Webinar for the consortia applying for the Pathfinder challenge on generative AI for cancer could leverage the EUCAIM infrastructure

09/06/2025

Leveraging EUCAIM to Support Early-Stage Generative AI Innovation in Cancer Research

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Agenda

1. Introduction to the EIC Pathfinder Challenge (7 min) [F. Zanca]
2. Overview of EUCAIM and the Cancer Image Europe Platform (12 min) [L Marti-Bonmatí]
3. What EUCAIM Offers to Early-Stage Innovators applying for the pathfinder (12 min) [I. Blanquer]
4. EUCAIM's Broader Contribution to Multimodal AI Research (12 min) [L. Cerdá-Alberich]
5. Use Cases & Engagement Opportunities for Innovators (12 min) [A. Alberich-Bayarri]
6. Discussion & Q&A (35 min)

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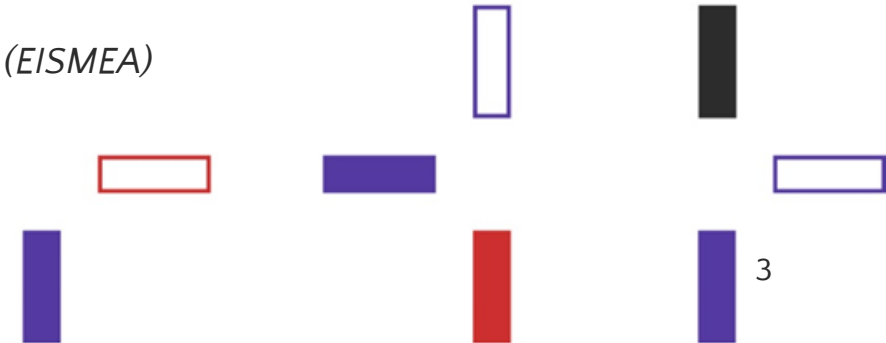
GENERATIVE-AI BASED AGENTS TO REVOLUTIONIZE MEDICAL DIAGNOSIS AND TREATMENT OF CANCER

Federica ZANCA

Program Manager Medical Imaging and AI in HealthCare

European Innovation Council and SMEs Executive Agency (EISMEA)



Agentic AI

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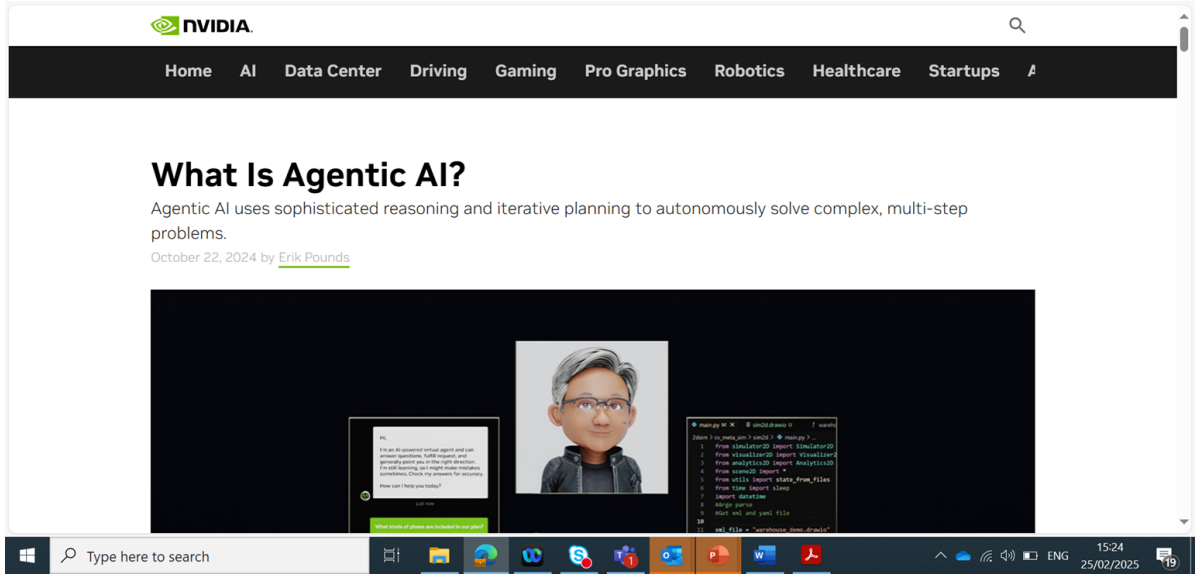
- Agentic AI refers to artificial intelligence systems that possess autonomous decision-making capabilities, enabling them to independently analyze challenges, develop strategies, and execute tasks without human intervention. These systems are designed to handle complex, multi-step problems by employing sophisticated reasoning and iterative planning.



Scope of the Challenge

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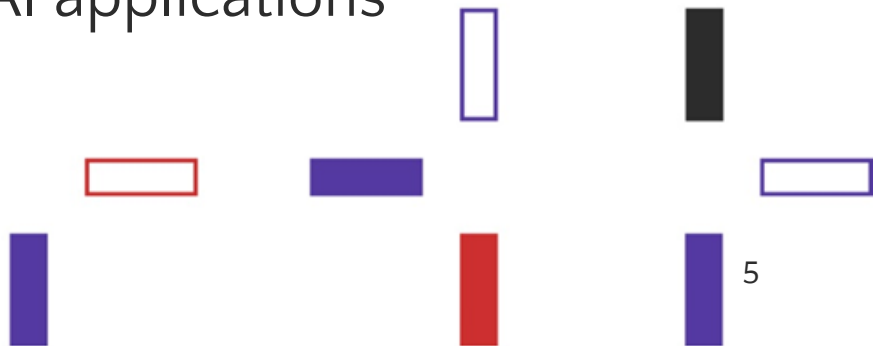
- Support **population-level real-world data multimodal multidimension learning**

- Enable streamlining tasks like determination:
  - of **clinical pathway,**
  - **patient risk** assessment**,**
  - prediction of **disease progression,**
  - assessment of **personalized treatment**

- Address **data** scarcity, biases, and privacy concerns for AI applications



Specific objectives of the Challenge

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AREA 1: Technological

i. AI-based tools and architecture for Integrating Multimodal Multidimensional Data

ii. AI-based tools for Medical Data Augmentation

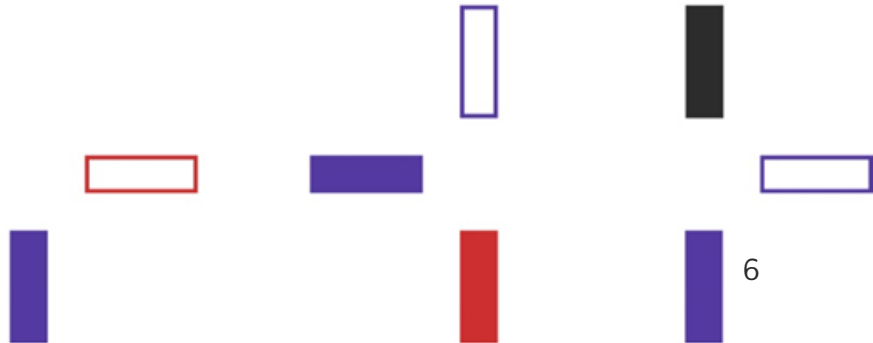
iii. AI-based tools and architecture for Medical Knowledge Representation and Integration

AND*

AREA 2 Clinical (exploiting info from area 1)

i. Autonomous agents for Predictive Diagnosis

ii. Autonomous agents for personalized Treatment Selection



*At least on sub-objective from each area

Horizontal to both areas

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✓Ethics, AI Trustworthiness & Model Transparency

✓Bias Detection & Mitigation

✓Regulatory Compliance & Clinical Validation

✓Cost-effectiveness and Economic Impact

The AI models developed under this Challenge are expected to comply with the EU concept for Trustworthy AI, relevant ethical principles, and the AI Act.

- https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai
- https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/640163/EPRS_BRI(2019)640163_EN.pdf
- https://www.europarl.europa.eu/topics/en/article/20230601STO93804/eu-ai-act-first-regulation-on-artificial-intelligence

Portfolio Considerations in EIC Pathfinder

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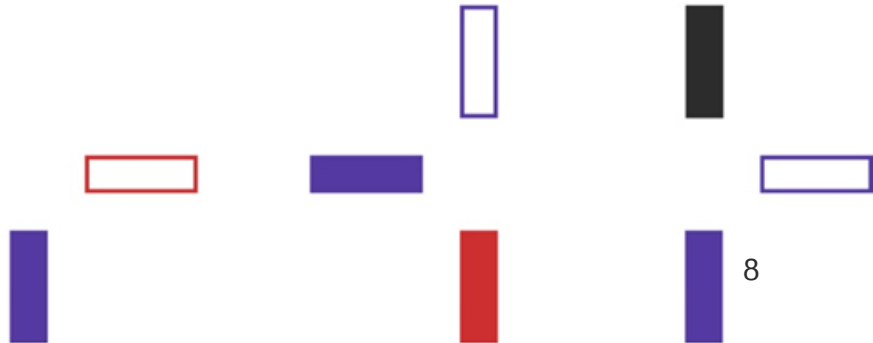
- **EIC does not fund standalone projects—it builds collaborative portfolios.**
- Funded projects are part of a **Challenge Portfolio**, working toward a **common vision**.
- Projects interact, share knowledge, and contribute to **collective goals**.



Step 2: Portfolio creation

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Category 1: Type of Cancer considered by a proposal.

As defined by WP, each proposal should focus on one (and only one) of the following diseases: breast cancer, cervical cancer, ovarian cancer, prostate cancer, lung cancer, brain cancer, stomach cancer or colorectal cancer.

Category 2: Type of clinical area covered with possible values:

i. Predictive Diagnosis.
ii. Personalized Treatment Selection.

Category 3: Technology area

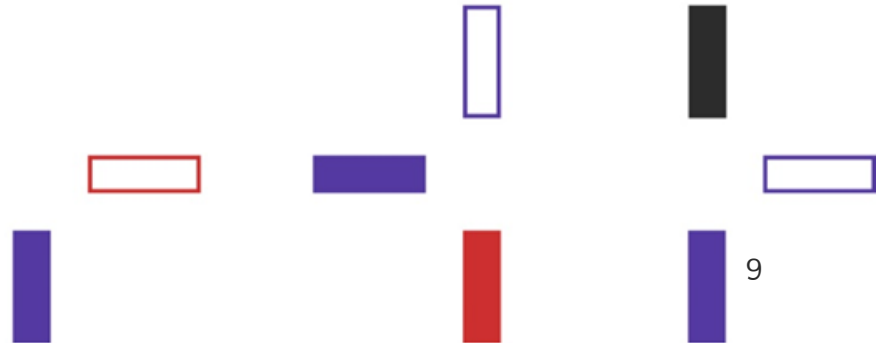
Which technological approach is used in the proposal. The three possible values are:

i. GenAI-based tools (or other advanced AI technologies) for Integrating Multidimensional Multimodal Health Data
ii. Medical Data Augmentation
iii. Medical Knowledge Representation and Integration.

Category 4: Access to Infrastructure, data and ecosystem integration

What are the research infrastructures and clinical facilities that the proposal aims to use, which large datasets do they have access to, and what are their partnerships with hospitals or research institutions for clinical validation.

!!!!
Projects covering all subcategories of Categories 2 and 3 will be preferred, as they best align with the holistic approach sought by the challenge.



Important!!!

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Access to infrastructure and data:

- Connection to Existing European Research and Clinical Infrastructures, e.g. Testing and Experimentation Facilities (TEFs), Euro-BioImaging, Cancer Image Europe platform*, the future UNCAN.eu platform, etc.
- National Cancer/Screening Registries and Open Databases.

