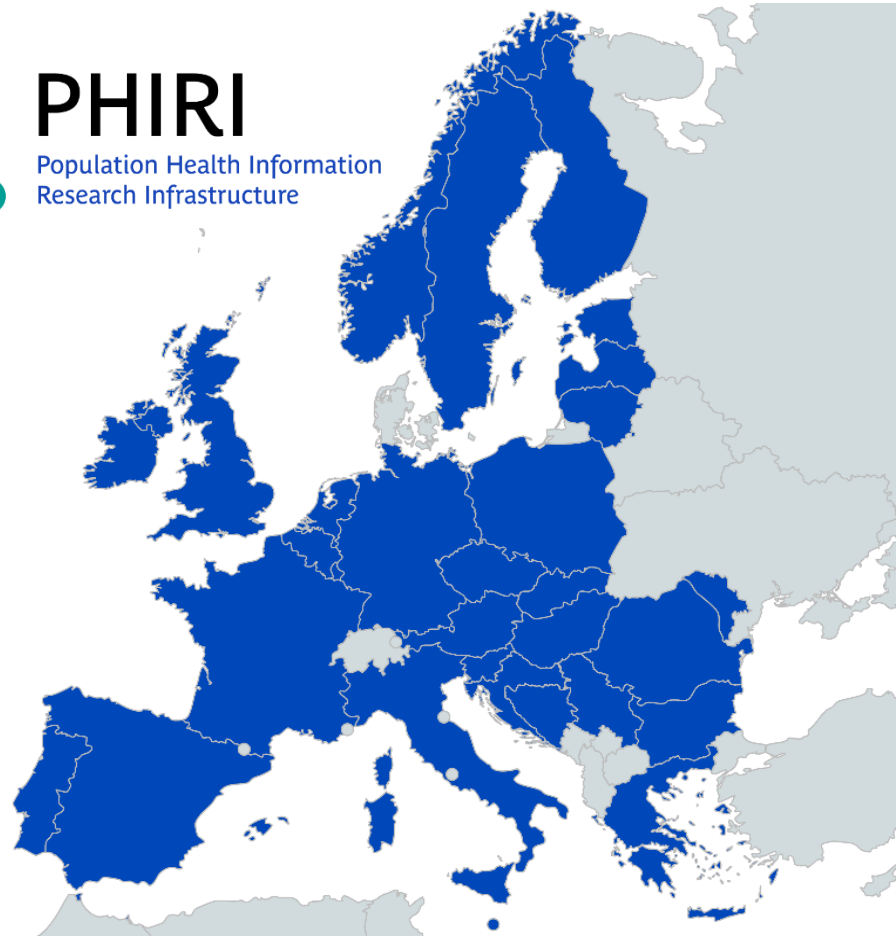
- a **European mechanism**, that aims to
- facilitate and support **data-driven population health research**
- and **exchange of best practices**
- to support **decision making**

41 partners

30 countries

3 years

PHIRI
Population Health Information Research Infrastructure



Map of PHIRI Partners

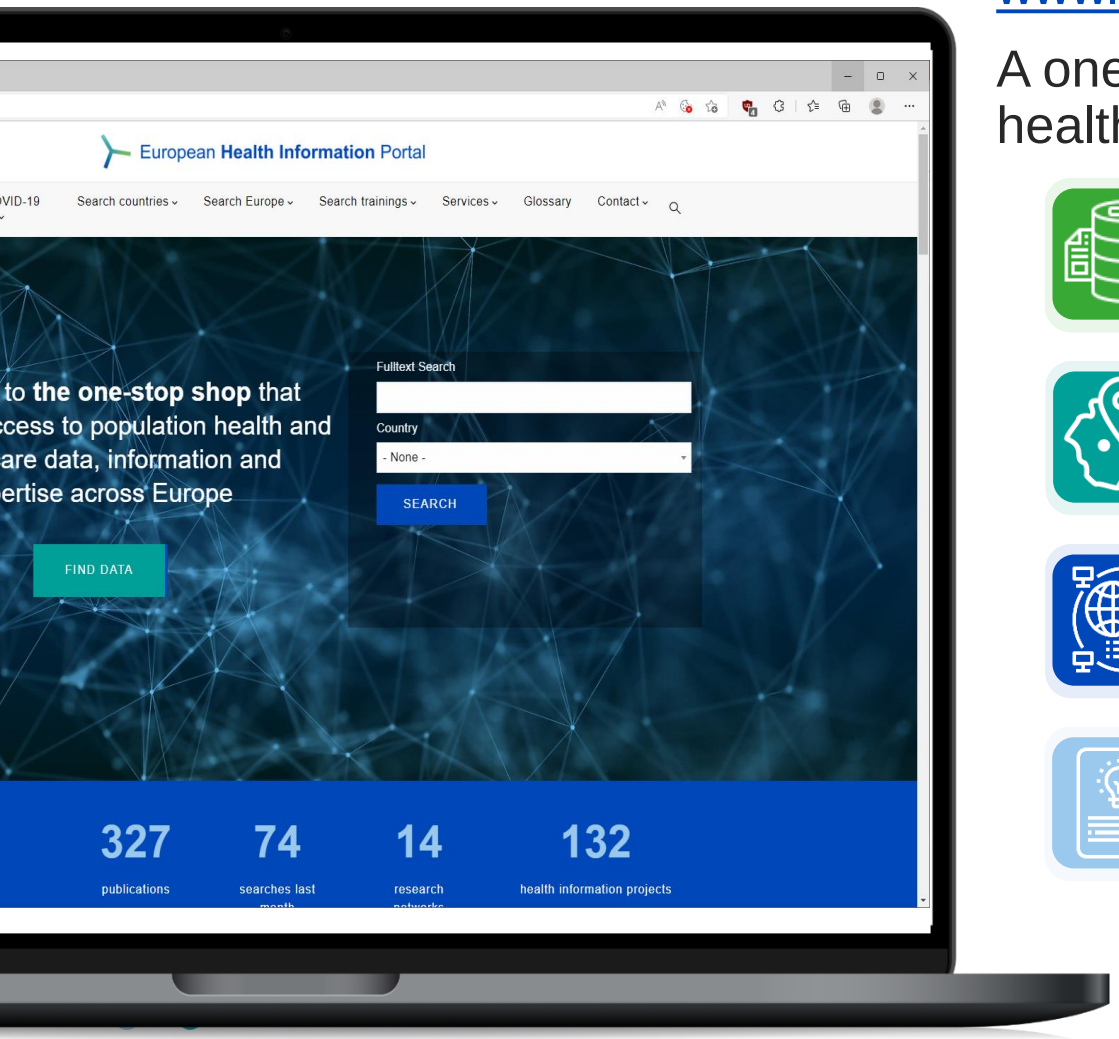
PHIRI
Population Health Information Research Infrastructure

www.phiri.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

The European Health Information Portal

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022



www.healthinformationportal.eu

A one-stop shop that facilitates access to population health and health care data, information and expertise across Europe.

- **Health information (data) sources**
- **Publications**
- **Countries and national nodes**
- **Trainings in all areas of population health**
- **Research infrastructures, Research networks**
- **COVID-19 Policy measures**
- **Health information projects**
- **COVID-19 Rapid Exchange Forum**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Introduction

The PHIRI federated research infrastructure is paving the way for population health researchers to enhance their research when reusing individual sensitive linked data.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Typical use cases when mobilizing real-world data?

High-level research questions	Design (typical)	Data distribution (typical)	Matrix content
Causal inference on individuals	Target trials	Matrix/Tensors	Weights - IPW
Causal inference on populations	Dif in Dif		B coefficients
Inference on pop. Subgroups	Retrosp. Cohort		Residuals
Outcomes prediction pop. subg.	ML		Synthetic data
Inference on providers	Monitoring		Aggregated data
Inference on populations	Ecological		Aggregated data
Patients' classification	ML - classification		Distance
Prediction on patients	ML - prediction		Distance
Knowledge based development	NLP		Distance
Hypotheses generation (eg tech repurposing)	In-silico ML		Synthetic data

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI: Real-world data measuring the COVID19 indirect "impact"

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

- Direct and indirect determinants of COVID-19 infection and outcomes in vulnerable population groups with reference to inequalities
- COVID-19 related delayed care in breast cancer patients
- The impact of COVID-19 on perinatal health and perinatal health inequalities
- COVID-19 related changes in population mental health

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Agenda

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

- **What the PHIRI federated research infrastructure has achieved so far?**
  - Juan González-García -IACS
- **An enhanced version of the PHIRI infrastructure: improving the analytical services**
  - Francisco Estupiñán-Romero - IACS
- **An enhanced version of the PHIRI infrastructure: improving the technological solutions**
  - Pascal Derycke - Sciensano
- **Improving PHIRI performance and scalability: working within EGI-ACE**
  - Patrick Furhmann – DESY, EGI Foundation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI
Population Health Information Research Infrastructure

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

What the PHIRI federated research infrastructure has achieved so far?

Juan González-García
Biocomputing Unit Manager
Institute for Health Sciences in Aragón, Spain

IACS Instituto Aragonés de Ciencias de la Salud

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Background

- Builds on top of the network from BridgeHealth project and Joint Action InfAct
  - Representatives of Public Health Institutes from 41 partners of 30 countries
    - 27 National Institutes of Public Health / Research / Disease Control
    - 7 Universities
    - 7 Ministries of Health

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Ambition and challenge(s)

- **Build** and validate a **federated research infrastructure** (FRI) for rapid cycle analysis
  - Demonstrated through COVID19 uses cases (4+1)
  - Valid for future pandemics and (in general) observational studies
  - Stablish a solid governance structure
  - Serve as prototype of Distributed Infrastructure on Population Health Align with European Health Data Space (EHDS) & others (HealthyCloud, etc.)
- Setup a **network of IT developers** capable of sustaining and upgrading the FRI
- Setup Health Information Portal on population health
  - Metadata catalogues on population health data sources, studies, guidelines, projects and trainings

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

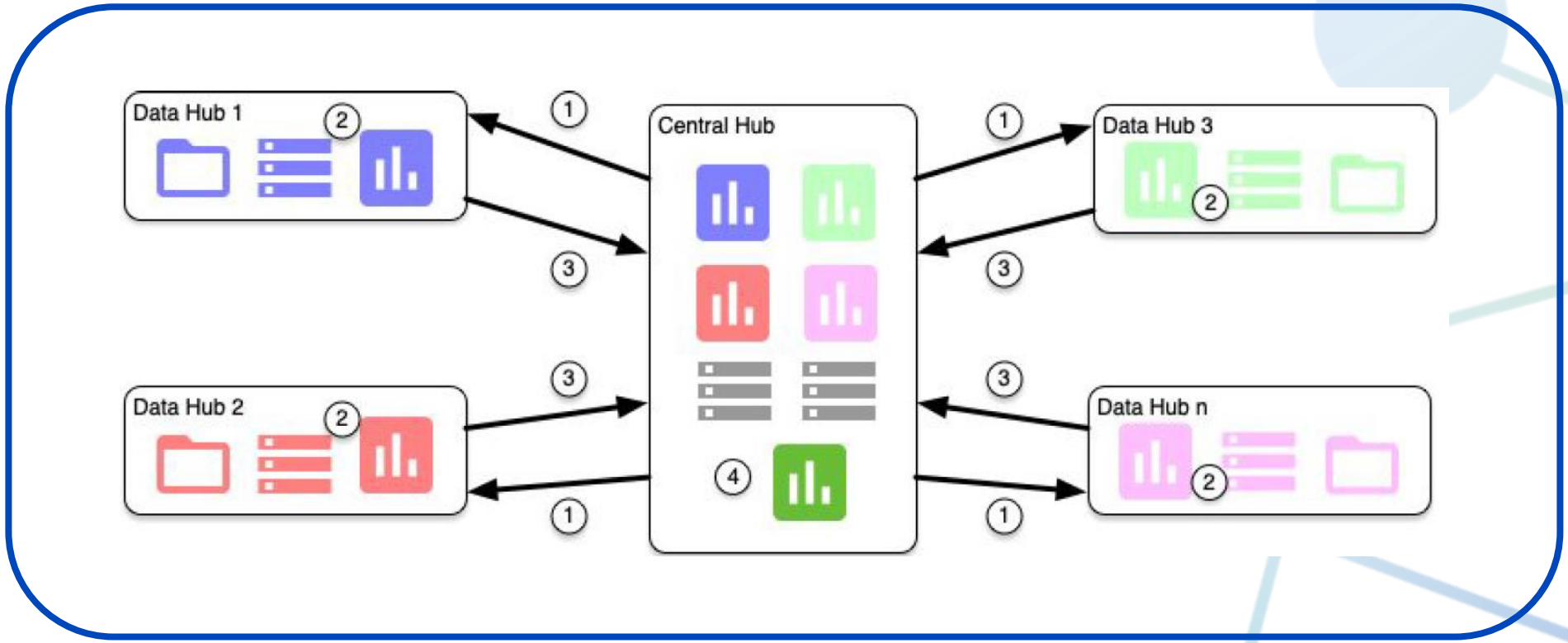
Ambition and challenge(s)

INTEROPERABILITY!

