Health Data Spaces
The European Cancer Images Federation

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Some actors in the Health Data Spaces

The European Health Data Space (EHDS)

1. Empowering individuals through increased digital access to and control of their electronic personal health data,.

2. Fostering a single market for electronic health record systems, relevant medical devices and high risk AI systems.

3. Providing a trustworthy and efficient set-up for the use of health data for research, innovation, policy-making and regulatory activities (secondary use of data).

Health Data Spaces Pilot
(https://ehds2pilot.eu/project/)

EU infrastructure ecosystem for the secondary use of health data for research, innovation, policy making and regulatory purposes

Testing and Experimental Facilities

Specialised large-scale reference sites open to all technology providers across Europe to test and experiment at scale state-of-the art AI solutions, including both soft-and hardware products and services in real-world environments.

Four areas: Agri-Food, Healthcare, Manufacturing & Smart Cities & Communities.

Testing and Experimentation Facility for Health AI and Robotics
(https://www.tefhealth.eu/)

It aims to test and validate innovative artificial intelligence (AI) and robotics solutions for the healthcare sector and accelerate their path to market.

Infrastructures in Flagship Areas

The Genomic Data Infrastructure
(https://gdi.onemilliongenomes.eu/)

The Genomic Data Infrastructure (GDI) project is enabling access to genomic and related phenotypic and clinical data across Europe. It is doing this by establishing a federated, sustainable and secure infrastructure to access the data.

European federated infrastructure for cancer images (EUCAIM)
(https://cancerimage.eu/)

A pan-European federated infrastructure of cancer-related images for the validation and development of AI tools, which will support and enhance the cancer diagnosis procedure, treatment and the identification of the need for predictive medicine.

Cancer Image Europe

The European Federation for Cancer Images

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EUCAIM

Europe's Beating Cancer Plan

EUCAIM

- **New EU approach to cancer prevention, treatment and care**
- Four key action areas

Prevention	**Early detection**	**Diagnosis and treatment**	**Quality of life**
Addressing key risk factors	*Improving access, quality, diagnostics*	*Ensuring integrated, comprehensive care*	*Improving support, rehabilitation, integration*

- One of the objectives of the EBCP is to make the most of the potential of data and AI to combat cancer
- 10 flagship initiatives, including the **European Cancer Imaging Initiative**

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European Commission

EUROPEAN CANCER IMAGING INITIATIVE

#euCancerImaging

European Cancer Imaging Initiative

EUCAIM

Cancer imaging datasets exist for different cancer types, but are scattered and not easily accessible

What is the ECII trying to achieve?

- Foster innovation and **deployment of digital technologies** for improved clinical decision-making, diagnostics, treatment and prediction
- Link resources and databases to establish an **open infrastructure of cancer images** for development and benchmarking, and piloting tools
- **Showcase access and use of medical images**, while ensuring privacy, trust and security
- Make large amounts of cancer images and linked data easily accessible in line with the **European Health Data Space** and **EOSC**.

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Cancer Image Europe

EUCAIM

- Research infrastructure developed by the EU-funded **EUCAIM project**
  - Coordinated by EIBIR, scientifically led by Prof. Luis Martí-Bonmatí (HULAFE, Valencia/ES)
  - Consortium: 76 partners from 14 countries
  - Runtime: January 2023 - December 2026
  - Budget: €35.6m
- Involving the major RIs in Health and key e-Infrastructures.