Ecosystem Integration

- Collaboration with Leading Clinical Institutions focused on oncology is **KEY**. The projects should be clinically driven
- seek complementarity and synergies with other activities already funded or in the funding pipeline in the framework of the Health cluster of Horizon Europe or Innovative Health Initiative Joint Undertaking

In support of the European AI Strategy[1] , the Cancer Plan for Europe[2] and the Cancer Image Europe platform[3]

[1] European approach to artificial intelligence | Shaping Europe's digital future (europa.eu)
[2] A cancer plan for Europe - European Commission (europa.eu)
[3] https://cancerimage.eu/ , https://digital-strategy.ec.europa.eu/en/policies/cancer-imaging

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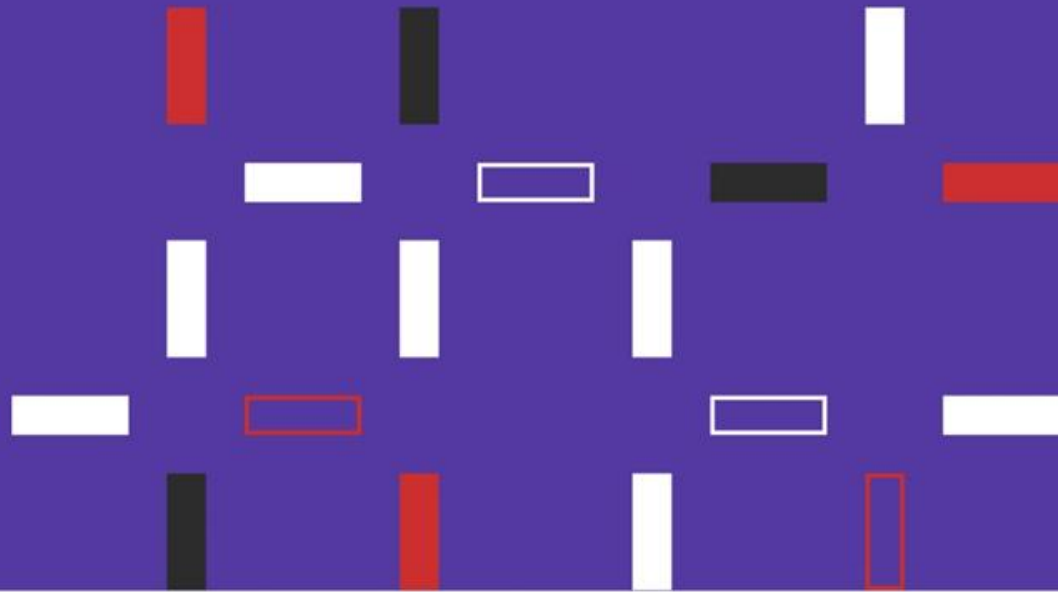
Thank you!

Federica.Zanca@ec.Europa.eu



Overview of EUCAIM and the Cancer Image Europe Platform

Luis Martí Bonmatí (HULAFE)
EUCAIM Scientific Coordinator

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Project overview

Research infrastructure developed by the EU-funded **EUCAIM project**

- Coordinator: EIBIR
- Scientific Director: Luis Martí-Bonmatí
- Consortium: 76 partners (14 countries) → 94 partners (17 countries)
- Runtime: January 2023 - December 2026
- Funding: 35.6 m€ (50% co-founded) → 39,42 m€

  - Flagship activity of the **European Cancer Initiative**

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Project overview

AI4Health Imaging

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Artificial Intelligence for Health Imaging: where EUCAIM started

chAImeleon	EUCAN IMAGE	ProCAncer-I	INCISIVE	PRIMAGE
2020 - 2025	**2020 - 2024**	**2020 - 2025**	**2020 - 2024**	**2018 - 2022**
Pan-European repository of health imaging data to validate AI solutions in cancer management	Develop large-scale cancer imaging platform with AI tools for diagnosis and treatment	Leverage AI to improve prostate cancer imaging through robust data integration	Develop AI solutions for cancer imaging analysis with a federated, interoperable platform	AI-driven medical imaging tools for pediatric cancer diagnosis and prognosis

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Partners and Stakeholders

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EUROPEAN INSTITUTE FOR BIOMEDICAL IMAGING RESEARCH

Instituto de Investigación Sanitaria La Fe

Beneficiaries: 65
Affiliated Entities: 10
Associated Partner: 1

Partners: 94

Stakeholders: +180

And many more!!!!

Main goals

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Address the fragmentation of the existing cancer image repositories

⇩

Atlas of Cancer Images

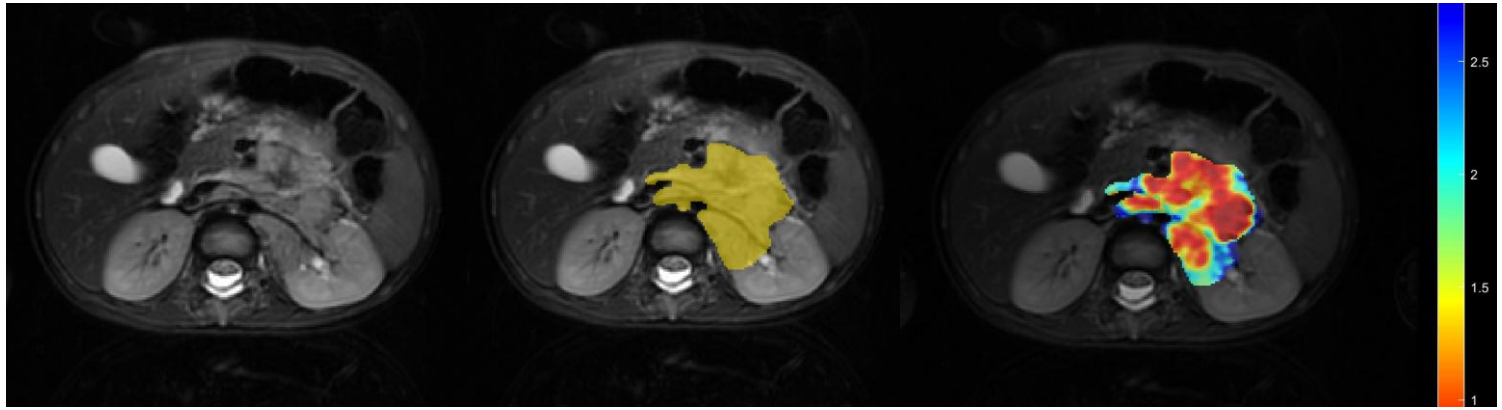
>60 million of anonymized cancer images

Accessible to clinicians, researchers and innovators

Enhance cancer diagnosis and treatment through Imaging Biomarkers, Models and AI tools

Development & Benchmarking of AI tools and Models toward Precision Medicine

Create a Federated Secure Processing environment for deploying observational studies



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Harnessing the Power of Data

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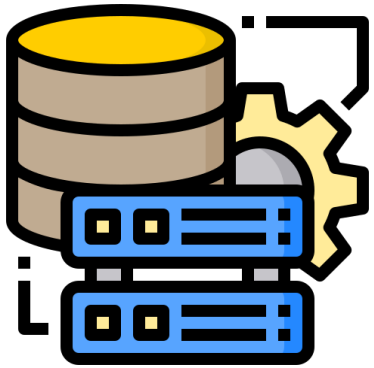
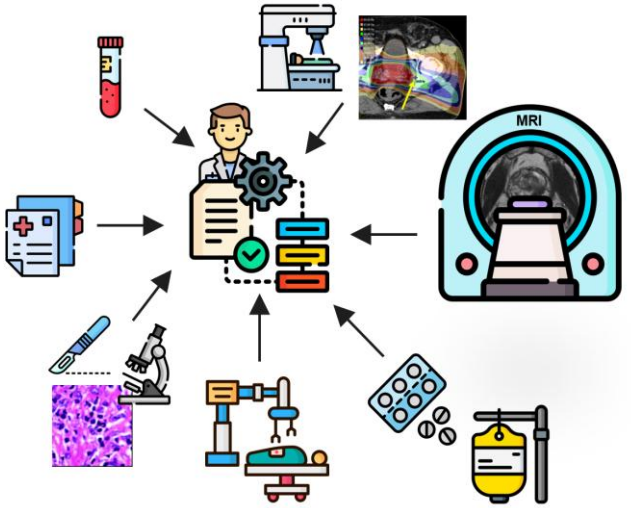


Data

Tools

Communities



Actionable Biomarkers and Models

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Hybrid platform: Atlas of Cancer Images

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Observational Studies RWD

DATA harvest model

DATA push model

AI Image Optimization

Hospitals

Cancer Screening Programs

Data Altruism

Observational RWD Studies

Central Storage Anonymized

Governance & Access

AI4Health Imaging

innovative medicines initiative

HORIZON 2020

Horizon Europe

ERIC
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

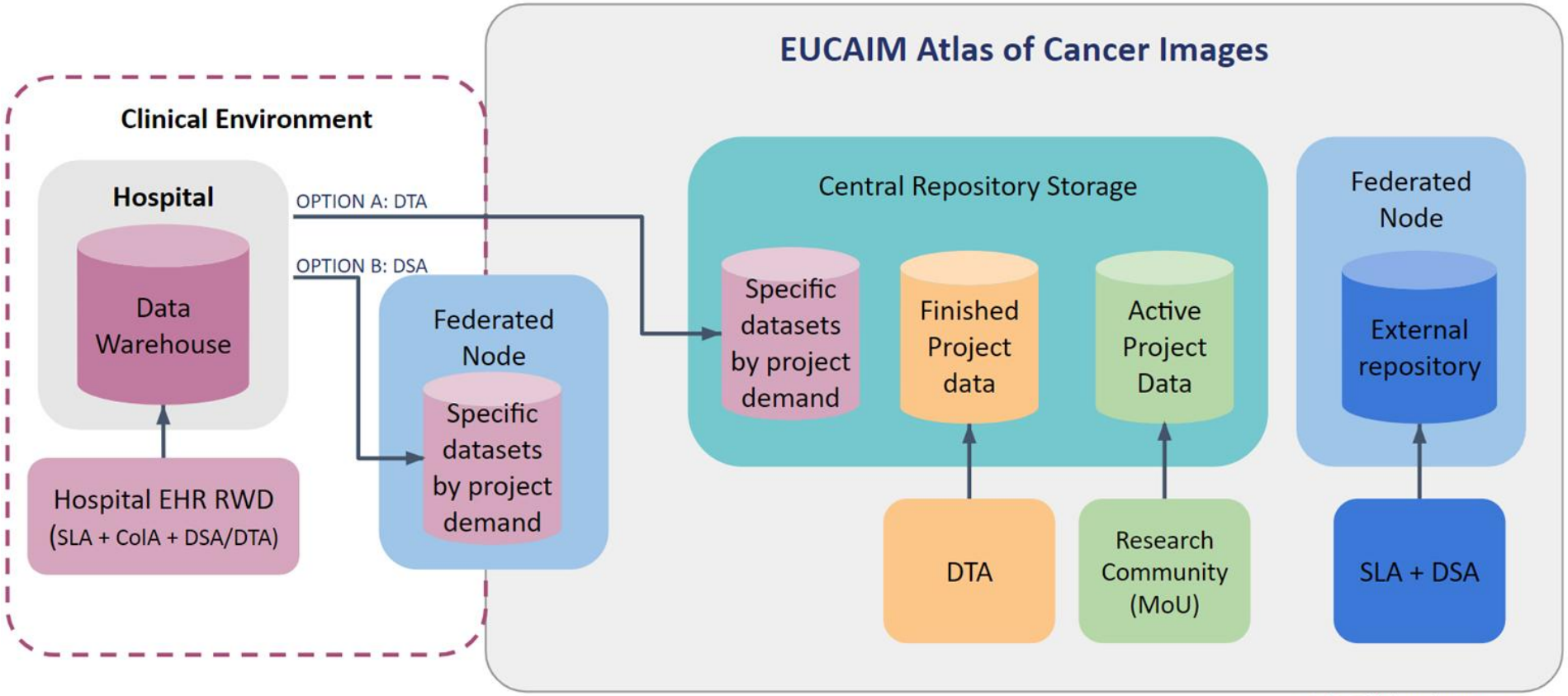
Biobanks

CLINICAL TRIALS

DATA & KNOWLEDGE Funded model

Integrated / Standardized

Hybrid platform: Atlas of Cancer Images



CoIA: Collaboration Agreement
DSA: Data Sharing Agreement
DTA: Data Transfer Agreement
MoU: Memorandum of Understanding
SLA: Service Level Agreement