*The New European Interoperability Framework

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Architecture solution



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Legal interoperability

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

"*ensuring that organisations operating under different legal frameworks, policies and strategies are able to work together*"

- Follow GDPR principles
  - *Privacy* and *Secure by design*
  - Minimise data mobilisation
- Align efforts with architecture proposal of HealthData@EU (EHDS2)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Organisational interoperability

"to the way in which public administrations align their business processes, responsibilities and expectations to achieve commonly agreed and mutually beneficial goals"

- Set up a IT experts network
- Open approach: maximise transparency by exchanging
  - Source code
  - Procedures and methodologies
  - General IT expertise
- Help desk in place to facilitate the implementation and deployment

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Semantic interoperability

"*the precise format and meaning of exchanged data and information is preserved and understood throughout exchanges between parties*"

- Foster the use of a Common Data Model (CDM) using standards
- Facilitate the mapping of original data formats to CDM

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

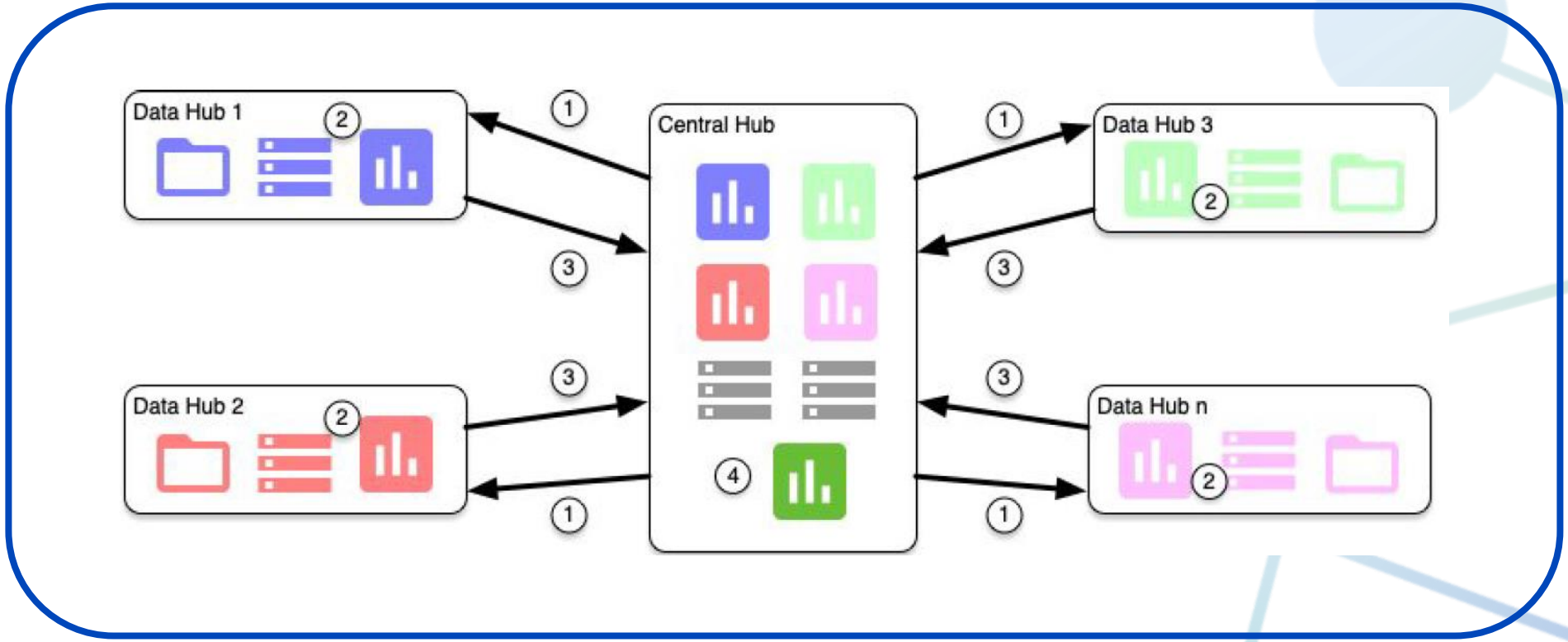
Technical interoperability

"*the applications and infrastructures linking systems and services. Aspects of technical interoperability include interface specifications, interconnection services, data integration services, data presentation and exchange, and secure communication protocols*"

- Adoption of container-based solutions
- Use of well know software stacks

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Wrap-up



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI
Population Health Information Research Infrastructure

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

An enhanced version of the PHIRI infrastructure: improving the analytical services

Francisco Estupiñán-Romero

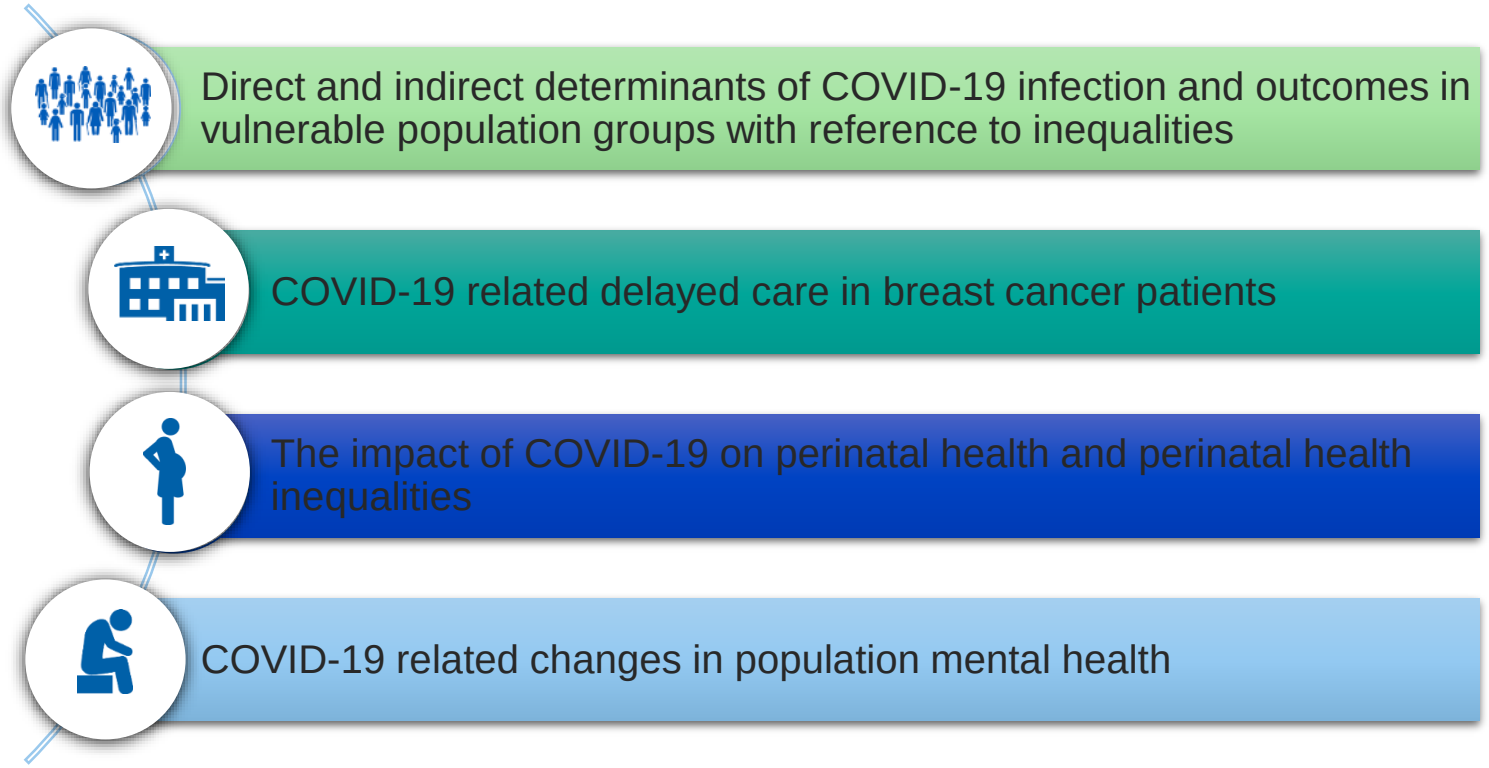
on behalf of PHIRI WP7

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI – Research Use Cases

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

4 real life research use cases measuring the impact of COVID-19 on population health



Demonstrate how a broad variety of data (e.g. administrative and survey data) can be reused in a distributed way across Europe:

a) **Conduct research** through use cases of immediate relevance on the consequences of the COVID-19 pandemic on European population health

b) **Pilot activities** for the benefits and added value of a federated research infrastructure by bringing together data from different European countries

PHIRI
Population Health Information Research Infrastructure

www.phiri.eu

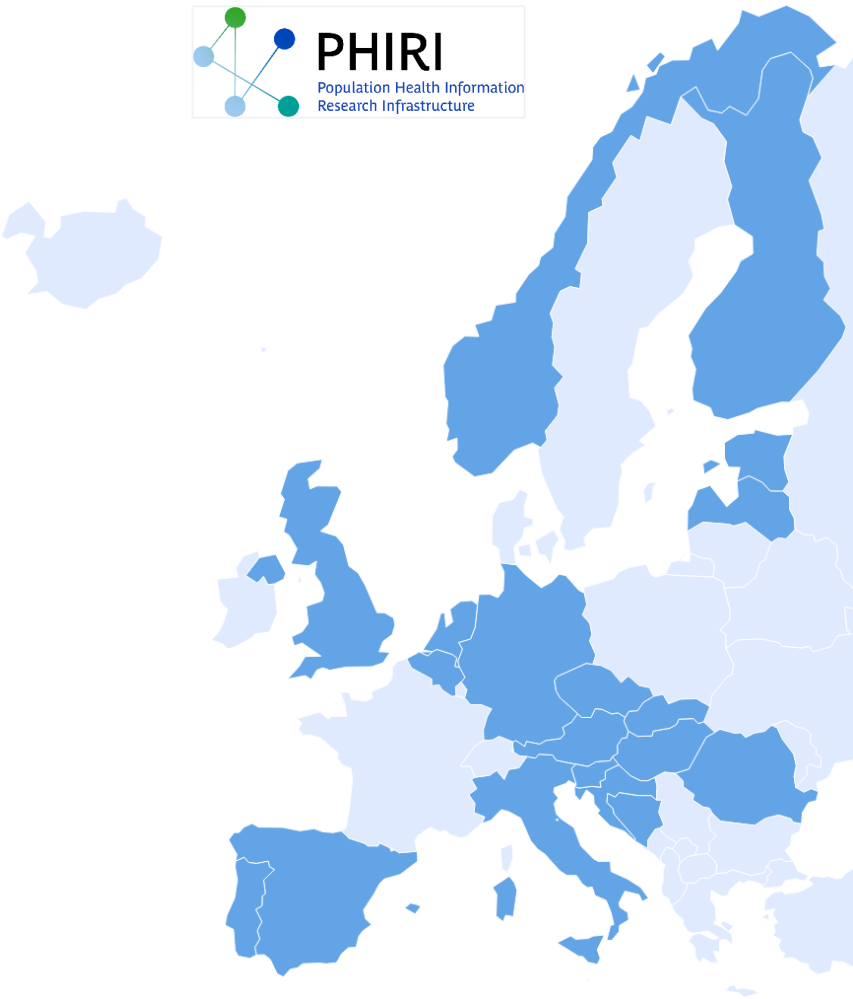
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI Research Use Cases – Achievements

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

PHIRI
Population Health Information Research Infrastructure

- In **almost 20 data hubs**, data is mobilized and ready to be analyzed in a distributed manner



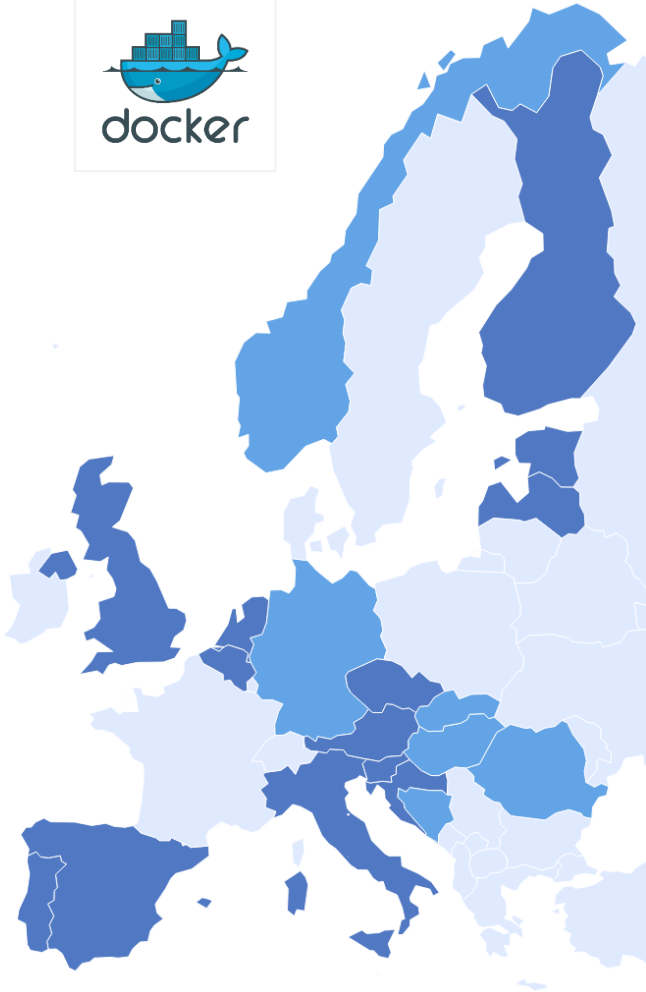
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI Research Use Cases – Achievements

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

- In **almost 20 data hubs**, data is mobilized and ready to be analyzed in a distributed manner