Instituto de Investigación Sanitaria La Fe · Clínic Barcelona Hospital Universitari · Hospital Universitario Ramón y Cajal · Instituto de Salud Carlos III

Universitat de València · Universitat Politècnica de València · CSIC · ITI Instituto Tecnológico de Informática · CRG Centro de Regulación Genómica · Universitat de Barcelona

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S2 Grupo · IQVIA · bahia software · Quibim · MATICAL INNOVATION

EURO BIOIMAGING · elixir · BBMRI-ERIC · eatris · EGI · BSC Barcelona Supercomputing Center, Centro Nacional de Supercomputación

Vision and mission

Vision

Enhance cancer **diagnosis** and **treatment** through AI tools

Mission

- **Deploy a hybrid federated infrastructure** to power up AI & imaging to beat cancer
- Provide a research platform for the **development & benchmarking of AI tools** toward Precision Medicine
- **Address the fragmentation** of the existing cancer image repositories by building a distributed **Atlas of Cancer Images** *(>60m anonymised cancer images)* accessible to clinicians, researchers and innovators
- Create a federated data warehouse approach for deploying observational studies

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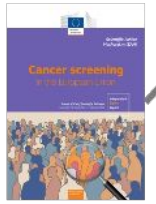
The Atlas of Cancer Images

Hybrid Platform

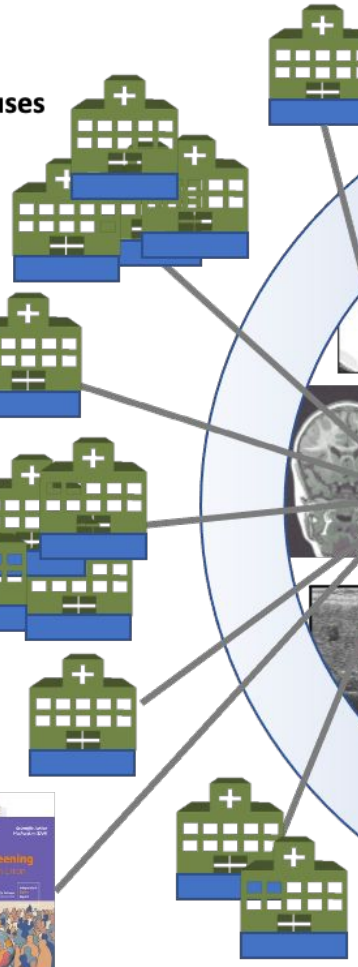
Distributed RW Data Warehouses
Extract, Transform and Load
ML Federated Learning

CDM hyper-ontology

Primary & Secondary Used Area



Cancer Screening Programs



Metadata Catalogue
Annotated Structured Data
AI Experimentation Platform

AI4Health Imaging

Atlas of Cancer Images

ERIC
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

CLINICAL TRIALS

Secondary Use Area

DICOM-MIABIS

Data Altruism

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The Atlas of Cancer Images

- Defining a hyperontology and metadata standards for image collections to enhance interoperability.
- Adhering to the FAIR Principles for collections and data.
- Integrating AAI mechanisms in the line of the recommendations of the EOSC AAI.
- Creating a federated community of providers - a potential thematic node.
- Supporting a community of users in the area of Cancer Imaging.