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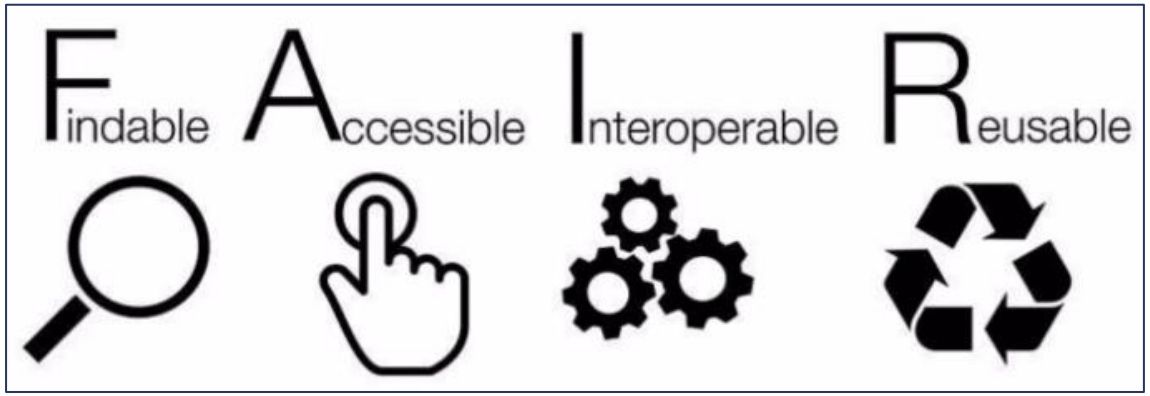
FAIR requirements



Cancer Images
DICOM / NIfTI

Metadata
Catalogue DCAT-AP

Clinical data
CDM mCODE

Hyper-ontology
Unified framework

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Main scenarios for Stakeholders (DH, SP: data and tools provision):

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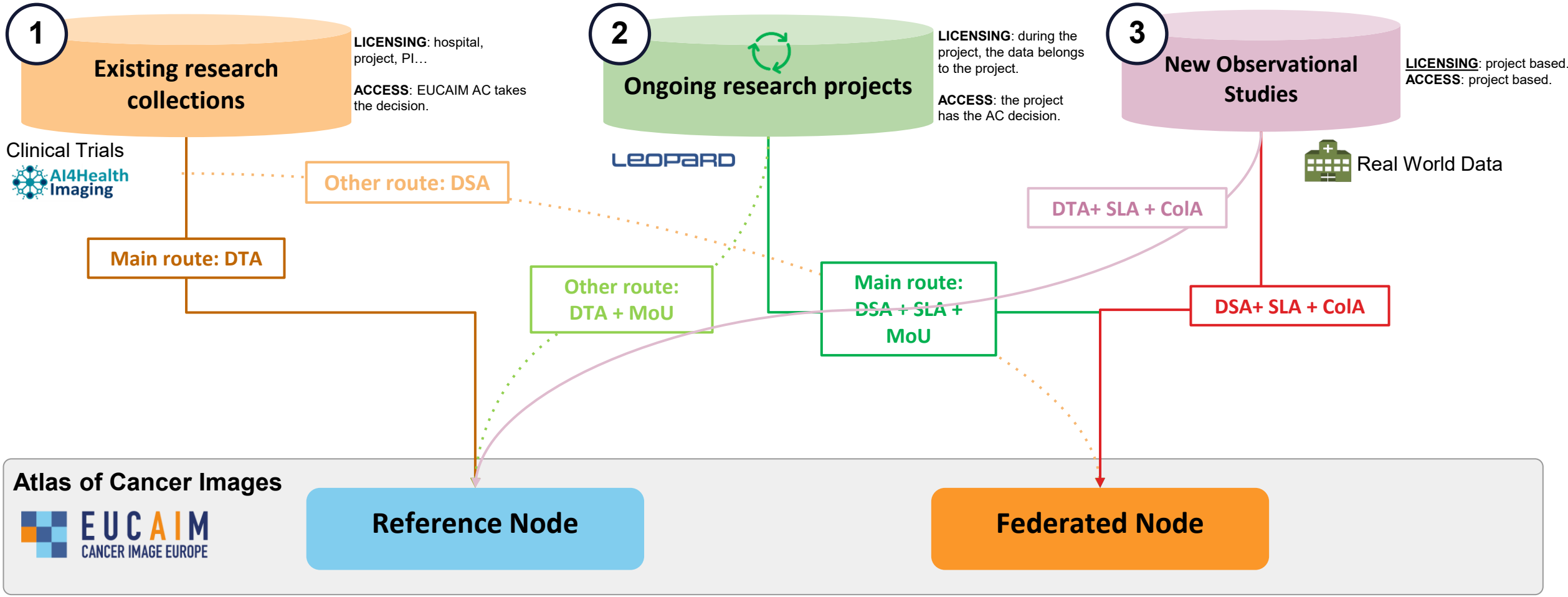

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ColA: Collaboration Agreement
DSA: Data Sharing Agreement
DTA: Data Transfer Agreement
MoU: Memorandum of Understanding
SLA: Service Level Agreement
AC: Access Committee

TIERs maturity level questionnaire

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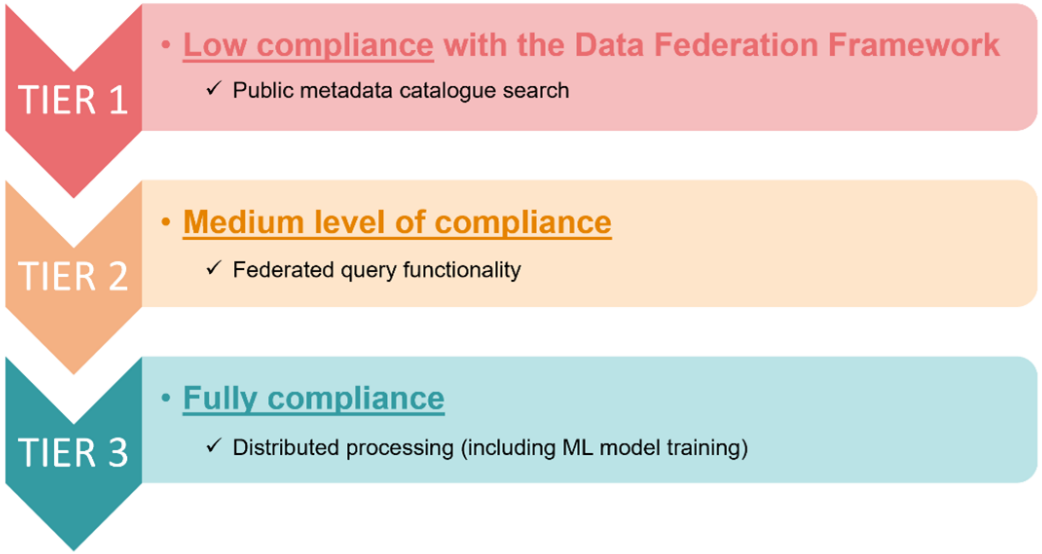
Three Tiers of Data Compliance

To accommodate different levels of data compliance, three technical tiers have been established. They are scalable, allowing partners to upgrade with new developments and new research projects.

Each tier offers increased visibility and usability of the data within the EUCAIM community.



Questionnaire MINIMUM REQUIREMENTS

Request of general information	
1. Please, provide details on the clinical cases available in your dataset:	Cancer type / Nº of cases/cancer type
2. In case you provide multiple datasets, are they following the same level of compliance? (If no, please fill all this questionnaire for each one of your datasets)	○ Yes ○ No
3. Which TIER level do you aim to achieve within the EUCAIM project?	○ TIER 1: At the registry level ○ TIER 2: At the data exploration level ○ TIER 3: At the data processing level
4. Which method will be used for data handling?	○ The data will be transferred to the reference nodes. ○ The data will be shared directly from the local node infrastructure.

In order to help you to identify your **TIER's starting point,** please fill the following checklist which includes the mandatory requirements for each tier level:

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Software Marketplace

Definition: A catalog of software/tools that can be used for pre- and post-processing data within the EUCAIM infrastructure.

Objective: Configure an integrated **toolbox** for the infrastructure. Build or adapt the selected tools to be able to perform in a distributed environment.

These tools are provided by the **Software Providers.**

- Preprocessing tools
  - Quality control
  - Data Curation
  - Harmonization
  - Annotation
  - FAIRification
  - De-identification
- Postprocessing applications
- Federated Learning platform
- Infrastructure platform
- Machine Learning models
- Analysis software

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EUCAIM Pre-processing tools

De-identification tools
Follow GDPR and national and international legislation

Harmonization tools
Increase the comparability among different providers, scanners and acquisition protocols

Annotation tools
Use of AI to reduce existing inter-/intra-observer variability of human processes

FAIRness tool
FAIR EVA: Evaluator, Validator & Advisor is developed in the EOSC Synergy project; checks the FAIRness level of digital objects

Data quality and curation tools
Data completeness and consistency, identification of corrupted/missing files

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Data Holders and Data Users have large benefits

- Collaborate on multidisciplinary teams (the Research Community, including physicians, data scientists, engineers, and AI specialists).
- Collaborate in guidelines and publications.
- Simplify access and technical support (to data, tools, and standards on hospital health data spaces).
- Participate in internal challenges (validate AI tools, validate annotated data collection).
- Benchmarking of AI tools against established methods.
- Access to first notifications on the construction of funded research projects within the Community.
- Collaborate with Enterprises for regulations and standards (recognition, licensing data).
- Contribute to the European AI governance and European Health Data Space definition and construction.
- Simplify access to Data, Tools and Internal Procedures documentation within the EUCAIM Platform.
- Being (individuals, institutions) academically recognize as part of the EUCAIM Community and Platform.

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Stakeholders in EUCAIM

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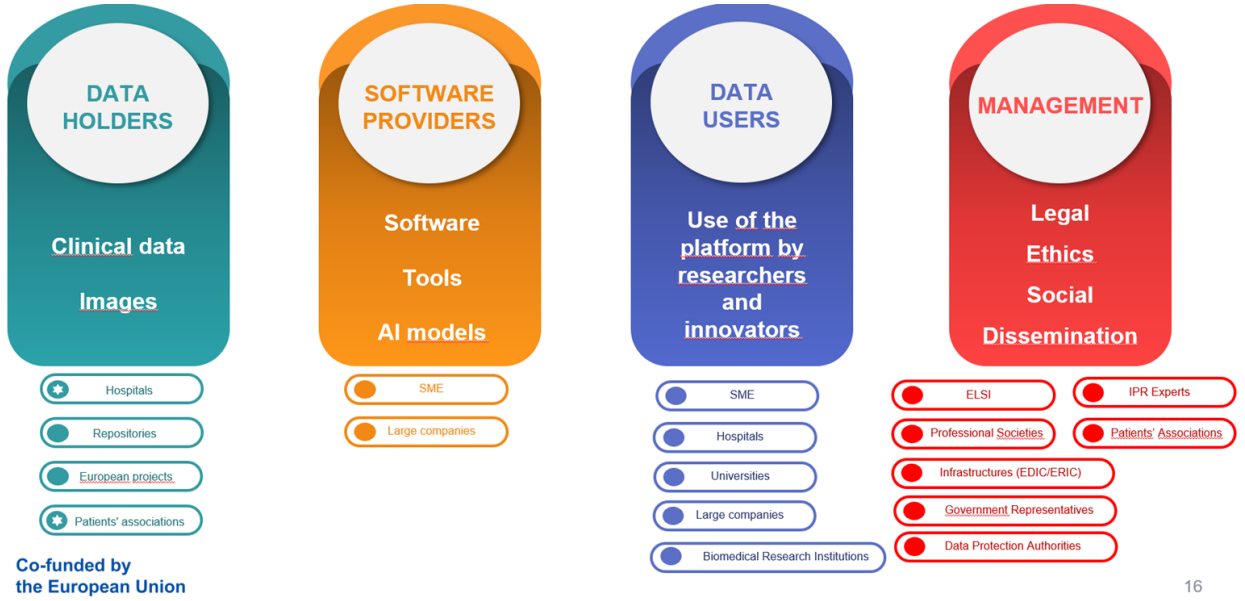
Data Users
Person or entity that wants to explore the catalogue and request **access to data for research**.

Sofware providers
Entity that would like to contribute with processing **tools, services, or applications** to the EUCAIM's marketplace.