- In **14 data hubs**, the PHIRI-app (Docker) is already deployed and tested



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

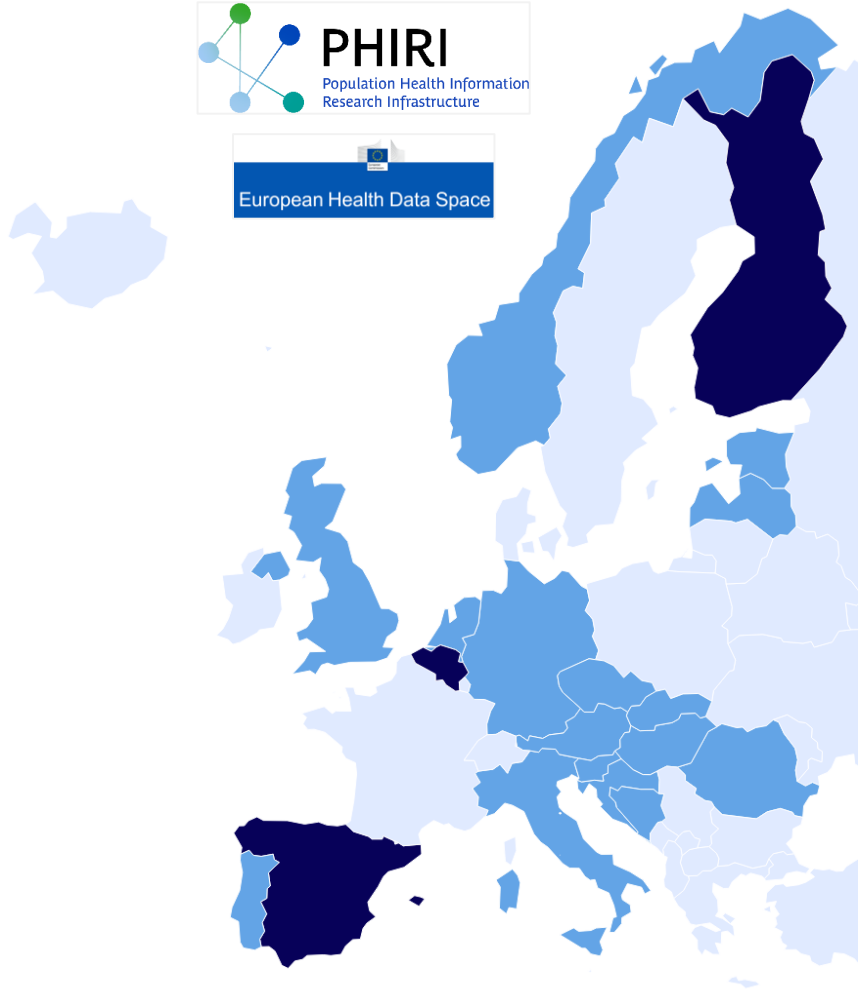
HIRI Research Use Cases – Achievements

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

PHIRI
Population Health Information Research Infrastructure

European Health Data Space

- In **almost 20 data hubs**, data is mobilized and ready to be analyzed in a distributed manner
- In **13 data hubs**, the PHIRI-app Docker is already deployed and tested
- There is already **overlap** between the PHIRI data hubs and the **health data access bodies (HDAB)** in the EHDS2
  - Majority of PHIRI use cases data hubs will be HDAB in the future



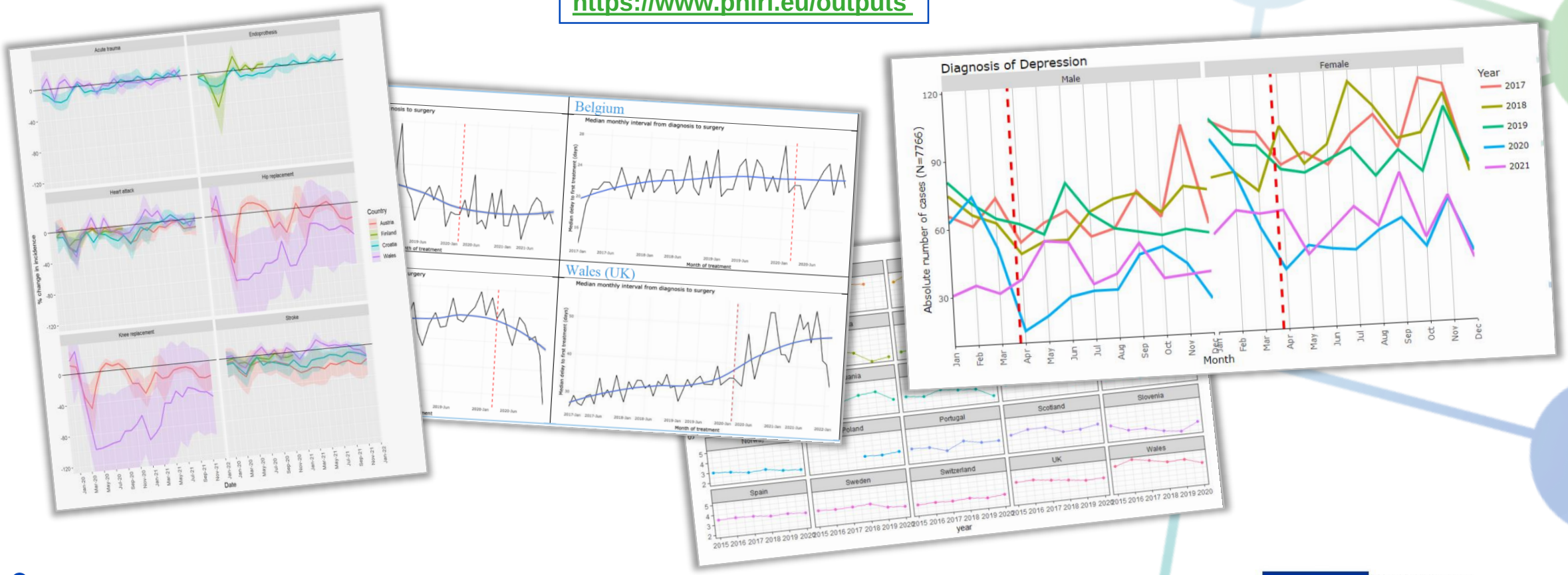
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI Research Use Cases – Achievements

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

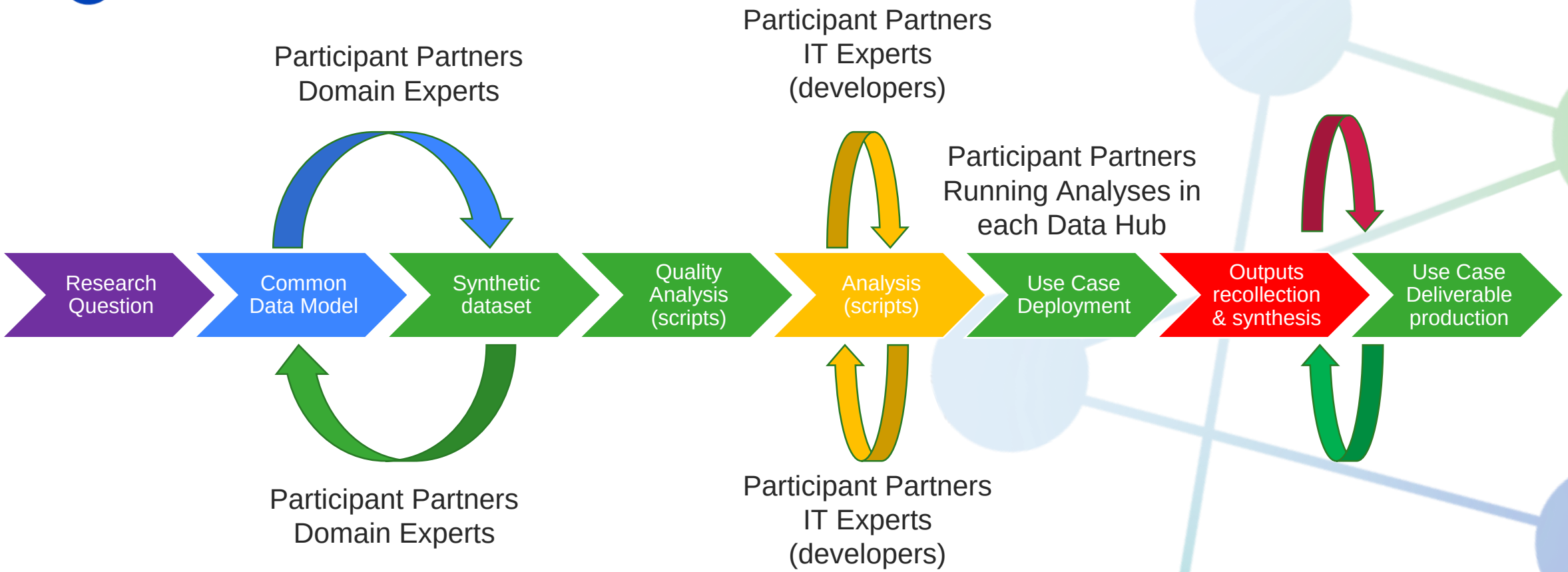
First results on the impact of COVID-19 on **population health** available and published in Use Case Reports:

https://www.phiri.eu/outputs



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Prototyping a use case in a federated infrastructure

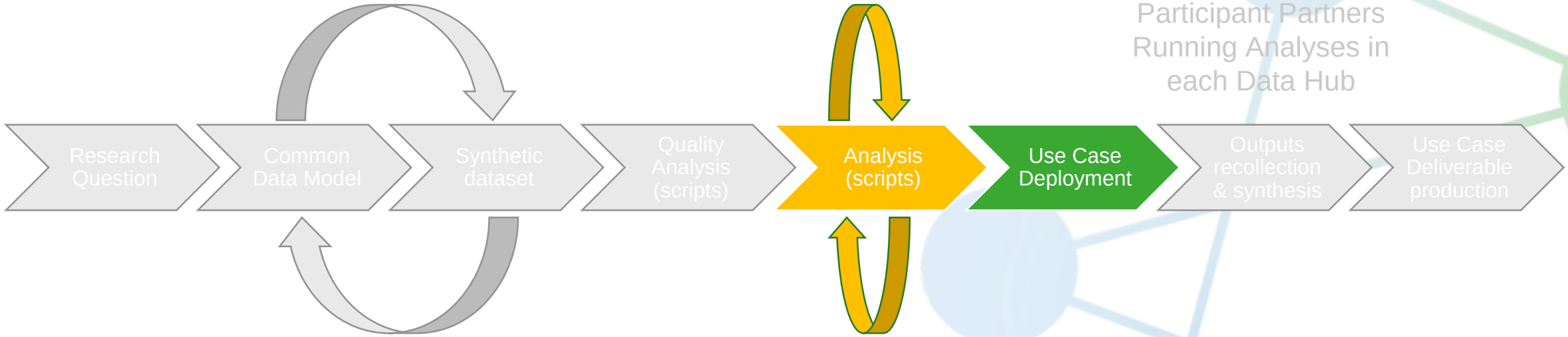


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Prototyping a use case in a federated infrastructure

Participant Partners
Domain Experts

Participant Partners
IT Experts
(developers)



Participant Partners
Running Analyses in
each Data Hub

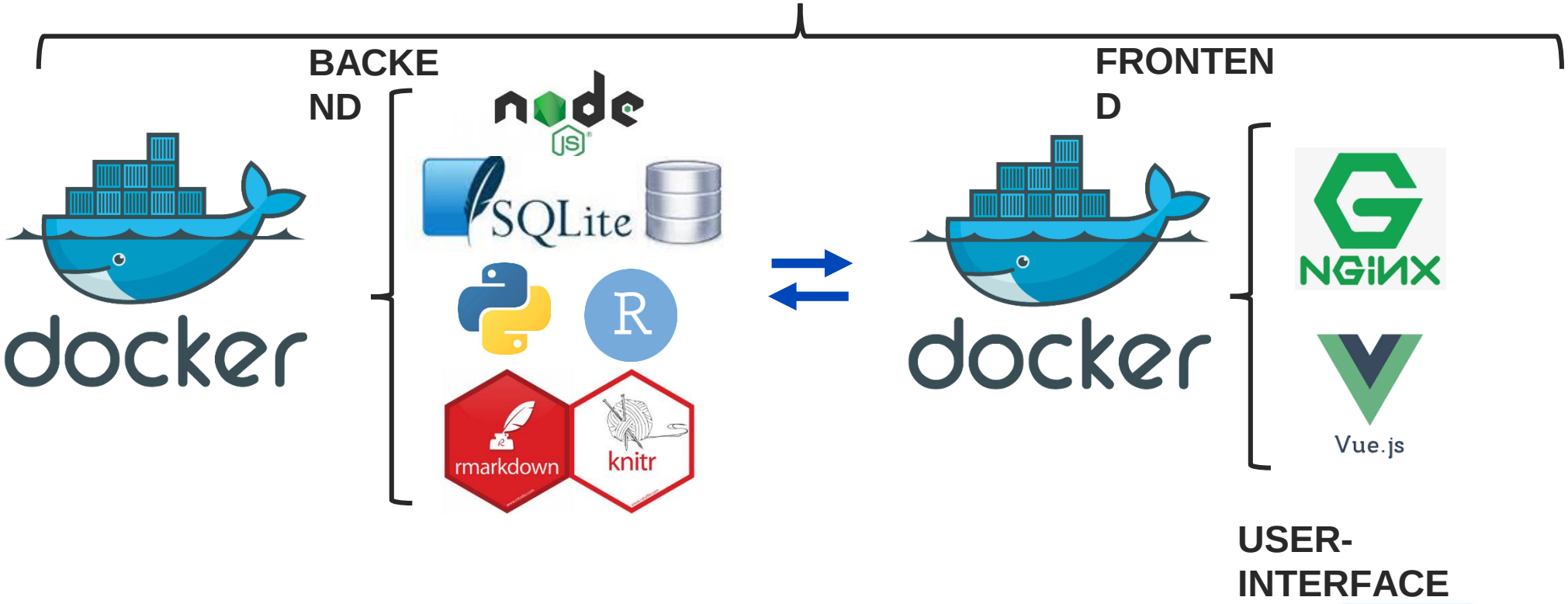
Participant Partners
Domain Experts

Participant Partners
IT Experts
(developers)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