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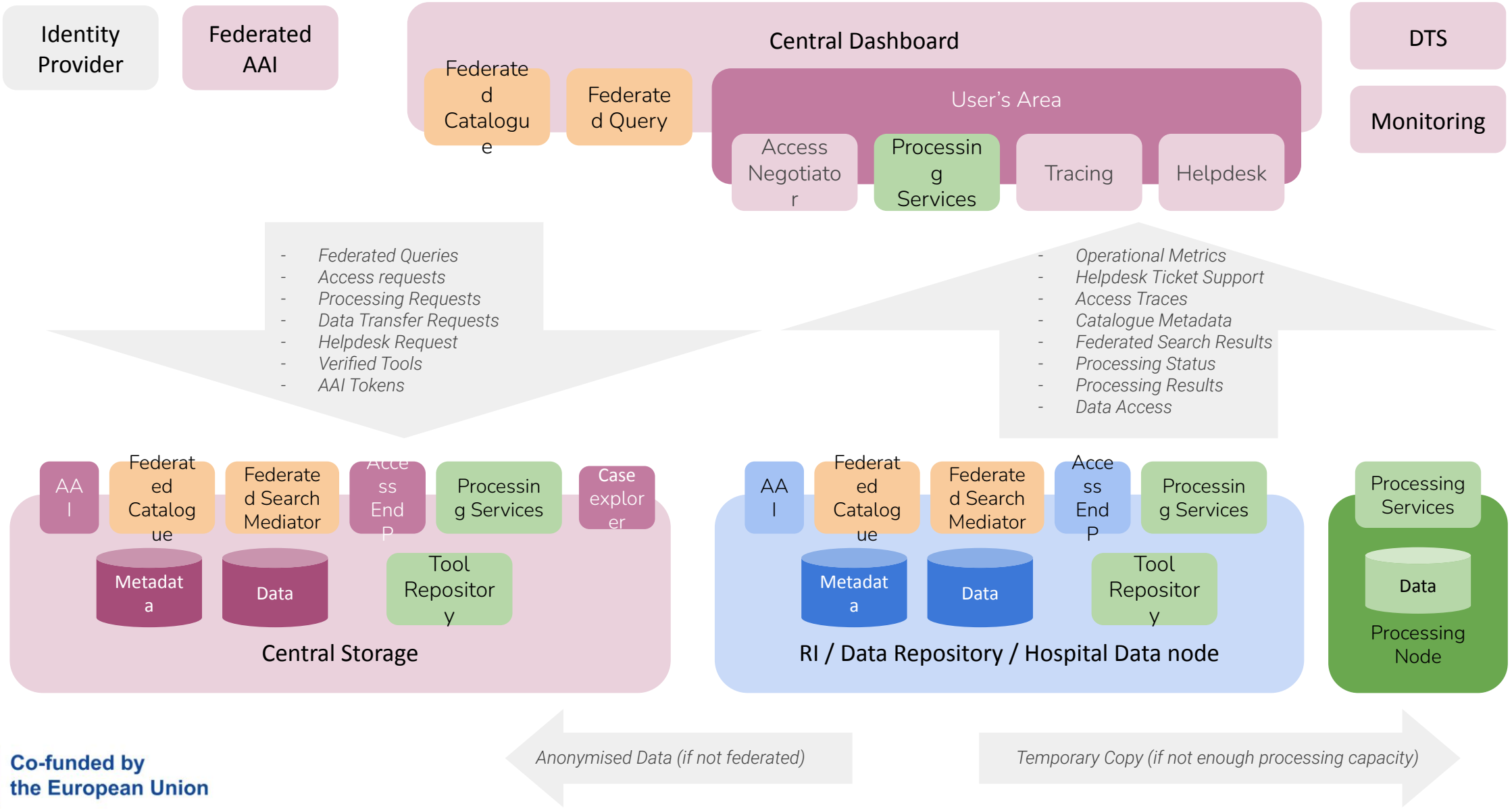
The Atlas of Cancer Images



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How to interact and collaborate

- Data provider
  - Join the federation and contribute with data and resources (Data Sharing)
  - Contribute with data (Data Transfer & Sharing)
- Service or tool provider
  - Contribute with processing tools, innovative services, processing capabilities, storage nodes.
- End-user
  - Use, test and validate data and services.

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Sustainability

- EUCAIM aims to be sustainable beyond the scope of the project
  - 50% funded, it already has worked on finding a matching co-fund.
- It has proposed the creation of an EDIC
  - A working group has been created to advance in the proposal, involving the countries that have expressed their interest.
- The EDIC model enables the participation of industry, which could provide an additional source of revenues
- The consortium is studying to request a lightweight baseline funding and a project-based (through private and public funding sources) targeted funding.

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Conclusions

- EUCAIM aims at consolidating the Cancer Imaging research community through a sustainable infrastructure.
- Data is extremely sensitive and complex, requiring a widely accepted legal framework.
  - The federated model will be key to fulfil the legal constraints.
  - The construction of the federation is cumbersome and technically challenge.
- FAIR principles and interoperability with other actions in health, and interdisciplinary areas such as environment, social sciences, climate, etc. are key.

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