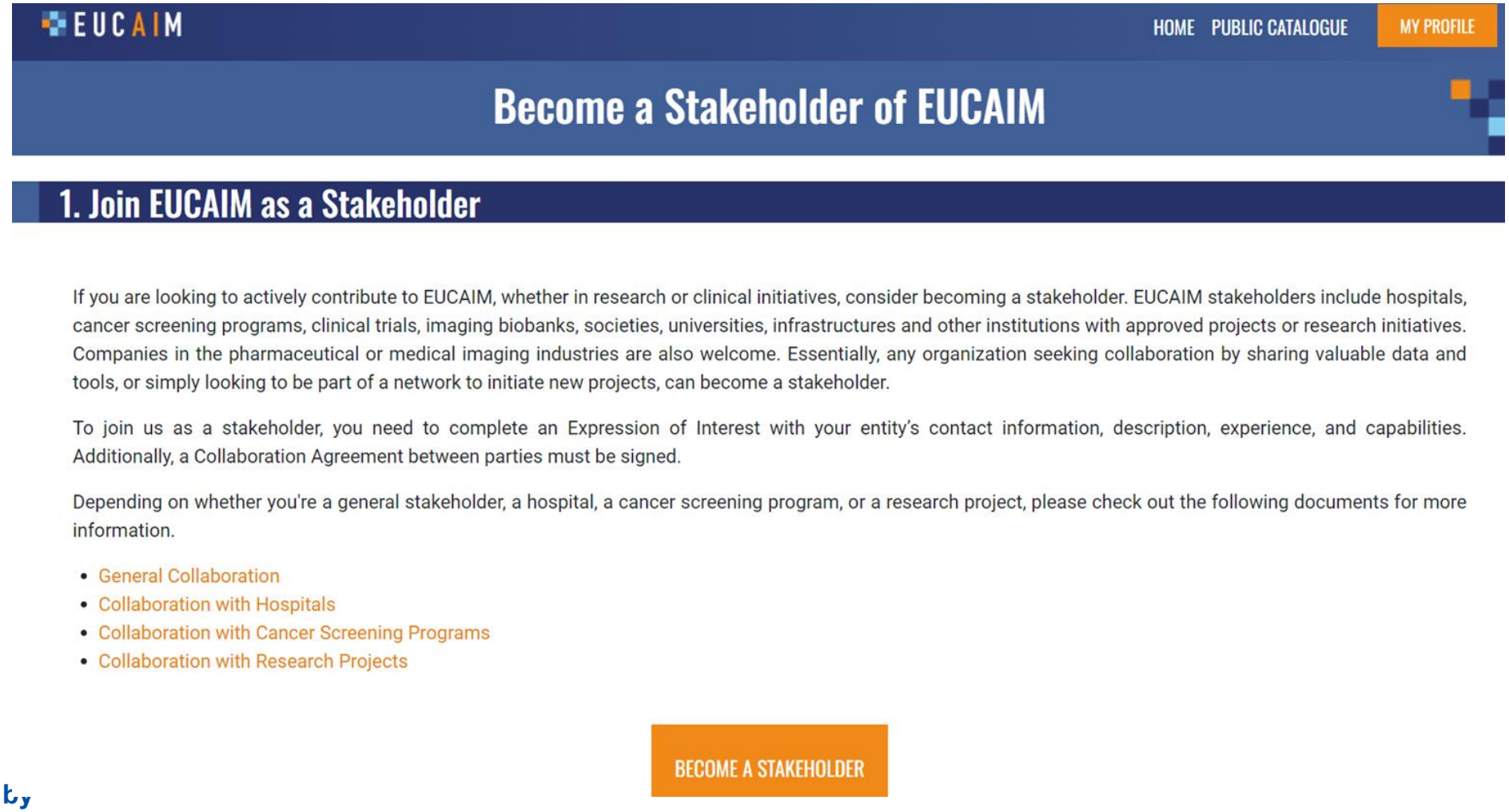


Data holders
Natural or **legal person**, including entities, bodies, and research organizations in the health or care sectors, who has the **right to make certain data available**.

Management-related
Legal, ethical, policy makers, dissemination.

Becoming a Stakeholder

EUCAIM Dashboard



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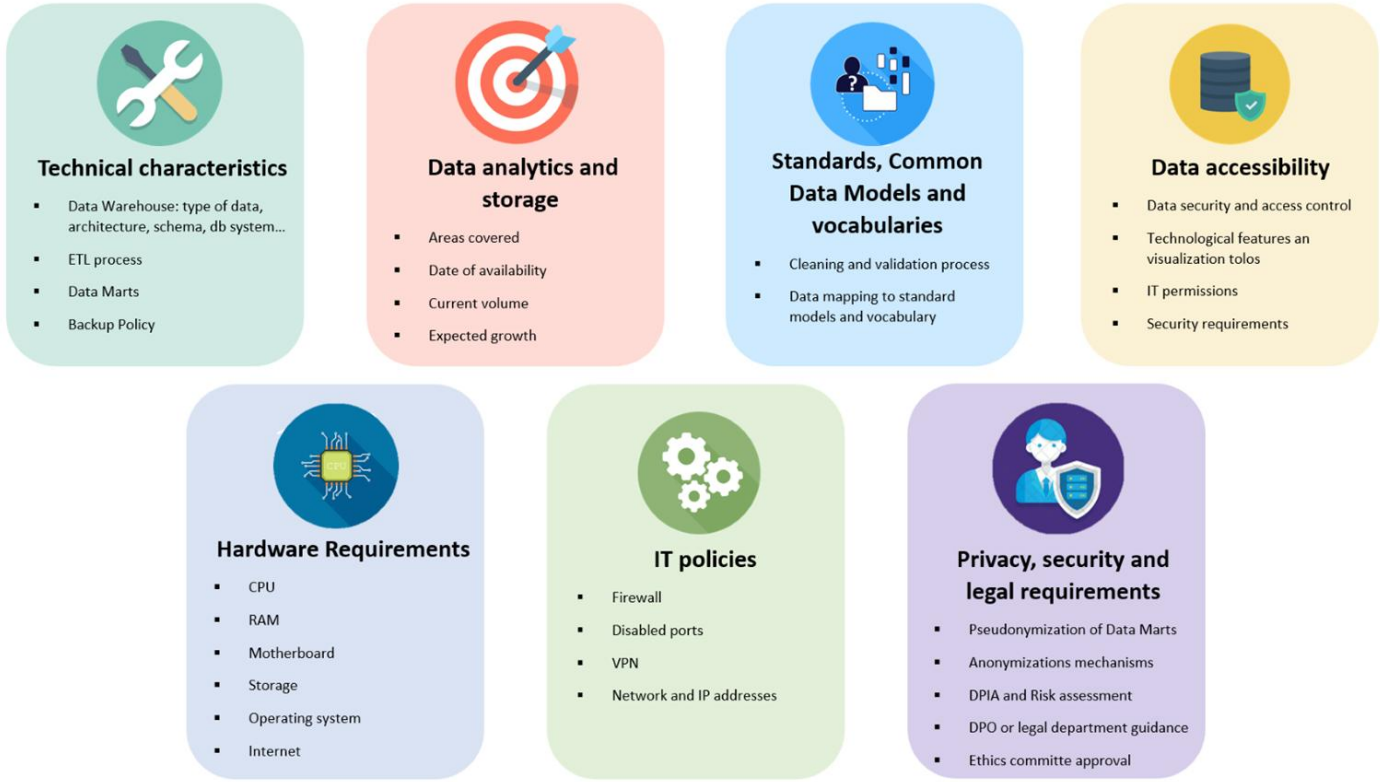
Engagement and requirements analysis

Questionnaire for evaluating the status of the existing health information systems for secondary use of data (secure processing environment)



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Benefits of EUCAIM

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Researcher	Innovator	Physician	Citizen
Infrastructure *and* ***Opportunities*** *to access, share and process pan-European cancer imaging data*	***Reference framework*** *with standardized* ***catalogue*** *of data and tools to facilitate certification*	***New Tools*** *for the diagnosis, prognosis and treatment of cancer patients to evaluate and clinically validate*	***Improved Quality of Life****, early diagnosis, personalized treatment, better prognosis*

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Timeline

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2023

Design completed

- Requirements analysis
- Design
- Collaboration mechanisms
- Early release of the data federation framework

2024

First version of platform

- Platform validated and populated for external production
- Data providers connected
- Prototype for federated learning
- Benchmarking platform

2025

Final release of platform

- Federated learning
- Final version of tools and services
- Federation of new cancer images databases through open calls
- Implementation of clinical use cases

2026

Full operation of federated repository

- Integration with other data infrastructures
- Piloting of the business model
- Legal and operation model finalised

2027

Expansion EDIC

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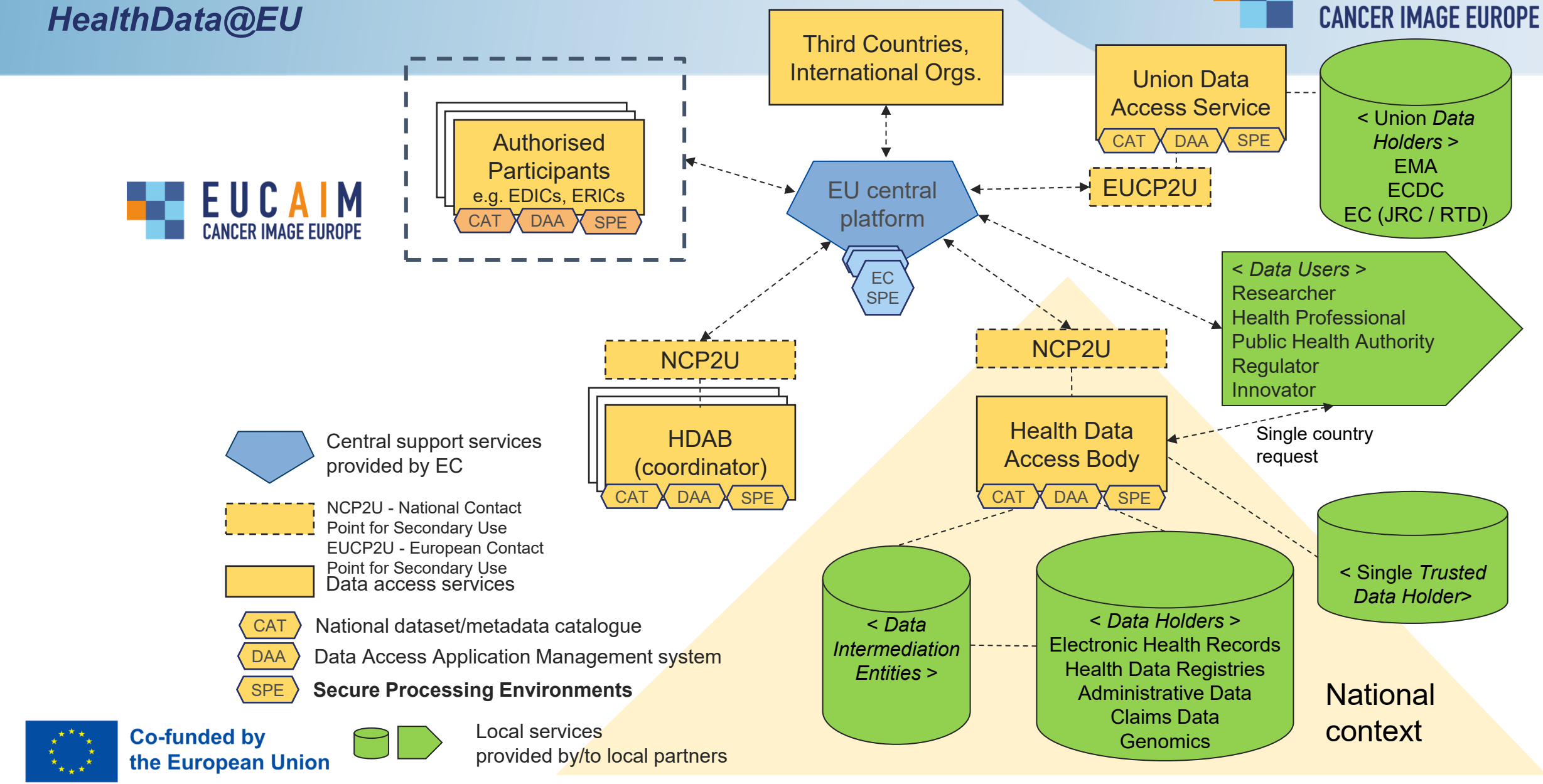
EHDS and EUCAIM-EDIC

HealthData@EU



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What EUCAIM Offers to Early-Stage Innovators applying for the pathfinder