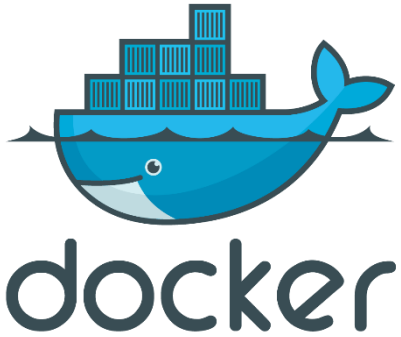
PHIRI Federated Analysis Application (Docker)

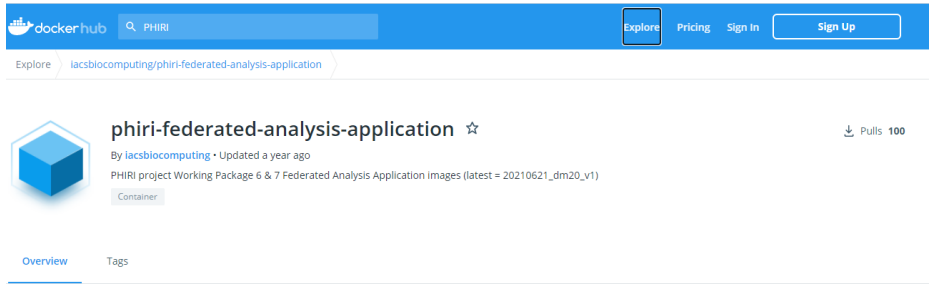
Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Orchestration of a use case: PHIRI Federated Analysis Application (Docker)



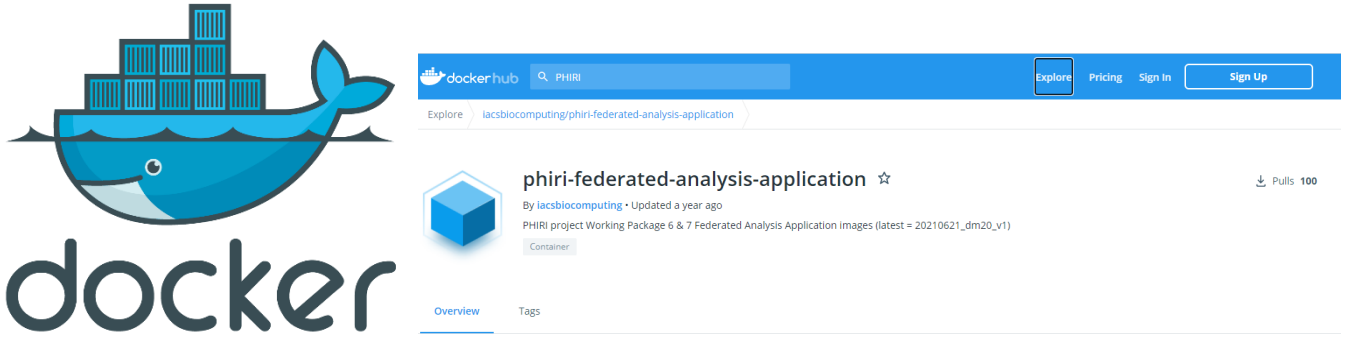


Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis

- Data availability
- Data accessibility
- Data minimisation
- Semantic interoperability

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Orchestration of a use case: PHIRI Federated Analysis Application (Docker)

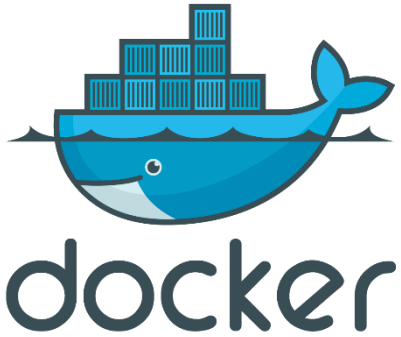


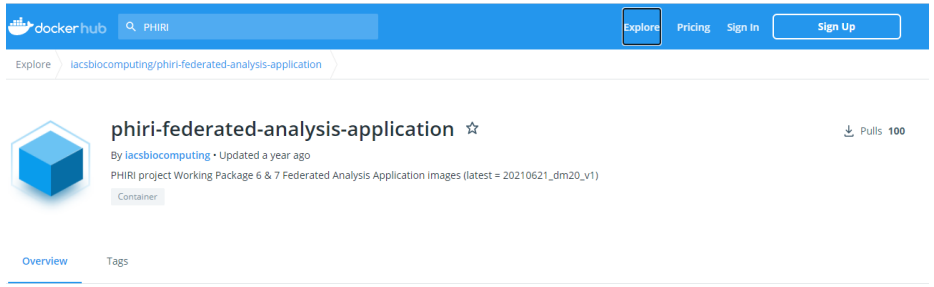
Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis

- Model benchmarking
- Script development
- Dependencies documentation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Orchestration of a use case: PHIRI Federated Analysis Application (Docker)



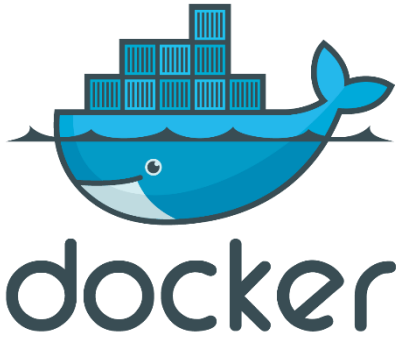


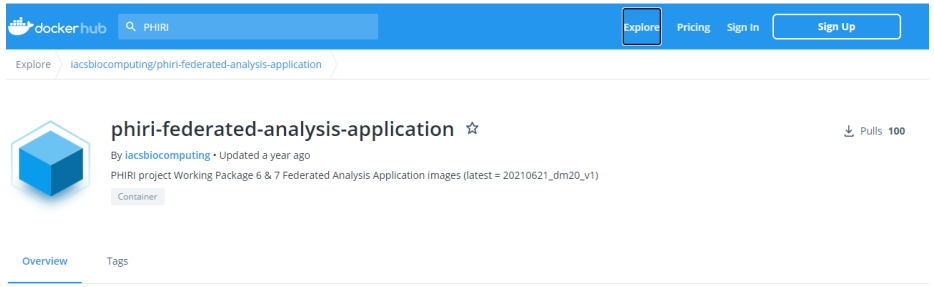
Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis

- Data quality at origin
- Informs interpretability

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Orchestration of a use case: PHIRI Federated Analysis Application (Docker)



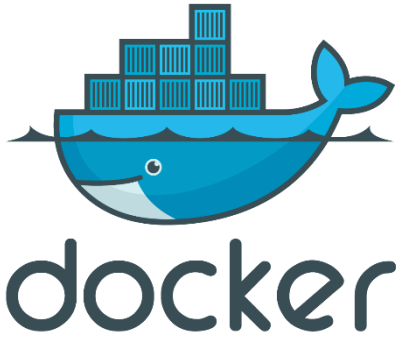


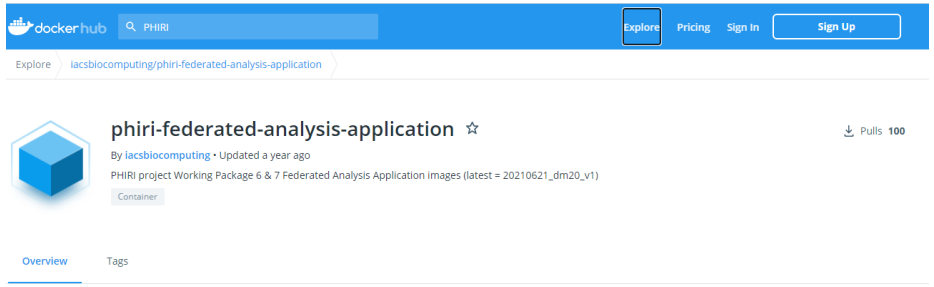
Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis

- Graphical User Interface

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Orchestration of a use case: PHIRI Federated Analysis Application (Docker)



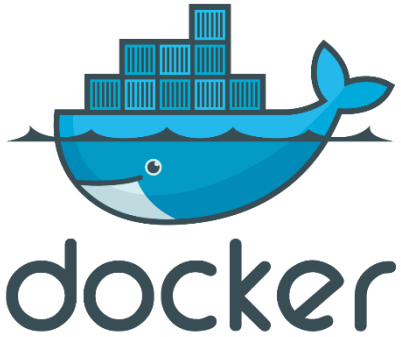


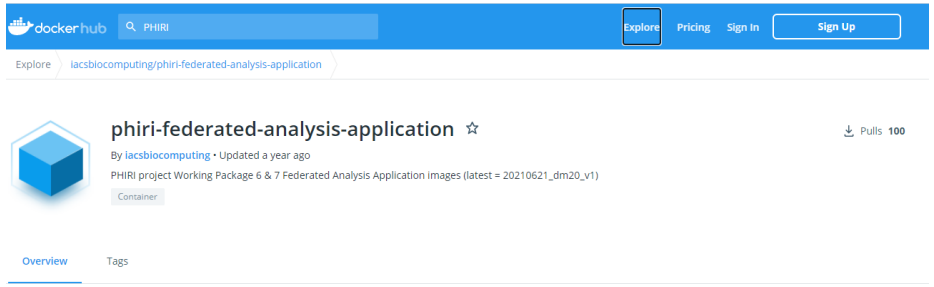
Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis

- All-in-one solution

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Orchestration of a use case: PHIRI Federated Analysis Application (Docker)





Common Data Model → Synthetic dataset → Quality Analysis (scripts) → Analysis (scripts) → Use Case Deployment → Outputs recollection & synthesis

- DQA (HTML interactive report)
- Local outputs (HTML report)
- Aggregated data outputs (CSV file)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI Research Use Cases – Ongoing Work

Help desk to support use cases' deployment

43
Tickets

274
Email threads

29
Meetings

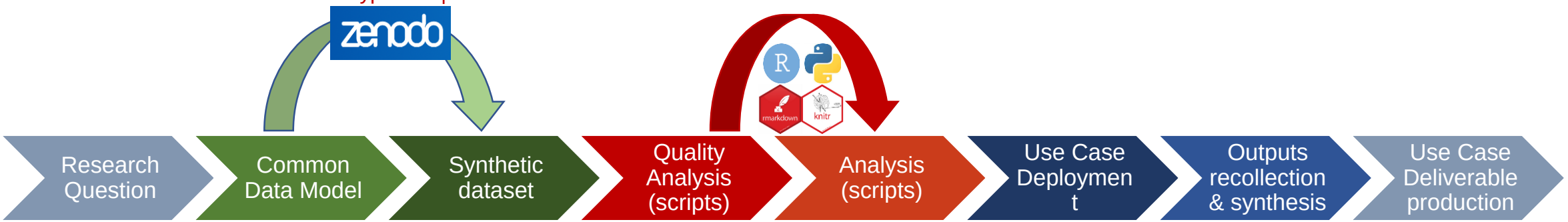
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI app - 10.5281/zenodo.5729310

1,527 views
204 downloads

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

UCA 388 | **97**
UCB 225 | **53**
UCC 213 | **51**
UCD 243 | **72**
Prototype 165 | **26**



UCA 204 | **246**
UCB 109 | **117**
UCC 86 | **93**
UCD 152 | **195**

Results compilation in progress
UCB 58 | **18**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Ongoing work

- Methods and outputs dissemination
- Implementation of more sophisticated analyses (on the same data)
- In the **lab**, testing algorithms for **full federated analyses**
- **Continuous update and publication** of all digital objects in
- **Mapping** WP6 CDMs to **OMOP CDM**
- **IT developers' forum**
  - Workshops and help desk for newcomers

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Towards an enhanced Federated Research Infrastructure for Population Health

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

- More complex queries, more actors involved (distributed algorithms implementation)
- Testing computational and software solutions (lab)
- Early adopters EGI-ACE in EOSC (IaaS)
- Role of PHIRI as part of EDHS2 & EOSC (services)
- Sustainability