Ignacio Blanquer (UPV)

EUCAIM Central Hub coordinator

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Roles targetted by EUCAIM

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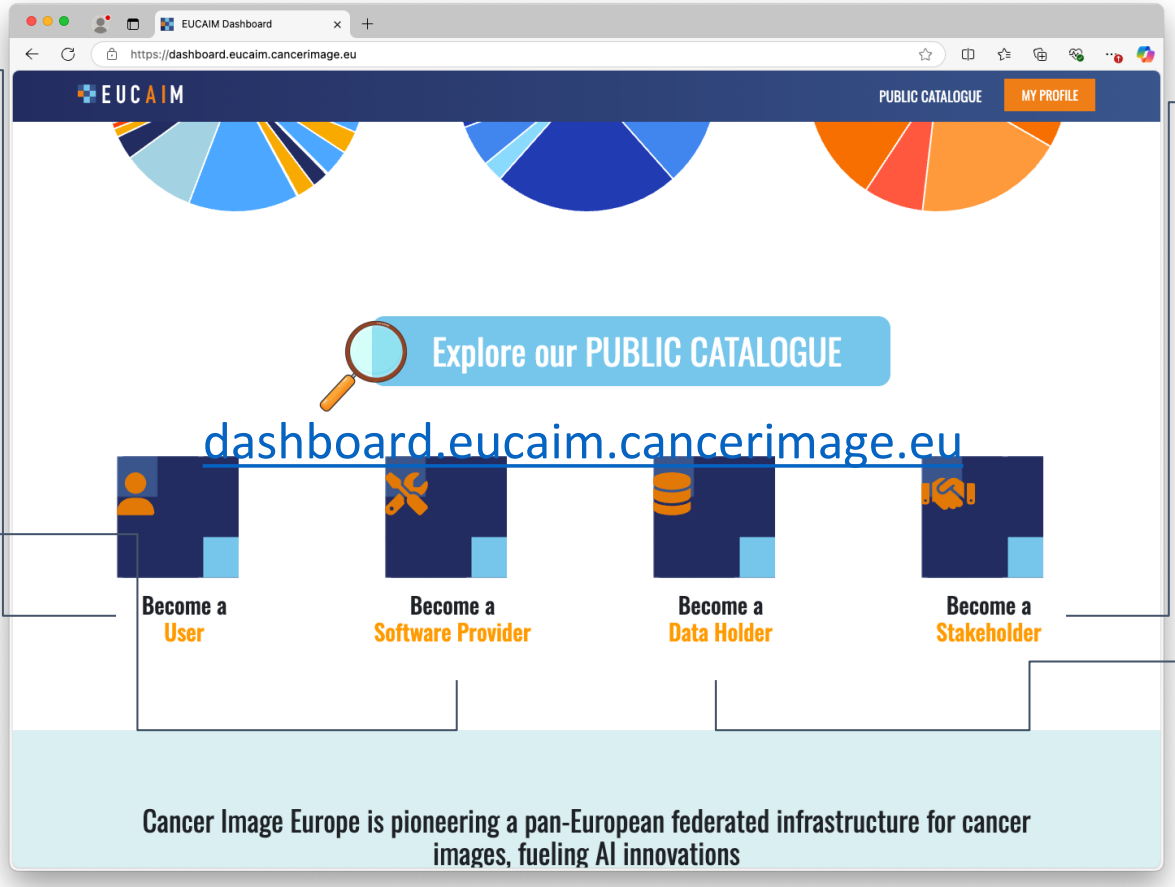
Research centers and innovative companies that want to **explore the catalog and request access to the data**

Researchers and innovators who wish to **contribute** with **processing tools** and **applications** to the EUCAIM catalogue



An entity that wants to join the EUCAIM consortium or that wants to be part of **future collaborations in data collection.**

Any natural or legal person, including research organizations in the health or care sector, with the right to **make certain data available**

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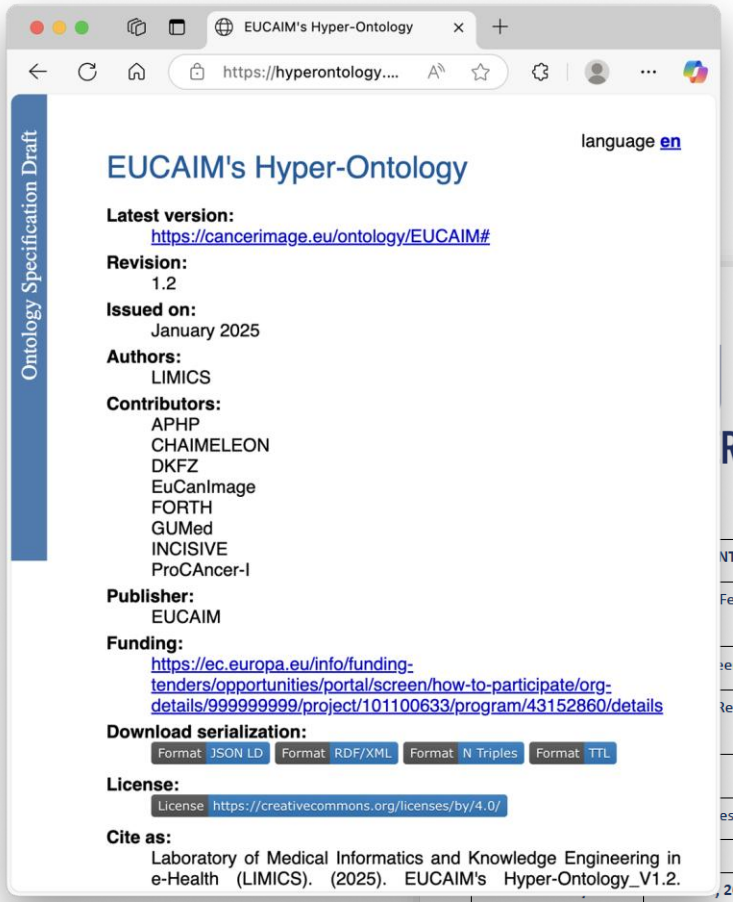
EUCAIM's Data

- Current version is 1.3 (release May, 2025)
  - Bottom-up approach mainly based on the clinical and imaging knowledge provided by the AI4HI projects.
- Syntactic mappings are performed to integrate the Hyperontology with OMOP and FHIR standards.
- A total of 64K subjects and 81K studies distributed across 5 providers.
  - Data for training, validation and test.
  - Special datasets for benchmarking.
- Restricted access, access granted on demand.



hyperontology.eucaim.cancerimage.eu

https://zenodo.org/records/15558108

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EHDS Data User Journey for EUCAIM's Atlas of Cancer Images

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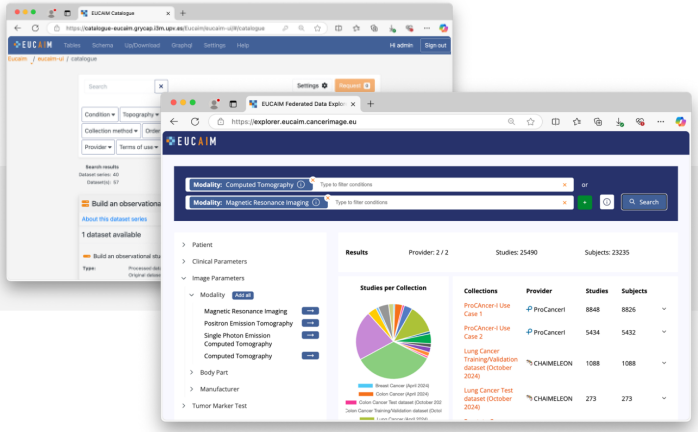
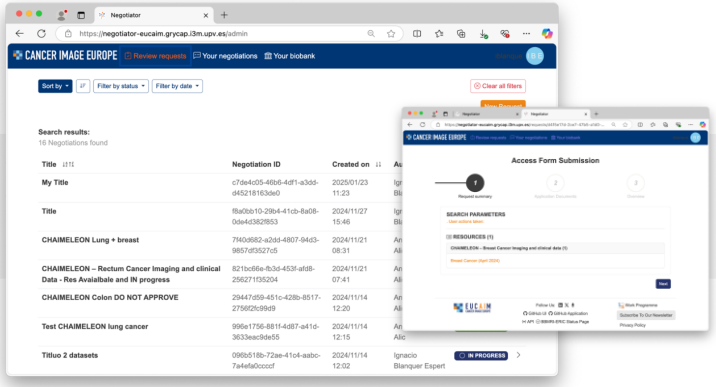
Data User

Data discovery (catalogue & explorer)

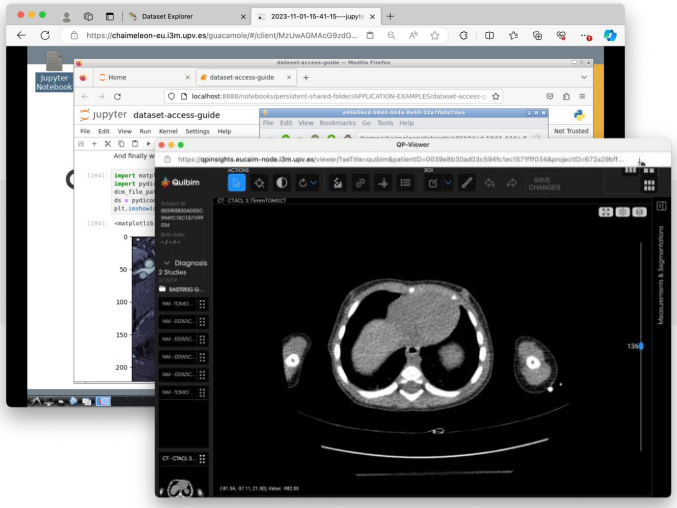




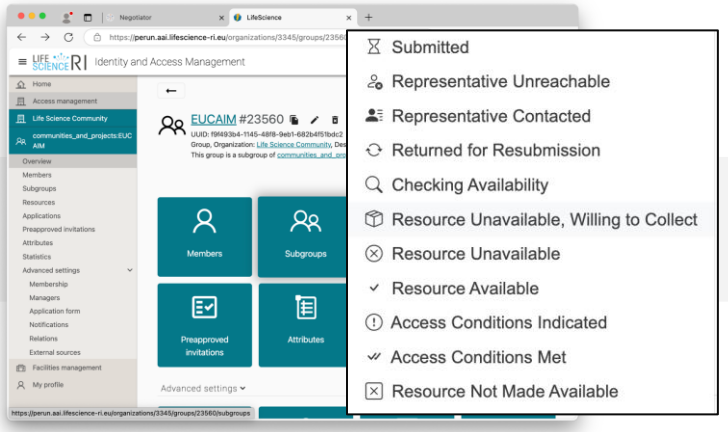
Permit application (negotiator)

EUCAIM Access Committee

Data use (@Reference nodes SPEs or Fed processing)



Data provision (@Reference nodes)



Data Preparation (lightweight in the Atlas, negotiator and AAI)

Data User

Resource Outputs (@SPEs or Fed processing)

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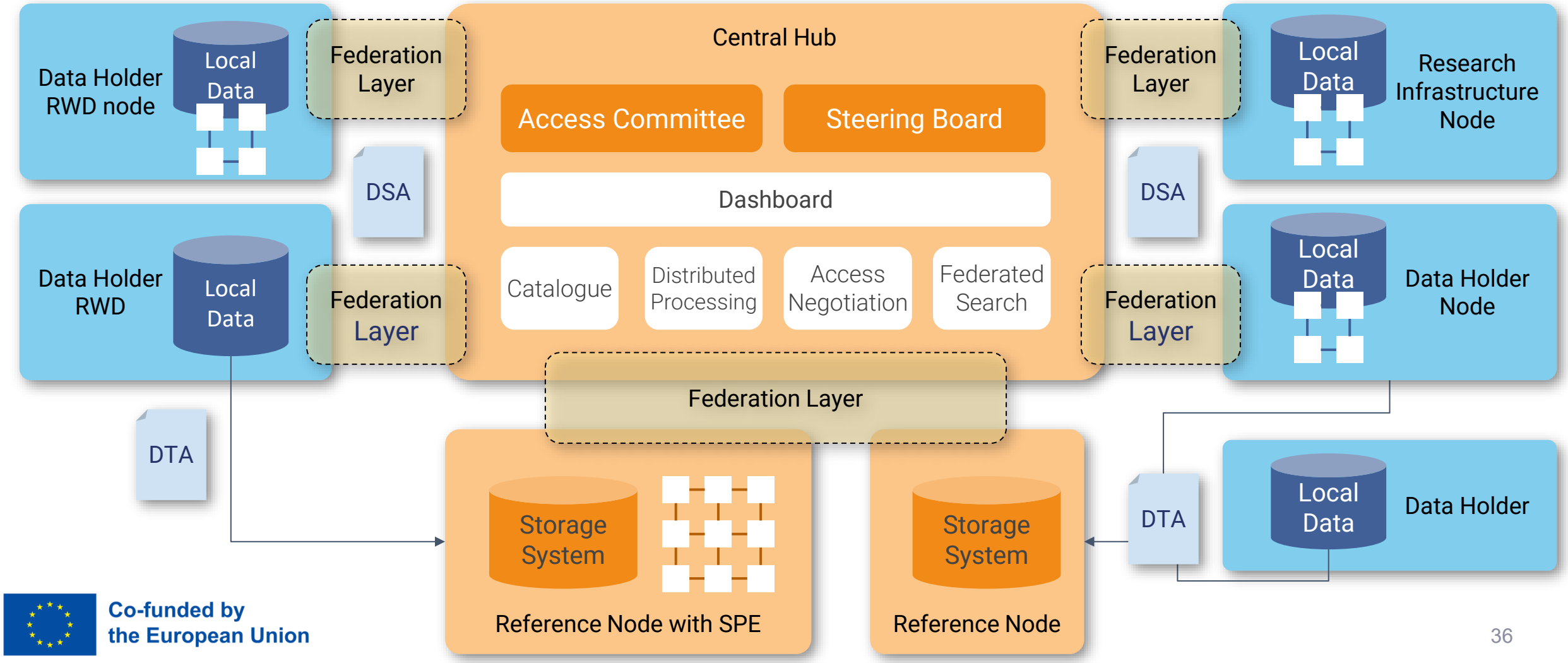
GENERALITAT VALENCIANA
Conselleria d'Innovació, Universitats, Ciència i Societat Digital

EUCAIM Federation



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Three levels of compliance with the federation

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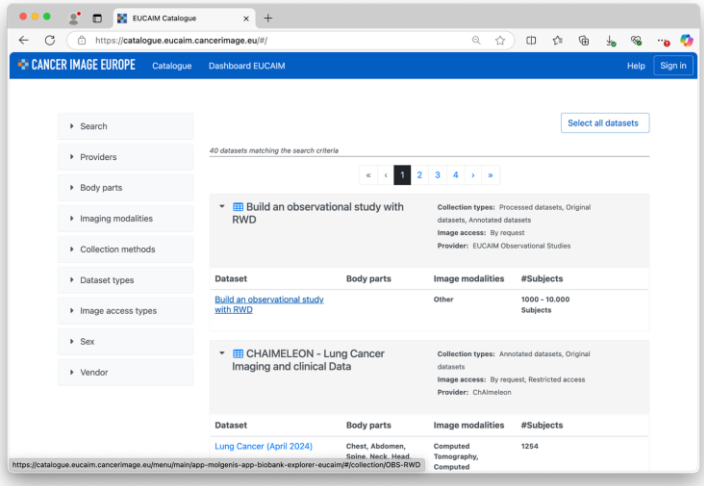
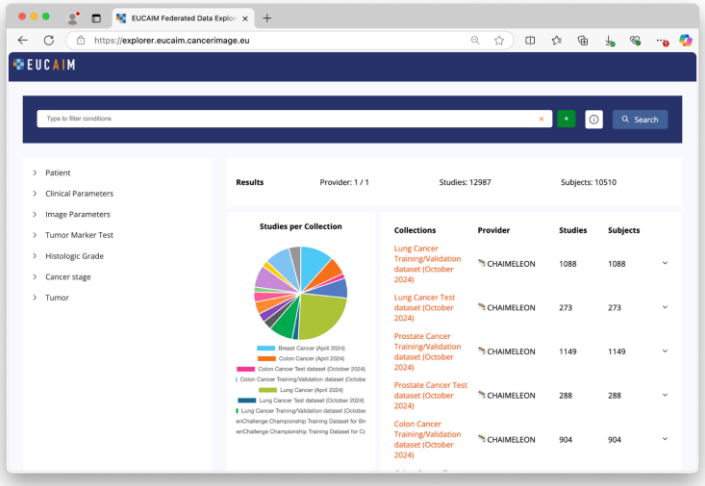
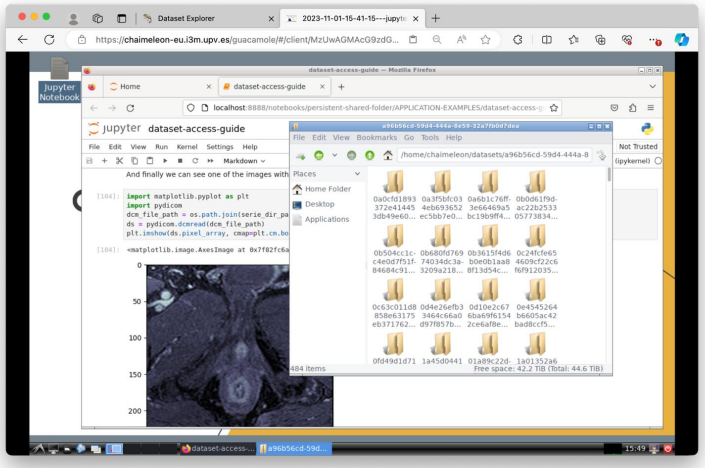


Tier 1: At the Registry level



Tier 2: At the data exploration level



Tier 3: At the Data Processing level

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EUCAIM's Core Services (I)

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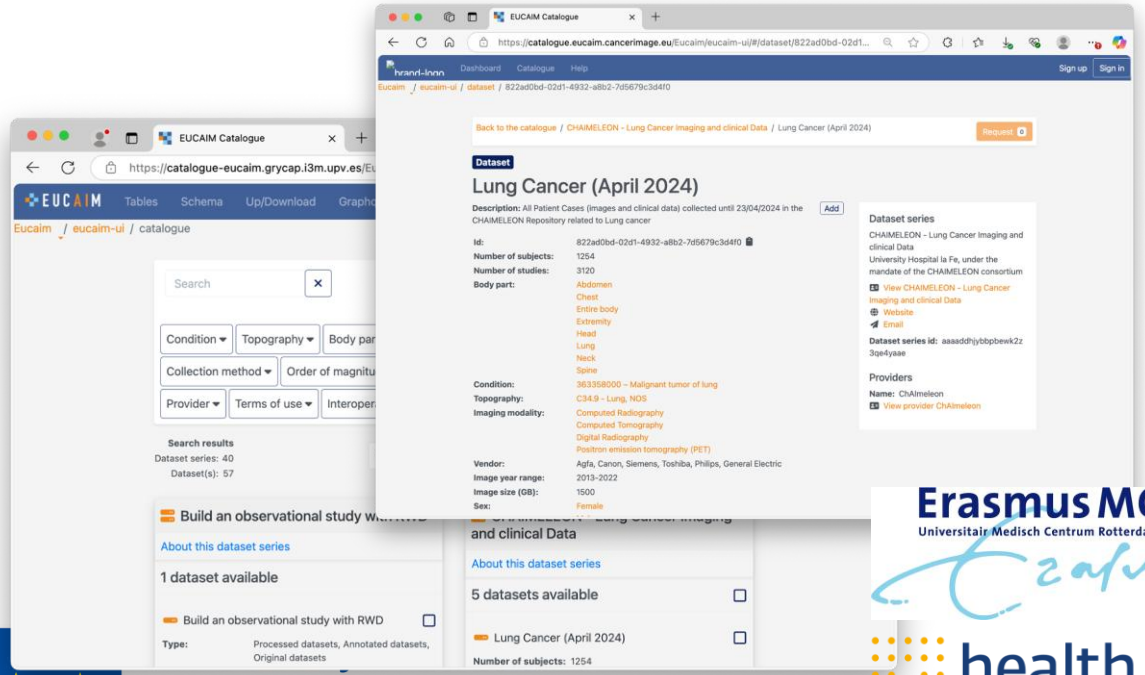
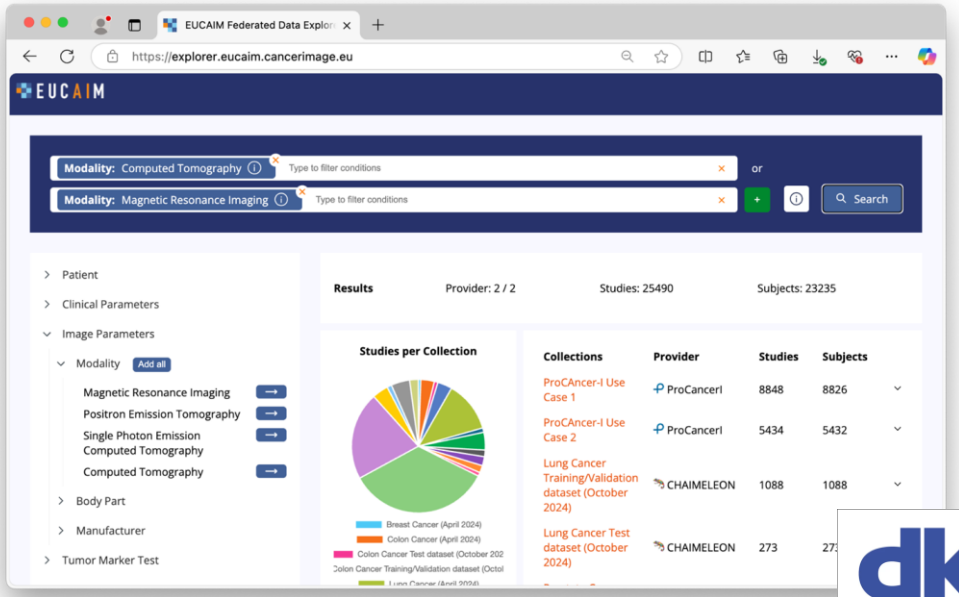
Catalogue

- A catalogue with metadata compliant to the HEALTH DCAT-AP schema.
- FAIR Data Points exposing each Dataset.



Federated Search

- Provides the list of datasets fulfilling the inclusion criteria and the number of studies.
- 27 searchable items from EUCAIM's CDM.



the European Union

Erasmus MC
Universitair Medisch Centrum Rotterdam

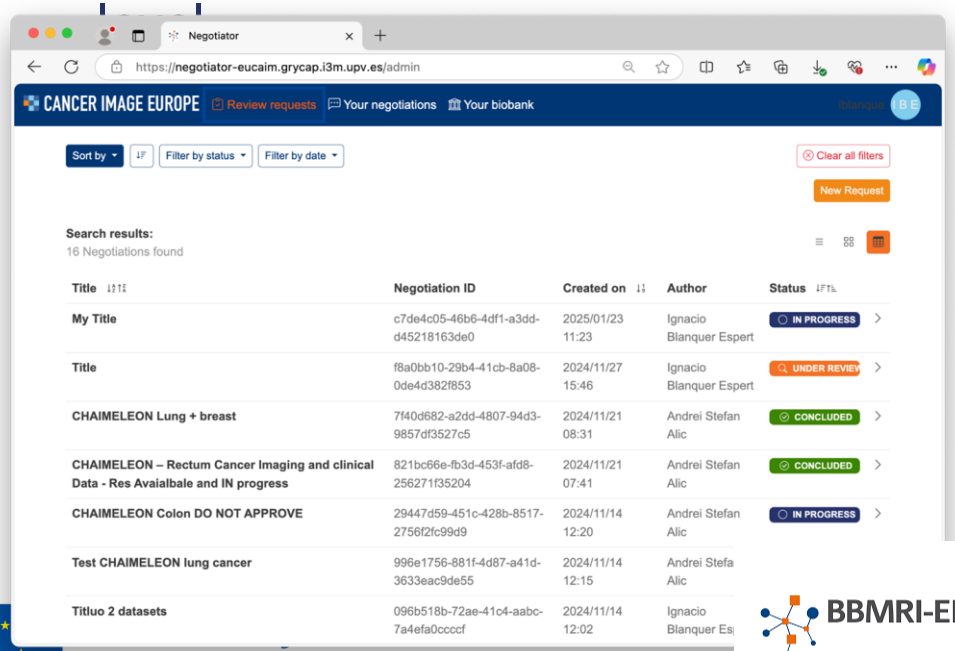
health RI
enabling data driven health &

dkfz.