PHIRI
Population Health Information Research Infrastructure

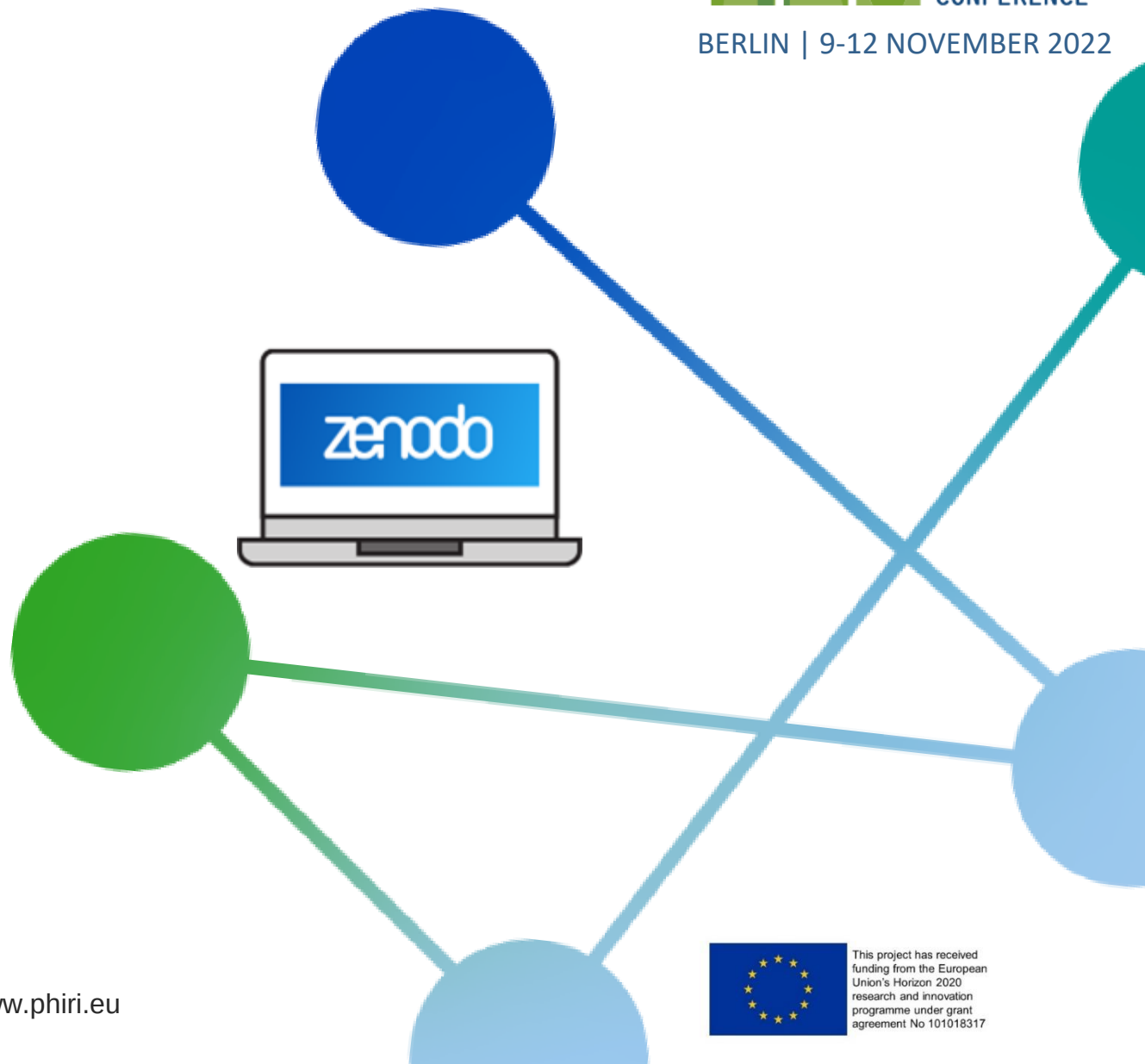
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI

Population Health Information Research Infrastructure

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022



Thank you!

Name: Francisco Estupiñán-Romero
E-mail: festupinnan@iacs.es
@PHIRI4EU
/company/phiri

IACS Instituto Aragonés de Ciencias de la Salud

Swansea University Prifysgol Abertawe

sciensano

www.phiri.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI
Population Health Information Research Infrastructure

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

An enhanced version of the PHIRI infrastructure: improving the technological solutions

Pascal Derycke

sciensano

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

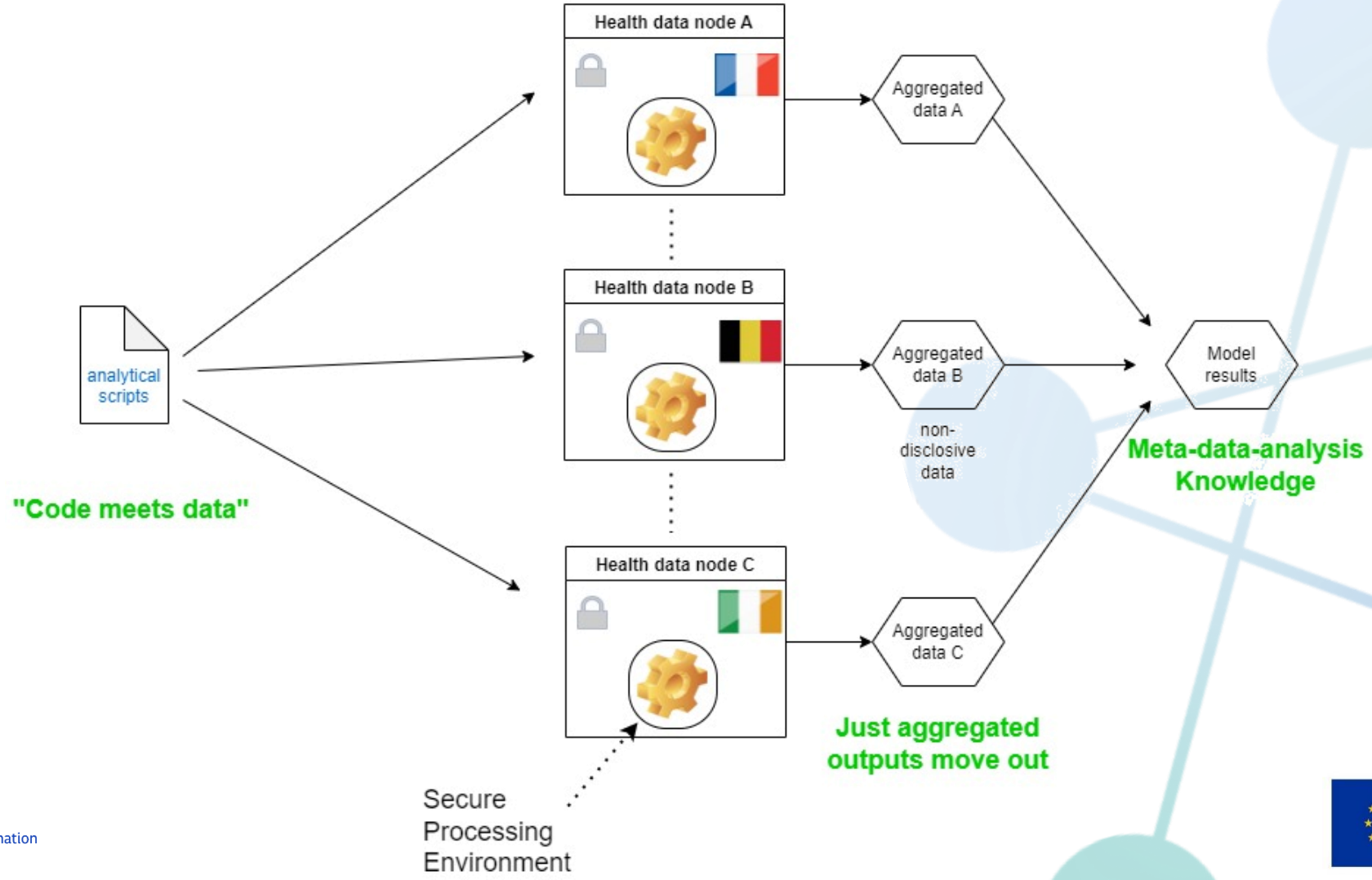
Population Health Information Research Infrastructure (PHIRI) Proof of concept:

CODE MEETS DATA

PHIRI
Population Health Information Research Infrastructure

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Distribution of a research question in multiple data hubs using a federated approach (as-is)



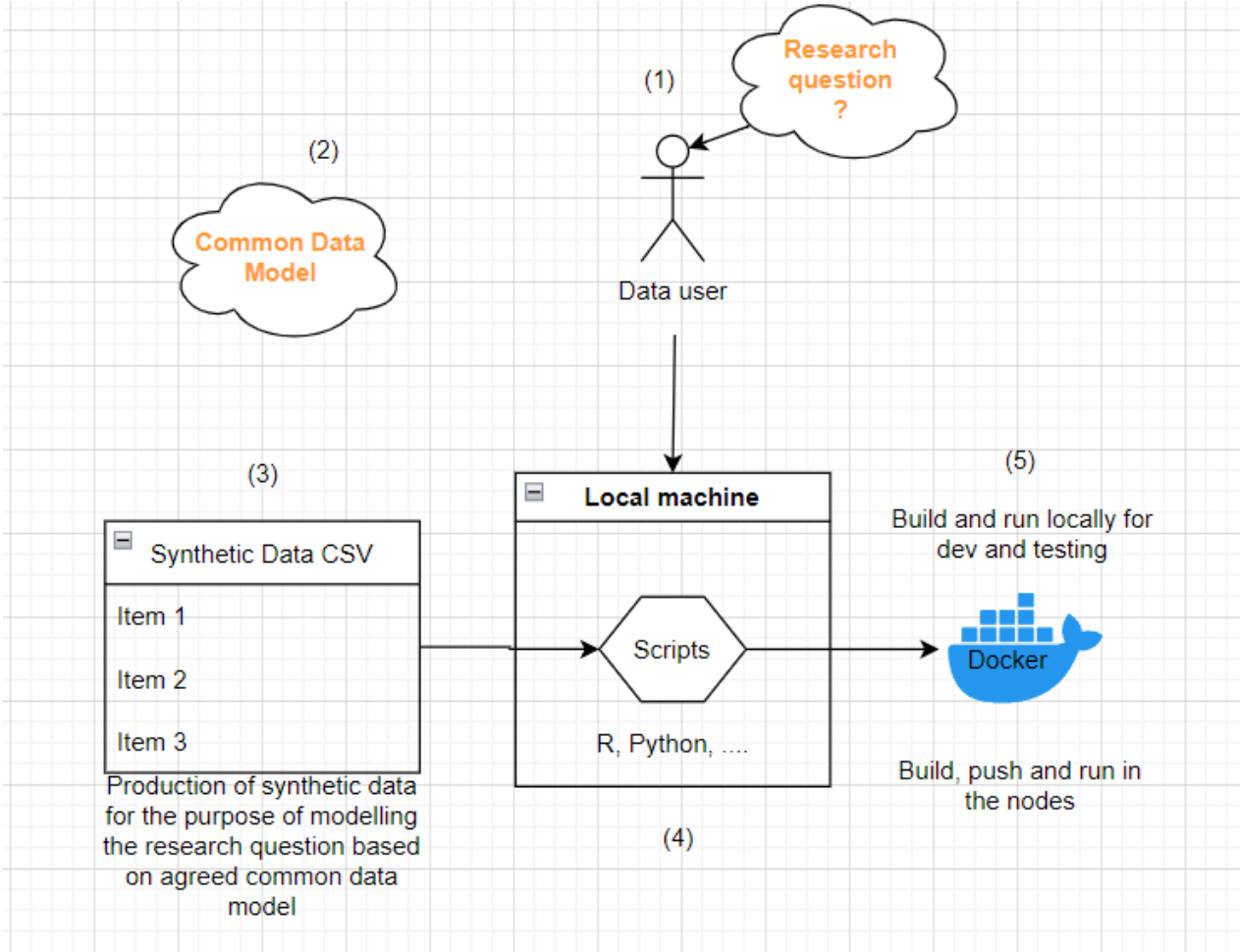
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Prerequisites: Development of the analytical pipeline for a federated analysis project

PHIRI analytical pipeline (as-is)

Steps:

1. Shape the research question
2. Design a Common Data Model
3. Production of synthetic data
4. Coding (Python, R)
5. Build the Docker image for distribution in the nodes



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Lessons learned:

- A stand-alone/portable application (such as a Docker image) made it possible to distribute and run the scripts in the data hubs: "**code meets data**"
- A **minimum knowledge of the available data** is needed to define a **Common Data Model**;
- Generating **proxy (synthetic) data is of importance** to code the analytical scripts for analysing data;
- Capacity building in the data hubs is of eminent importance.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

Upgrading options for PHIRI research infrastructure

TO-BE

PHIRI
Population Health Information Research Infrastructure

www.phiri.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Upgrading options:

PHIRI analytical pipeline (as-is)

1. Design of Common Data Models
2. Production of synthetic data
3. Coding (Python, R)
4. Build the Docker image for distribution

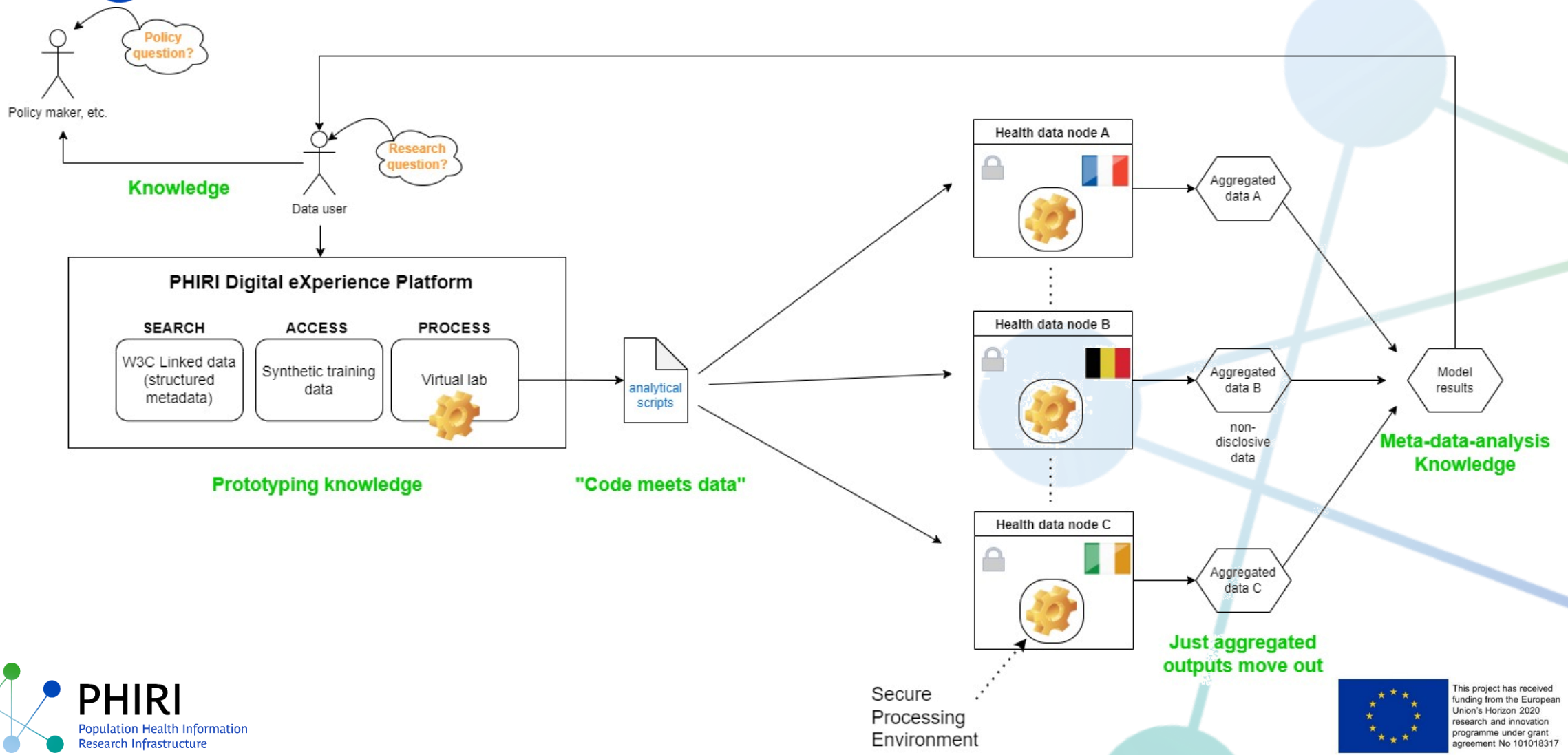
Integrated information system (to-be)