Status of Core Services (II)

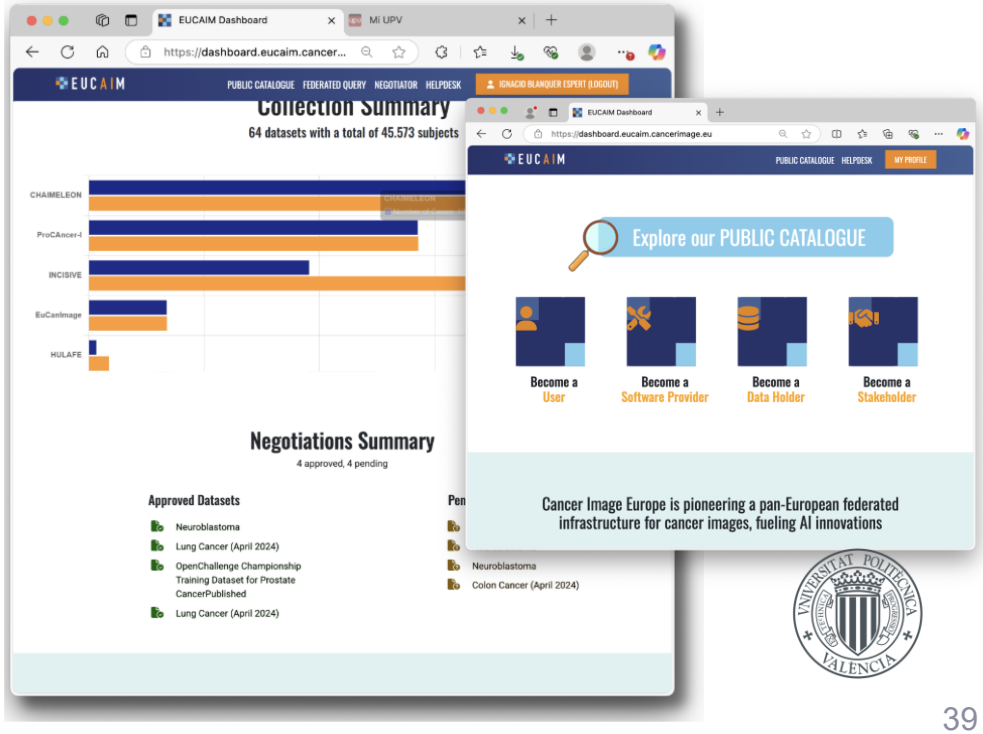
Access Request Service

- Customised BBMRI-ERIC Negotiator.
- Full life-cycle of dataset access implemented.
- Access forms customised at dataset



Dashboard

- Entry point for the user.
- Data monitoring and User's Library with the datasets with access granted.



Reference nodes

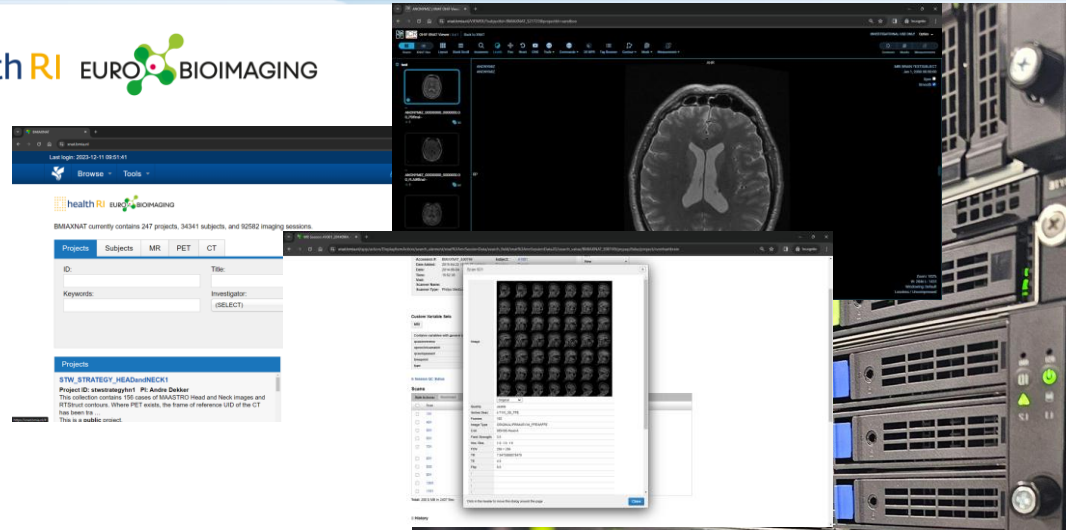
EUCAIM CANCER IMAGE EUROPE

Euro-BioImaging / Health-RI / EMC

Medical imaging repository based on XNAT

- SPE supported by data materializer tool or whitelisting
- Integrated with core services (Catalogue, Negotiator).
- Imaging data: DICOM or NIFTI; Clinical data: JSON, CSV.
- Currently Tier 1 functionality.

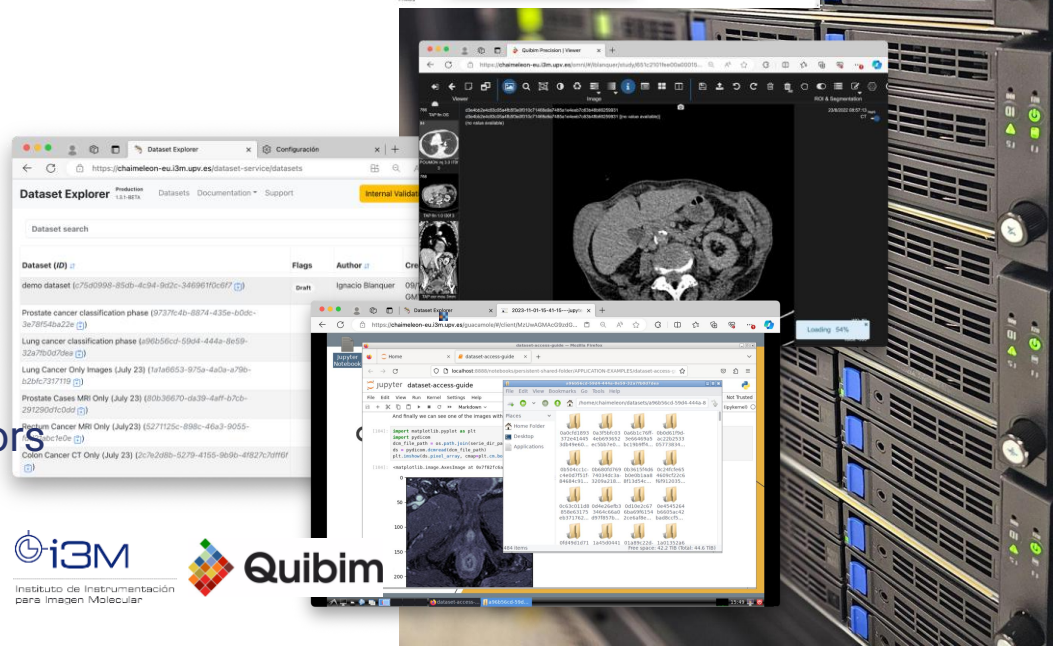
health RI EURO BIOIMAGING



UPV

Storage with SPE from UPV & QP-Insights (Quibim)

- Integrated with core services (Catalogue, Negotiator, SPE, LS-AAI).
- Imaging data: DICOM (or NIFTI); Clinical data: JSON (or CSV).
- Currently Tier 2 functionality.
- Powered with 10 nodes, 960 cores, 7,5TB RAM and 25 GPU accelerators and an additional server with 300 TB.



Universitat Politècnica de València

i3M Instituto de Instrumentación para Imagen Molecular

Quibim

Data use: Virtual Research Environment

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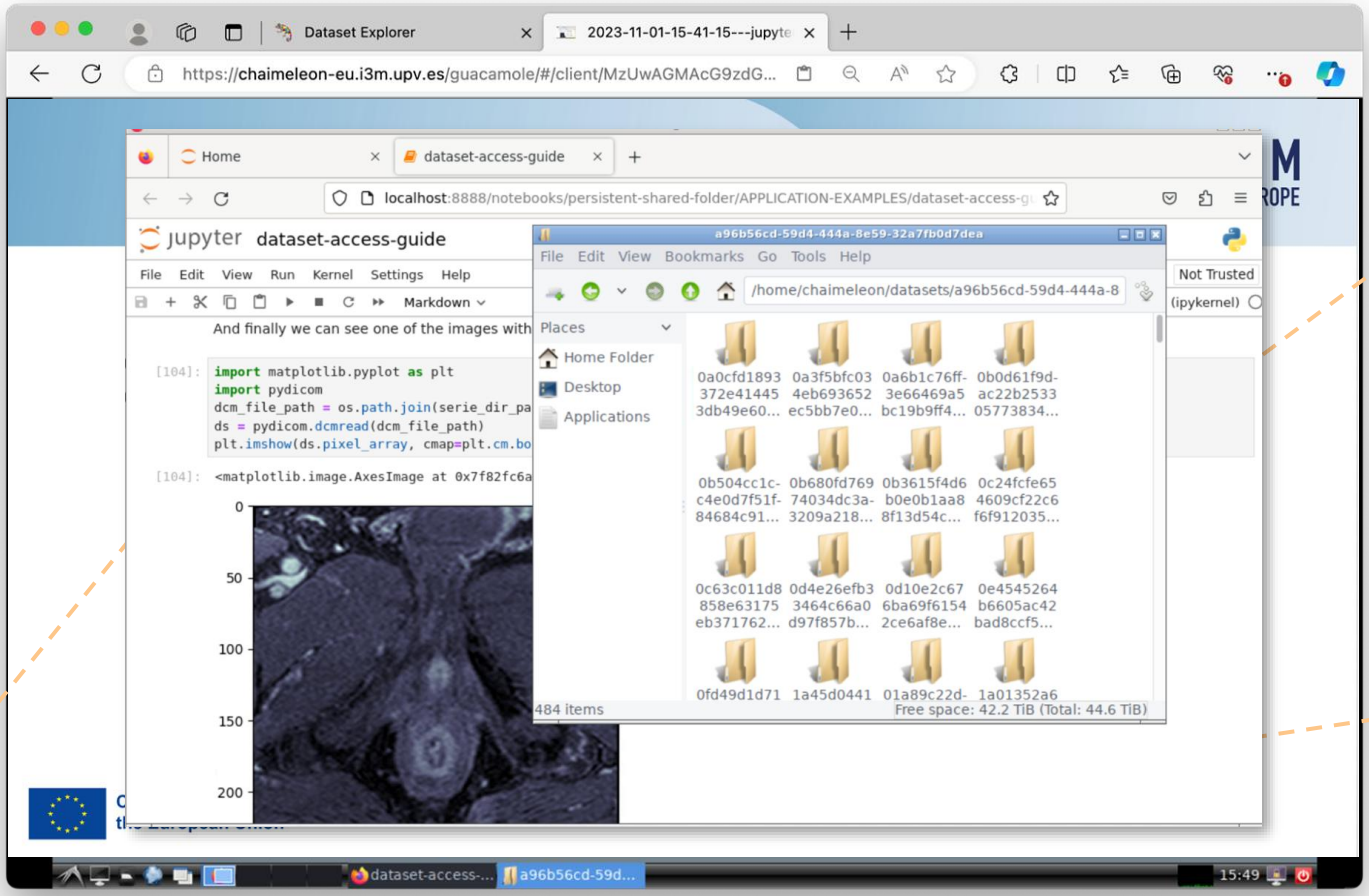
A GUI with an ubuntu container in a network-restricted environment

Data Analytic SW libraries



Mounts the studies of the datasets as a POSIX volume.

Link to a batch queue system with GPUs and powerful resources.

Data cannot be downloaded due to the network policies and the restricted configuration of the access proxy - accesses are traced and preserved.