1. Search for data and information (logical structure of data)
2. Access “proxy” data
3. Coding (Python, R) in Virtual Labs
4. Transfer analytical scripts for execution in the Secure Processing Environment

A Research Infrastructure designed as a DigitalXPlatform

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI (to-be): an integrated information system for prototyping knowledge



PHIRI
Population Health Information Research Infrastructure

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

Search for health data Data discovery: DCAT metadata catalogue

TO-BE

PHIRI
Population Health Information Research Infrastructure

www.phiri.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

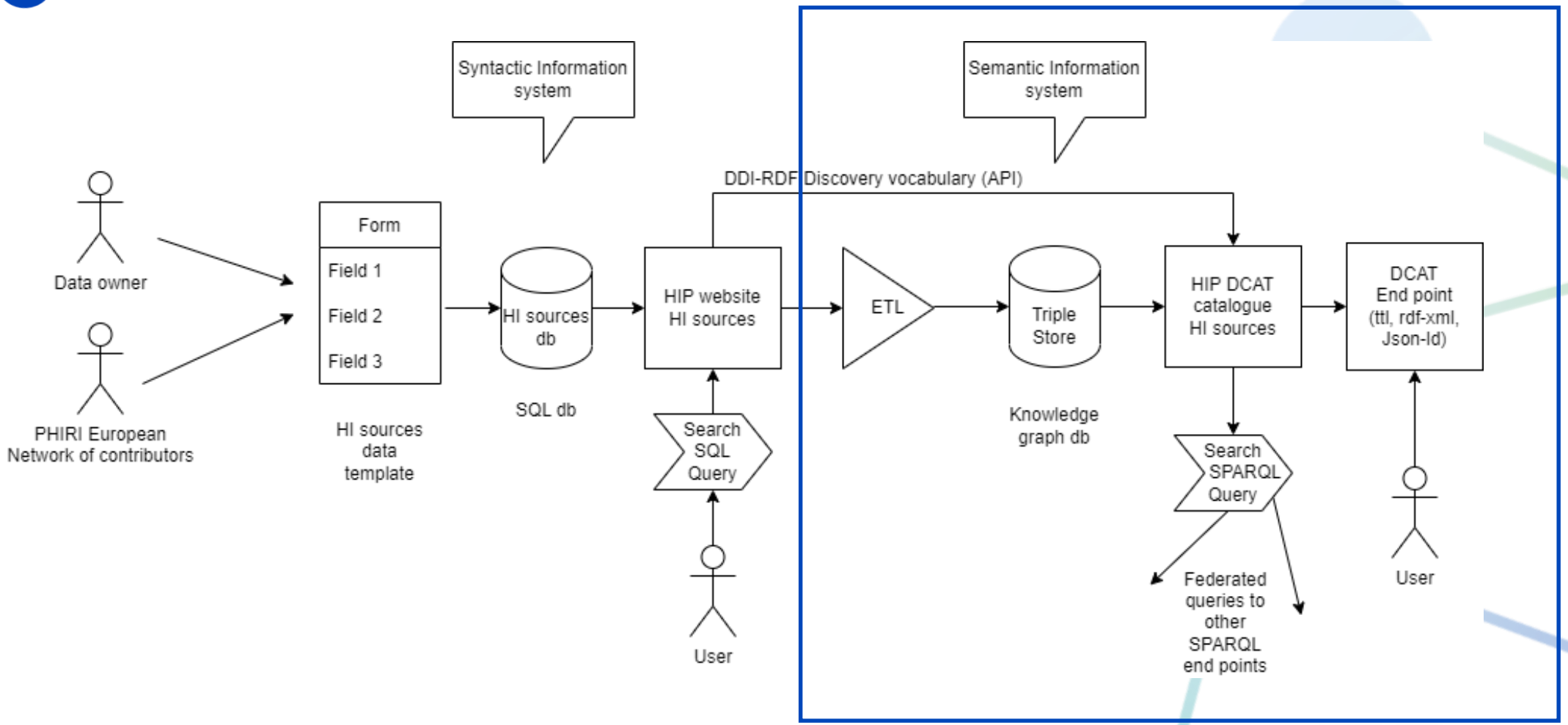
Requirements: FAIR metadata catalogue (Metadata for machines)

Publish semantically-rich and machine-actionable metadata:

- Use of DCAT W3C metadata standard for describing catalogues of datasets (interoperability)
- Publish in machine readable formats (TTL, RDF-XML, JSON-LD)
- Use unambiguous interpretation (Controlled vocabularies)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Upgrading the healthinformationportal.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

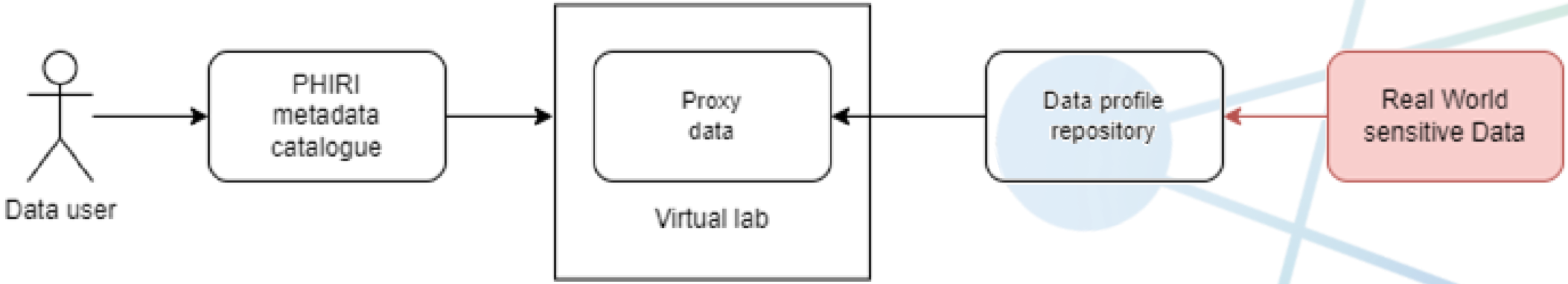
Access proxy data Data discovery (DDI-RDF Discovery vocabulary)

TO-BE

PHIRI
Population Health Information Research Infrastructure

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Provide information about the logical structure of Real World Sensitive Data and access to proxy data (to-be)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

Process and prototype knowledge

TO-BE

PHIRI
Population Health Information Research Infrastructure

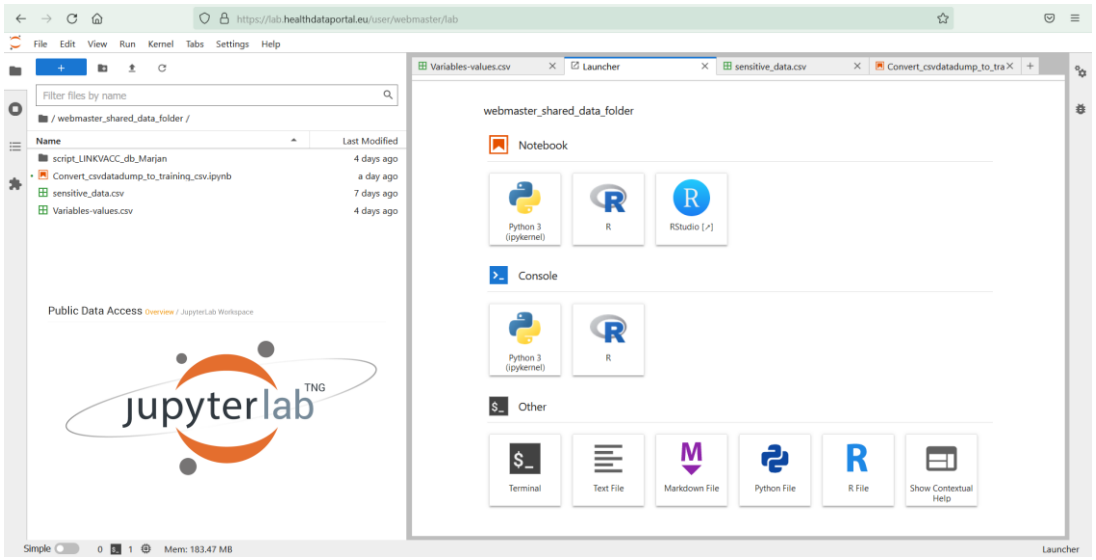
www.phiri.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Research Infrastructure as a DigitalXPlatform

EUROPEAN PUBLIC HEALTH CONFERENCE
BERLIN | 9-12 NOVEMBER 2022

“Open Science platform for collaborative Population health research”



PHIRI Virtual Research Environments offering access to virtual labs & demonstrators:

binder

PHIRI
Population Health Information Research Infrastructure

www.phiri.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Conclusion: upgrading the PHIRI federated platform

PHIRI aims to offer a **technical interoperability framework** allowing data analysis to be computationally reproduced in an isolated and secured processing environment.

In order to complement/enhance the EHDS2 ecosystem, upgrading options for PHIRI could include:

- A linked open data platform with virtual labs ('playground') offering search, data access (training data) and processing facilities for the prototyping of knowledge.
- A technical interoperability framework to the EHDS2 allowing processing of sensitive data in secure and isolated environments ("codes move to data") for the production of insights

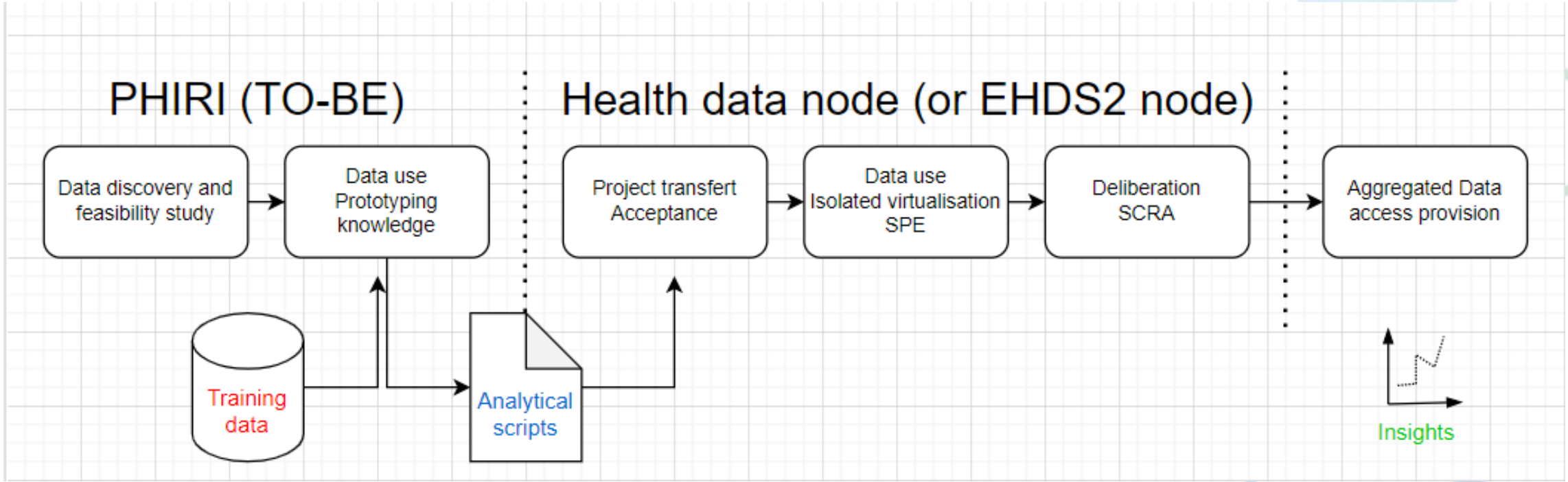
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Conclusion

TO-BE

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

User journey for the secondary use of data powered by the PHIRI research infrastructure



Playground **Sandbox**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

PHIRI

Population Health Information Research Infrastructure

EUROPEAN PUBLIC HEALTH CONFERENCE

BERLIN | 9-12 NOVEMBER 2022

Name: Pascal Derycke
E-mail: Pascal.Derycke@sciensano.be
@PHIRI4EU
/company/phiri
www.HealthInformationPortal.eu

sciensano

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101018317

Improving PHIRI performance and scalability: working within EGI-ACE

Patrick Fuhrmann
DESY

On behalf of
Gergely Sipos (EGI-ACE Technical Coordinator)
EGI Foundation

European Public Health Conference
November 2022, Berlin

EGI-ACE receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101017567.

Outline

- EGI and EGI-ACE
- PHIRI use case
- Science with EGI Notebooks and Binder
  - In a scalable way
  - In a reproducible way
- Conclusions

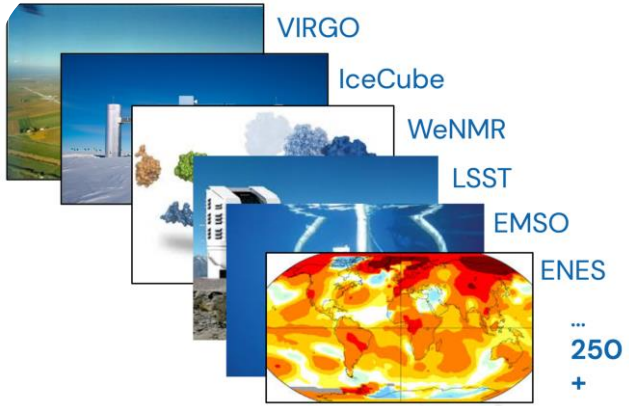
PHIRI
Population Health Information Research Infrastructure

EGI = An international e-infrastructure

Advanced computing and data analytics for research and innovation

2010

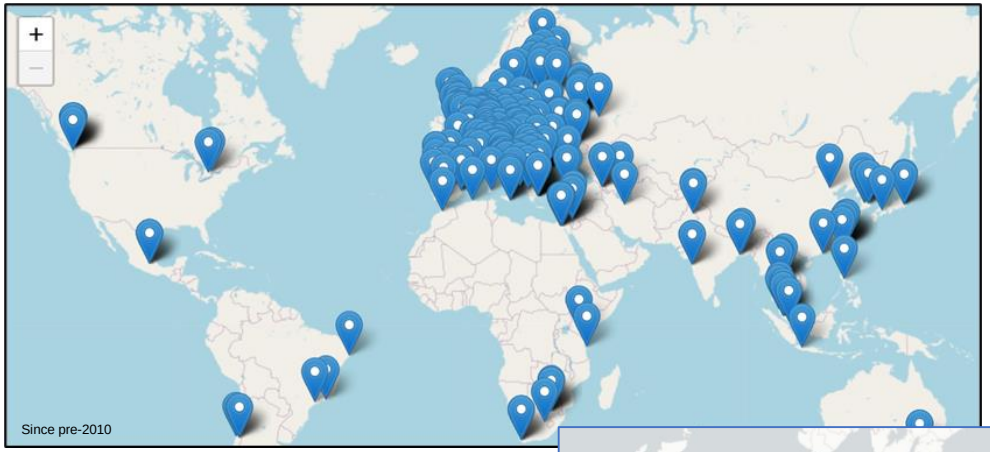
From the high-energy physics compute grid (WLCG)



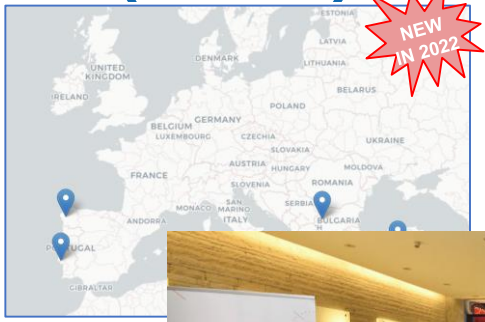
2022

To a multi-disciplinary, multi-technology infrastructure

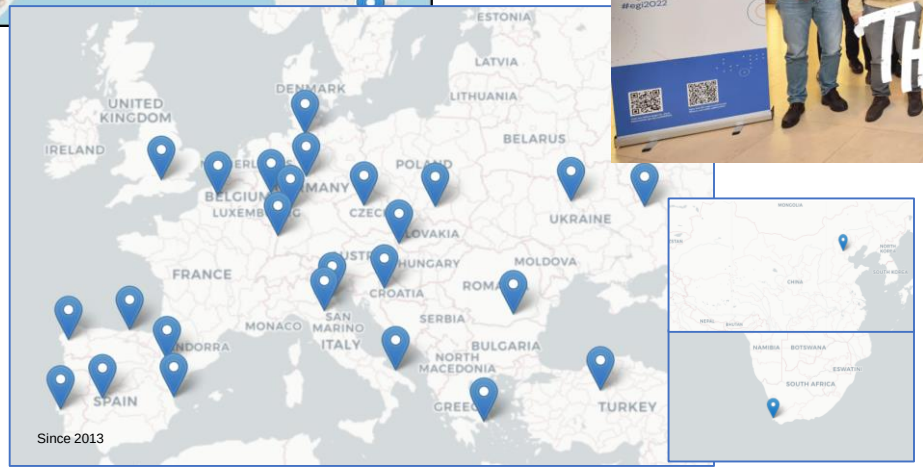
EGI compute infrastructures (Oct/22)



200+ High Throughput Compute sites
(ARC-CE, HTCondorCE, SRM, webdav, XrootD)



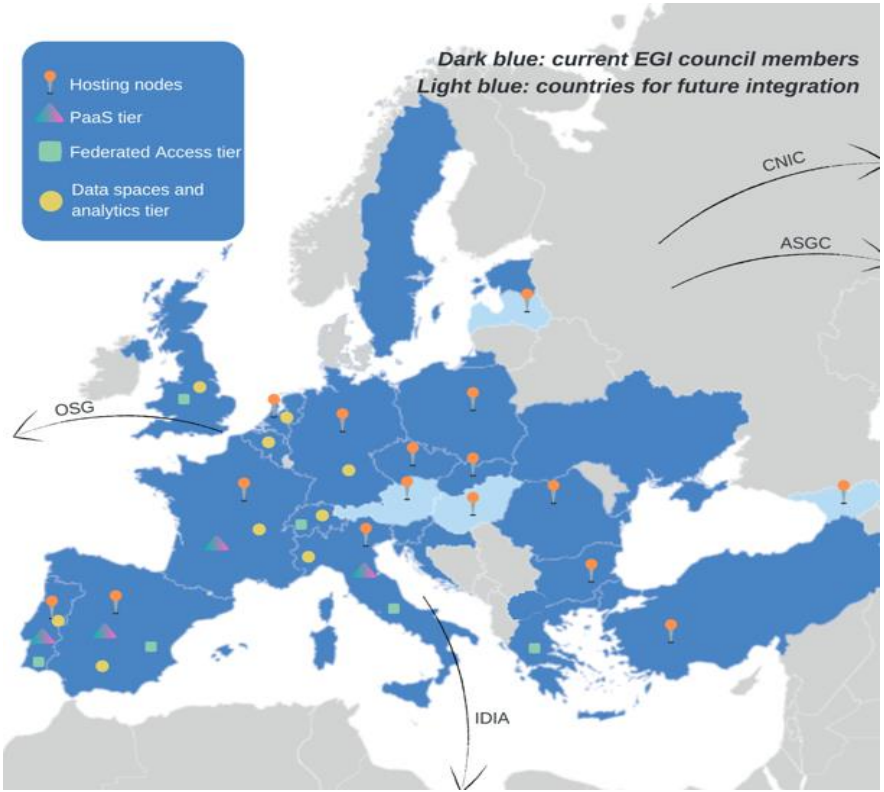
4 HPC sites



28 Cloud sites
(OpenStack)

EGI-ACE = EGI H2020 flagship project because…

EGI Advanced Computing for EOSC (European Open Science Cloud)



Consortium:

- Coordinator - EGI Foundation
- 33 Partners, 23 third parties
  - Incl. Sciensano for PHIRI

Duration:

- Jan 2021 - June 2023 (30 months)

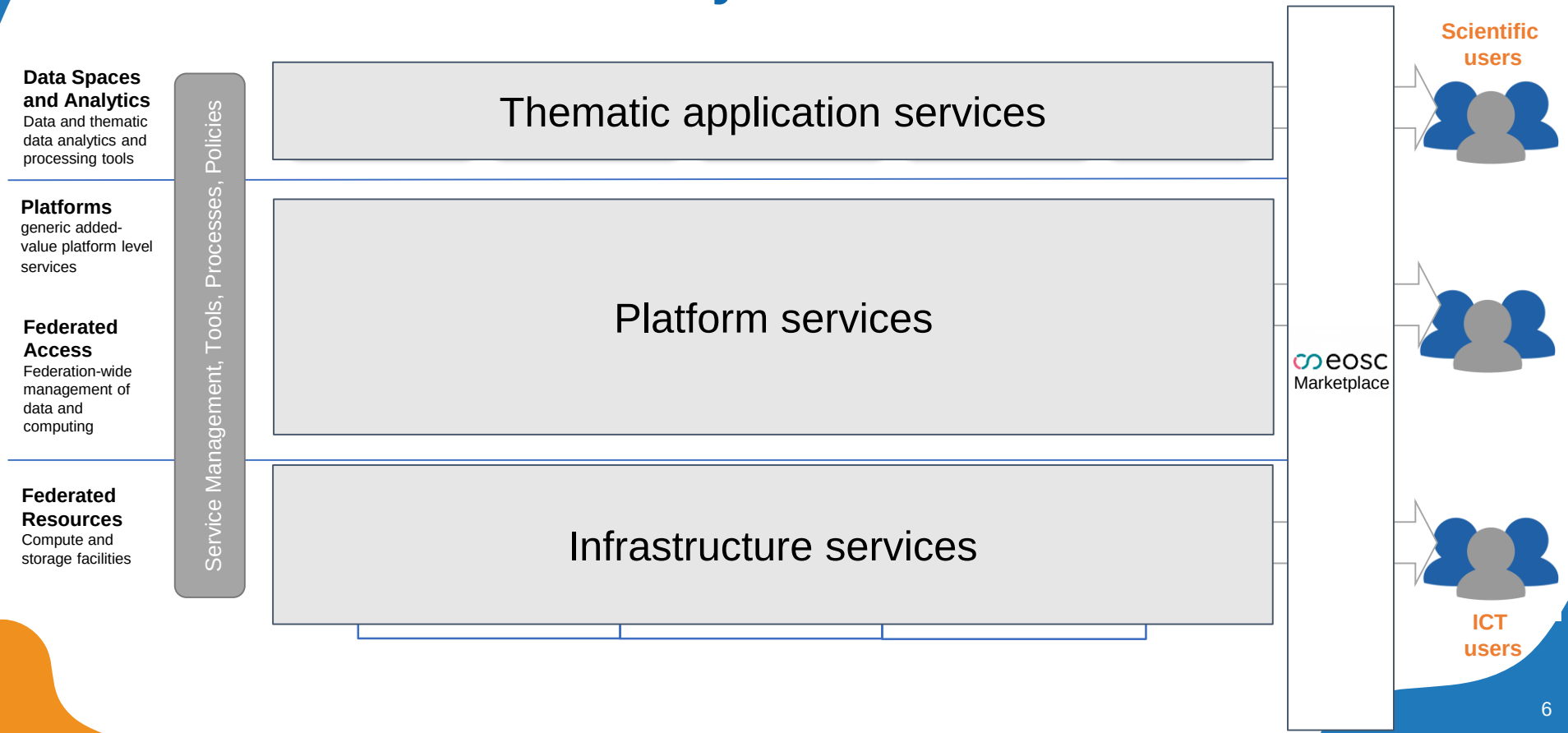
EGI Services for

- Research
- Federation
- Business

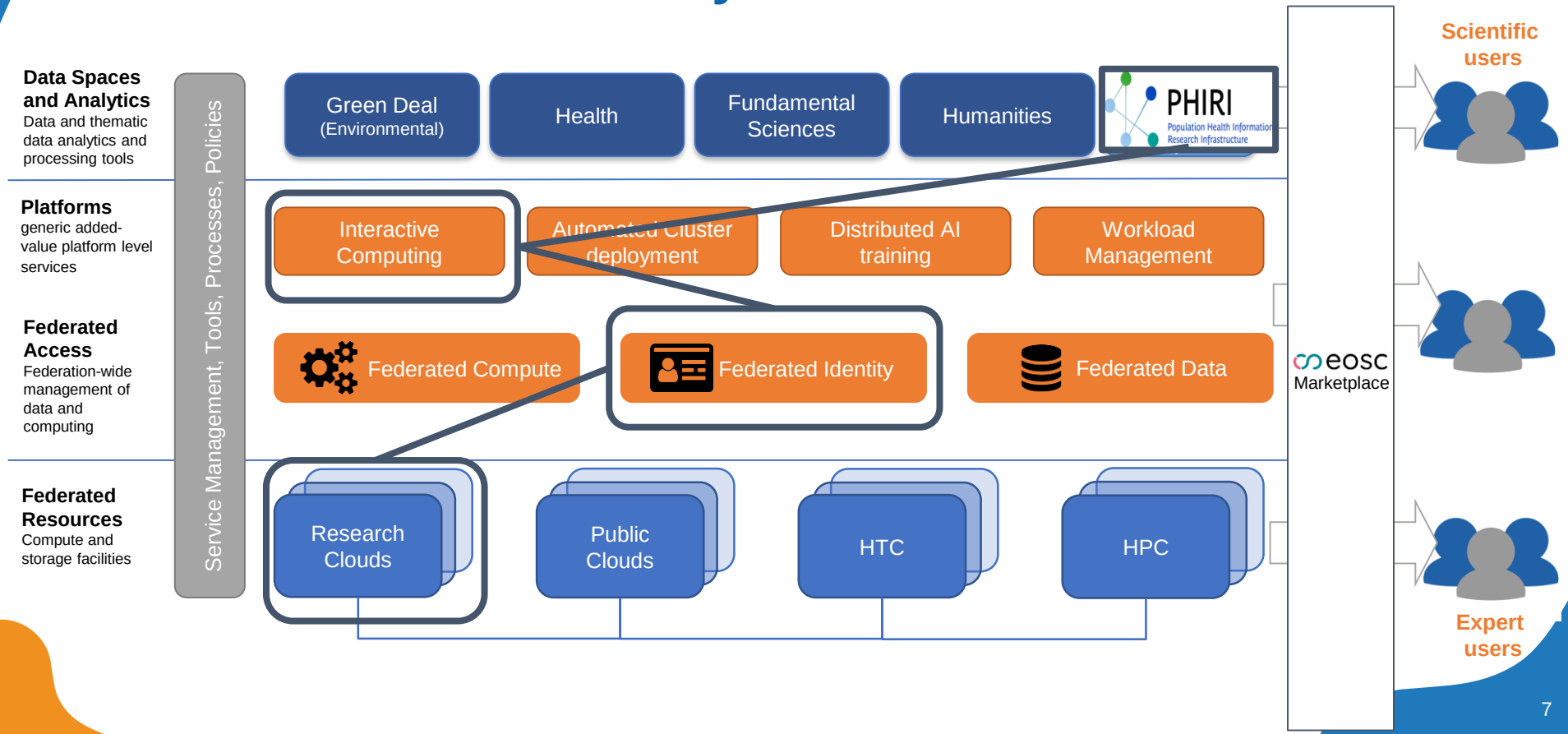
Scope:

- Co-development of services with research communities
- 49% service delivery (Virtual Access)

EGI-ACE service delivery activities



EGI-ACE service delivery activities



PHIRI use case in EGI-ACE

https://www.phiri.eu/

About PHIRI

RI on population health information that aims to facilitate and generate the best available evidence for research on health and well-being of populations as impacted by COVID-19.

PHIRI
Population Health Information Research Infrastructure

Piloting PHIRI services on EGI

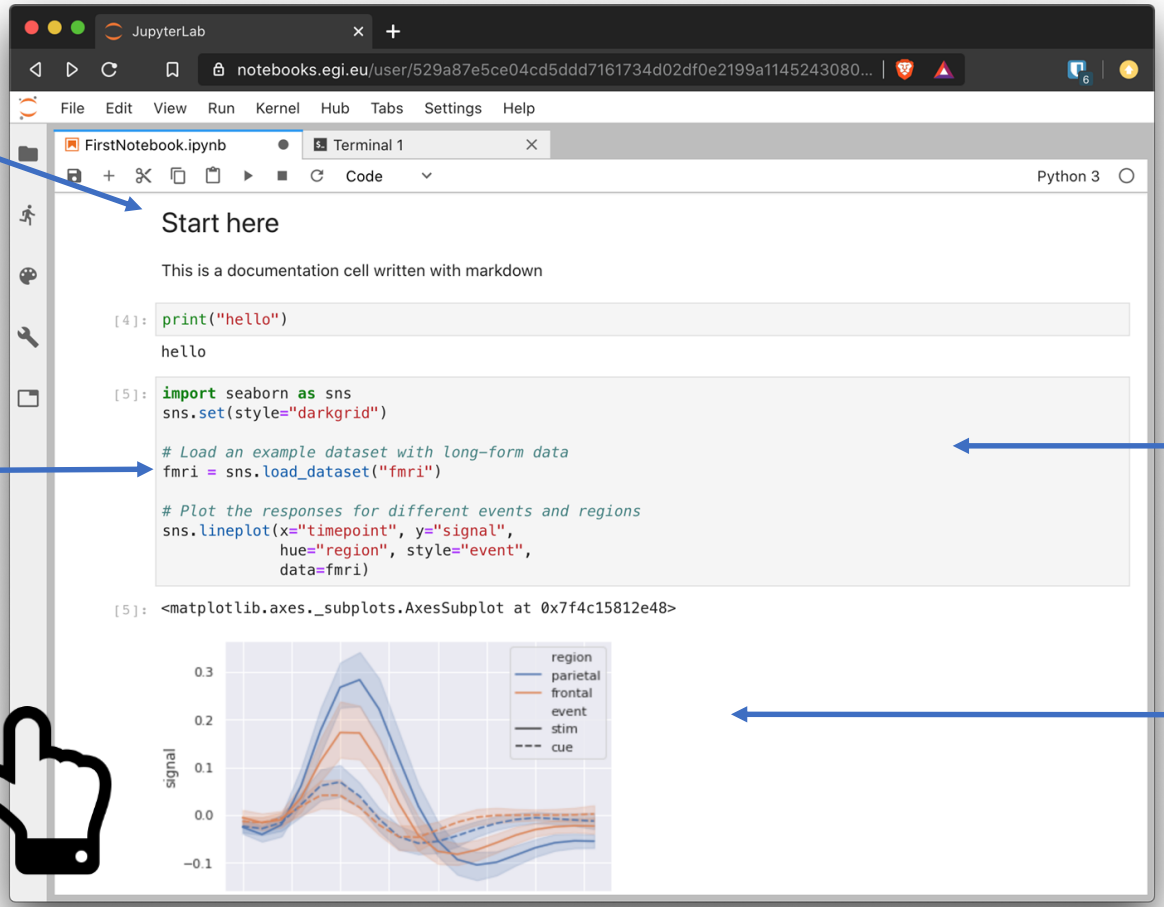
1. **Reproducibility**: write, run, share, re-run data analysis ('FAIR notebooks')
    - EGI Notebooks and Binder services at CESNET (CZ)
    - Using RStudio kernel
    - Notebooks+Binder (as Docker containers), reinstall at other sites
3. **Scalability**: Deploy and operate PHIRI web environments in the cloud
    - **Underlying capacity *(scalable within BIFI and to other sites)***
        - OpenStack cloud resource from BIFI (ES)
        - 20 vCPU cores. 50GB of RAM and 1TB of block storage

EGI Notebooks (based on JupyterHub)

Documentation
Text formatted using Markdown/LaTeX

Data
Import from local/remote disk

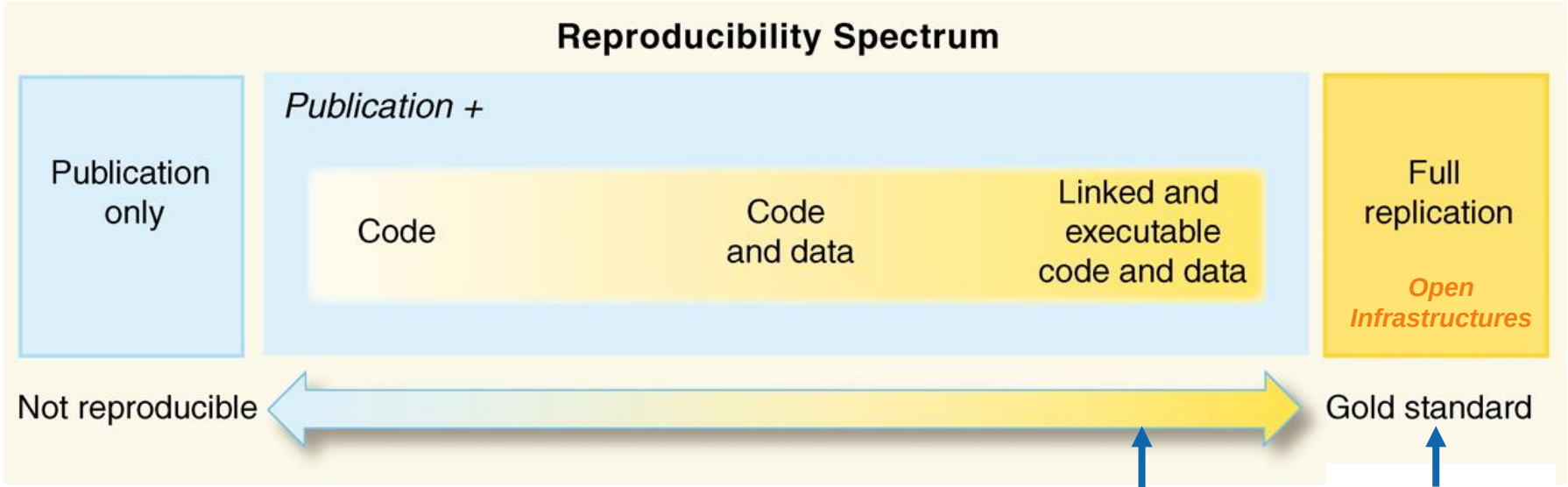
Interactive
browser based environment with federated login



Code
Use your favourite language

Output
Results of the code execution(e.g. plots)

Reproducible science on the way to Open Science



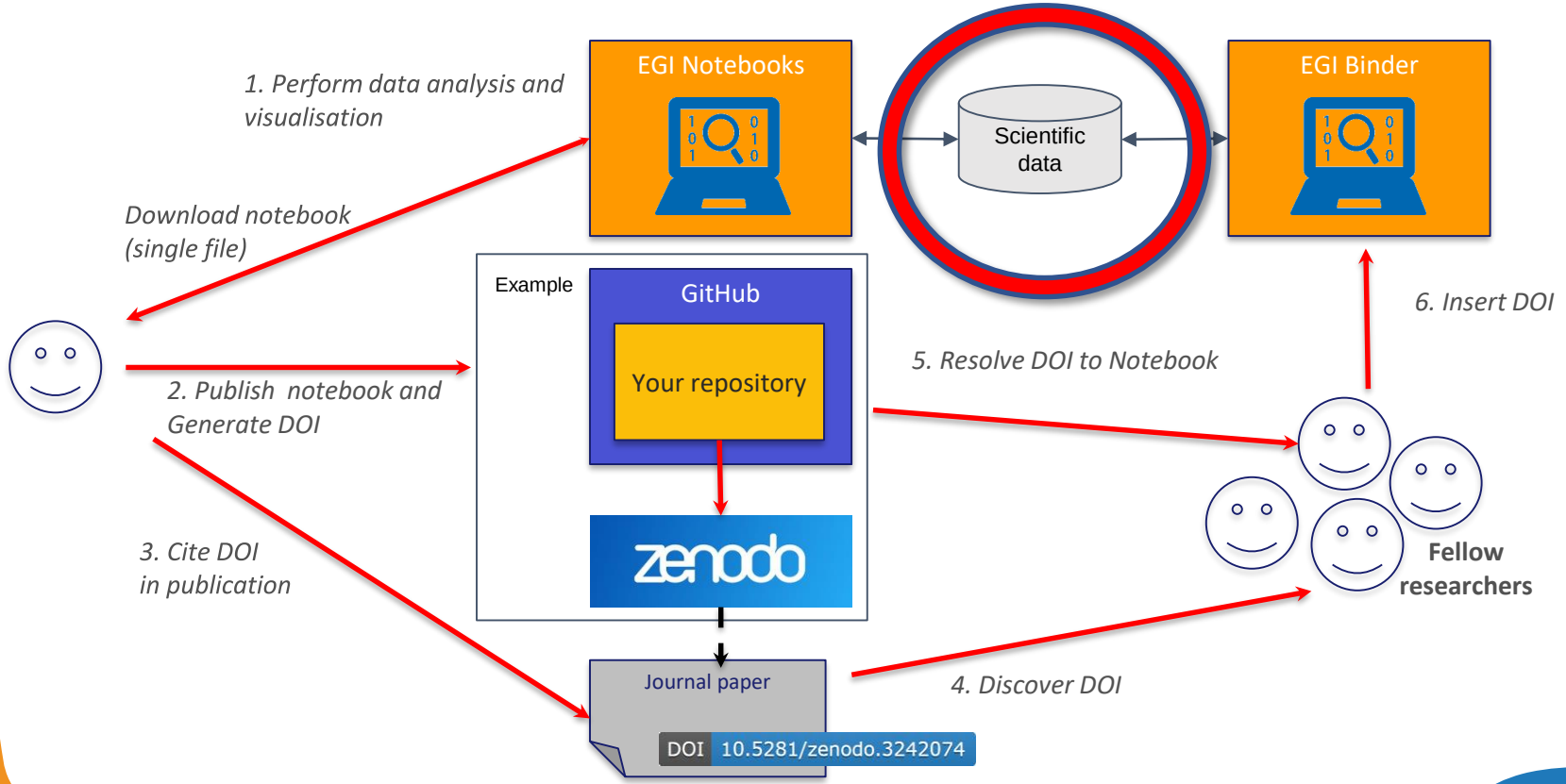
Curtesy: Research Gate

Notebooks

binder

With Binder, open those notebooks in an executable environment, making your code immediately reproducible by anyone, anywhere.

Reproducible science with EGI Notebooks and Binder



Conclusions

- PHIRI made first steps to ‘cloudify’ user environments and analysis applications
  - Scalability
  - ‘Remote updates’
  - Sharing and reproducing
    - Notebooks-Binder OR
    - whole setup with Docker
- Partnership with EGI
  - Building on an interoperable compute federation
- Additional areas to explore with EGI in the future
  - Federating data for centralised search and discovery
  - Remote access to datasets from Notebooks and Binder
  - AI/ML from notebooks

Thank you!

Contact: **support@egi.eu**
Website: **www.egi.eu/projects/egi-ace**

EGI Foundation

@EGI_eInfra

EGI-ACE receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101017567.