Quibim

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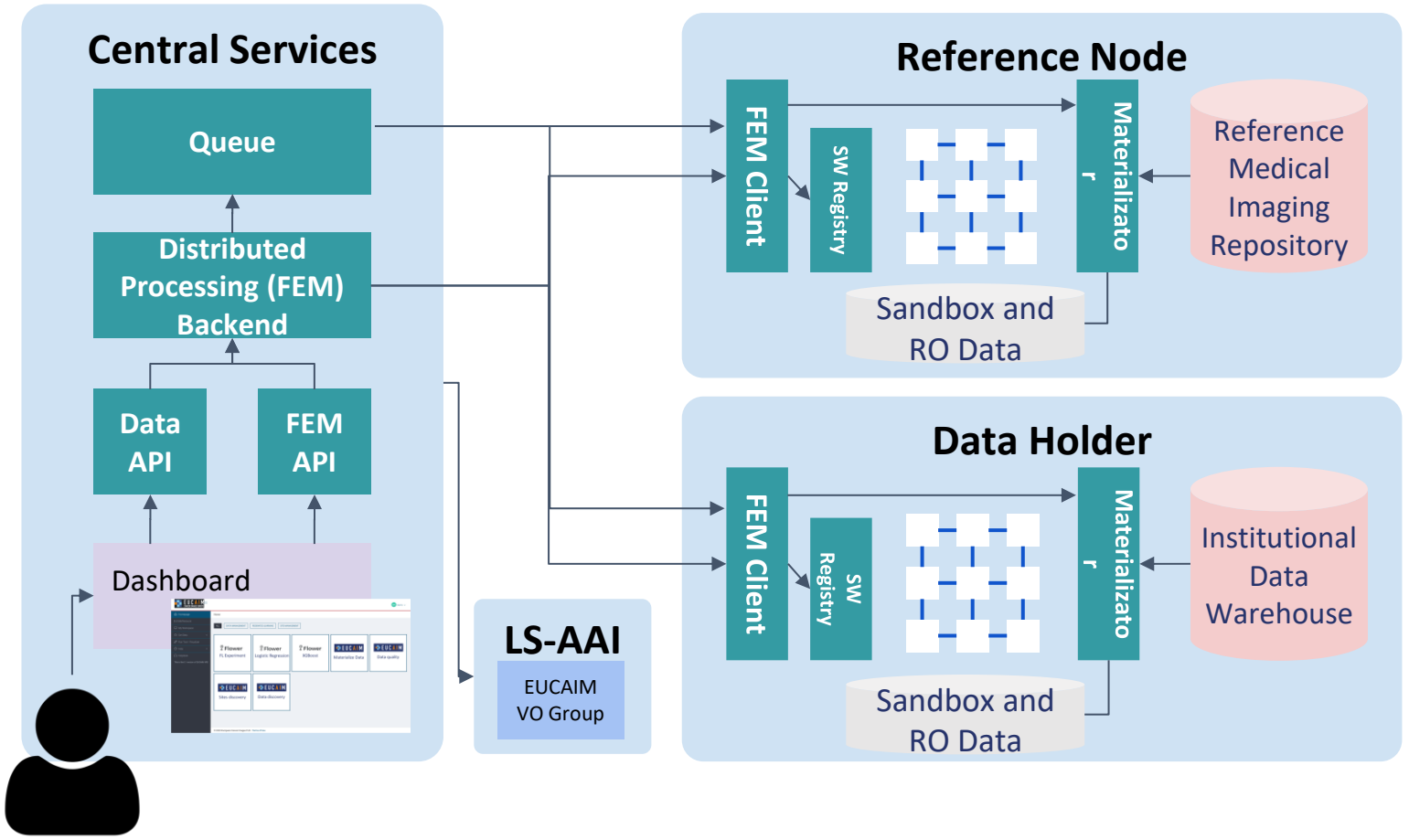
Data Use: Federated Processing Environment

- Integration with processing environments have been proven through the demonstrators
- Future integration will focus on:
  - GUI in the Dashboard.
  - Permissions through the User's Library.
  - Integration in the SW Catalogue repository (harbor.eucaim.cancerimage.eu).



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Summary

Data for developing and extending processing applications

Secure Processing Environments to run the processes

Data and SW tools for validating tools wrt benchmarking data

A platform for long-term preservation of data

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EUCAIM's Broader Contribution to Multimodal AI Research

Leonor Cerdá-Alberich (HULAFE)
EUCAIM AI Researcher

Co-funded by
the European Union

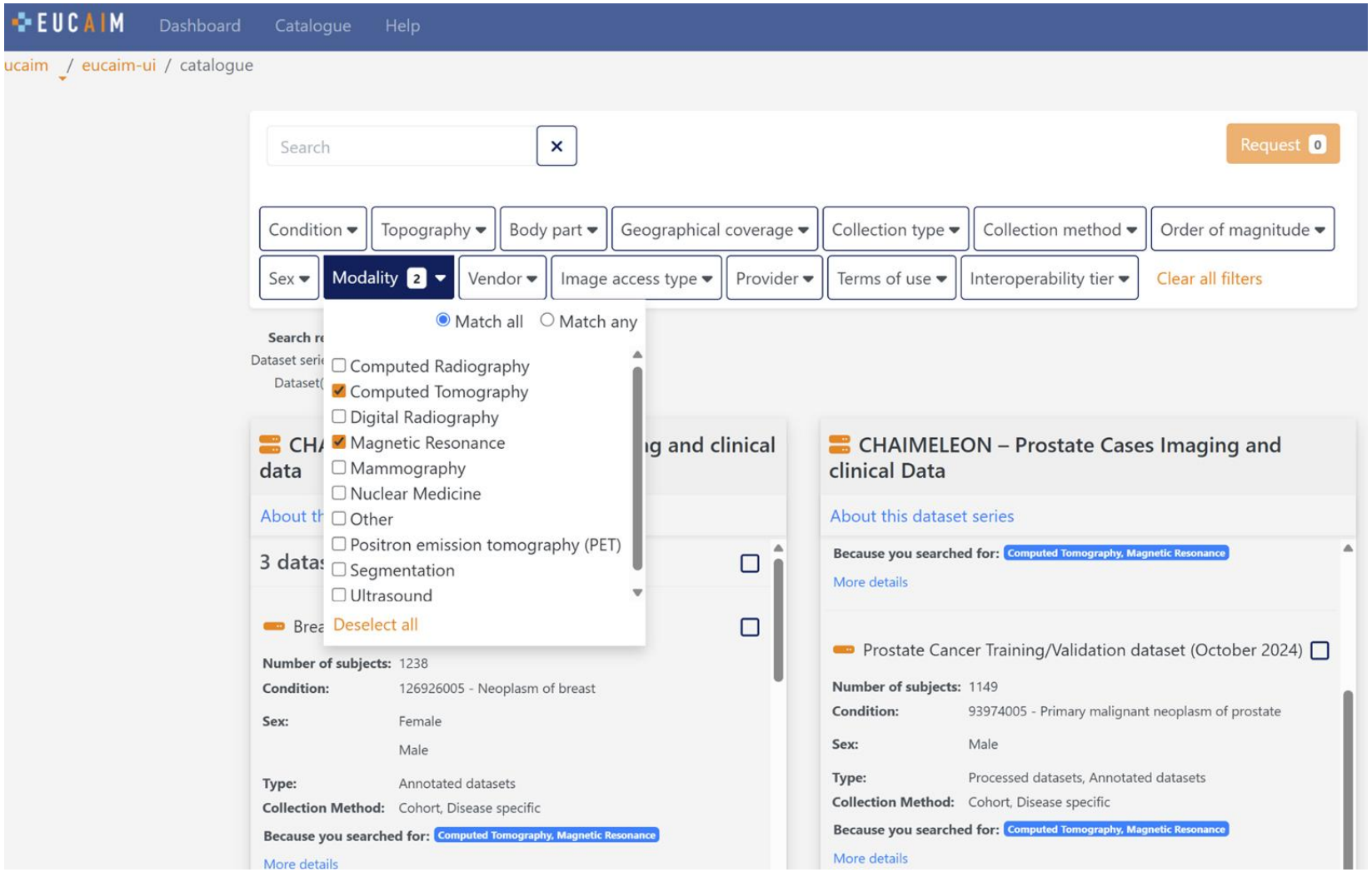
Data Interoperability

EUCAIM CANCER IMAGE EUROPE

Radiology and Nuclear Medicine Imaging Data

Tier-1 Interoperability

EUCAIM Catalogue



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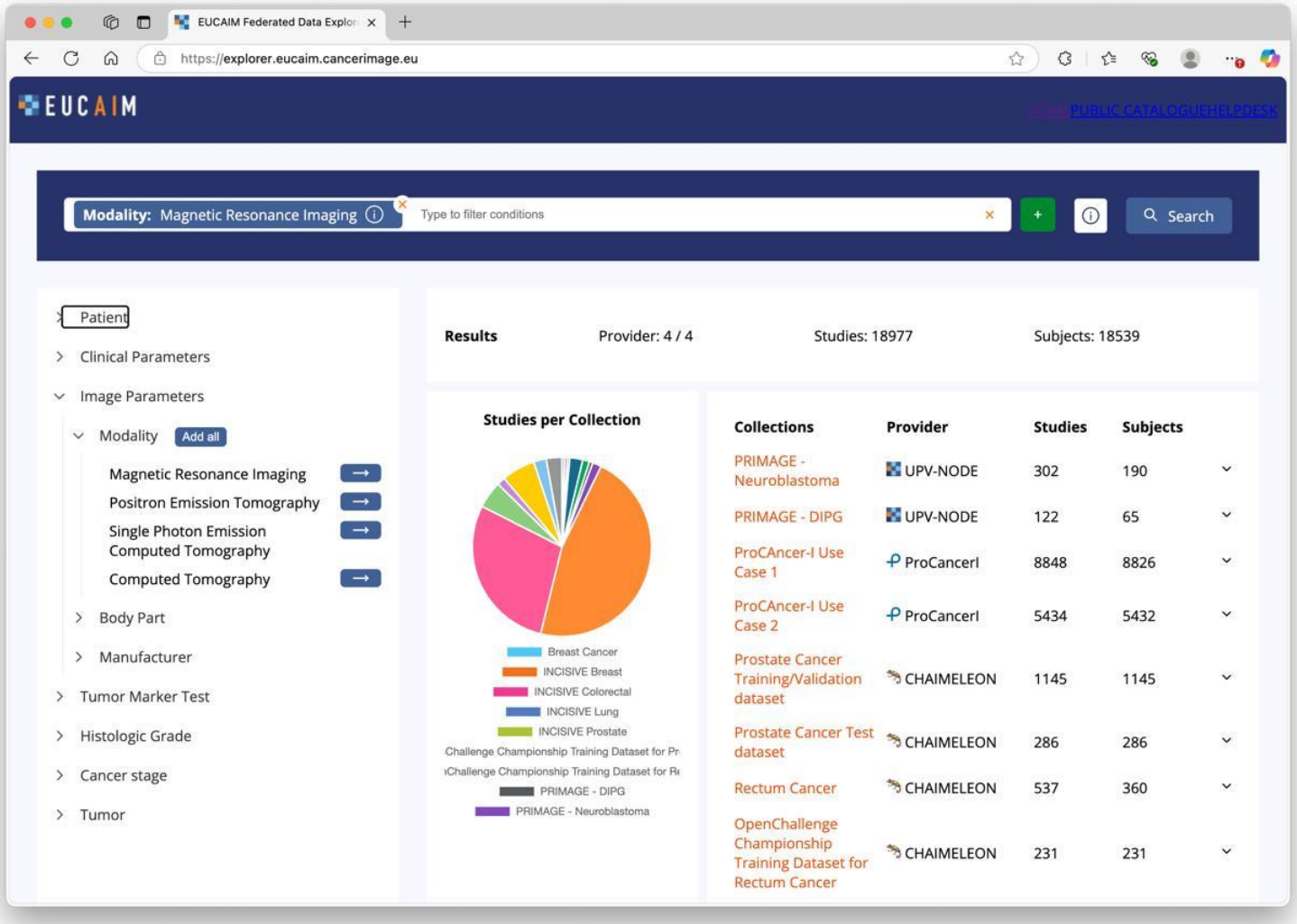
Data Interoperability

EUCAIM CANCER IMAGE EUROPE

Radiology and Nuclear Medicine Imaging Data

Tier-2 Interoperability

EUCAIM Federated Search



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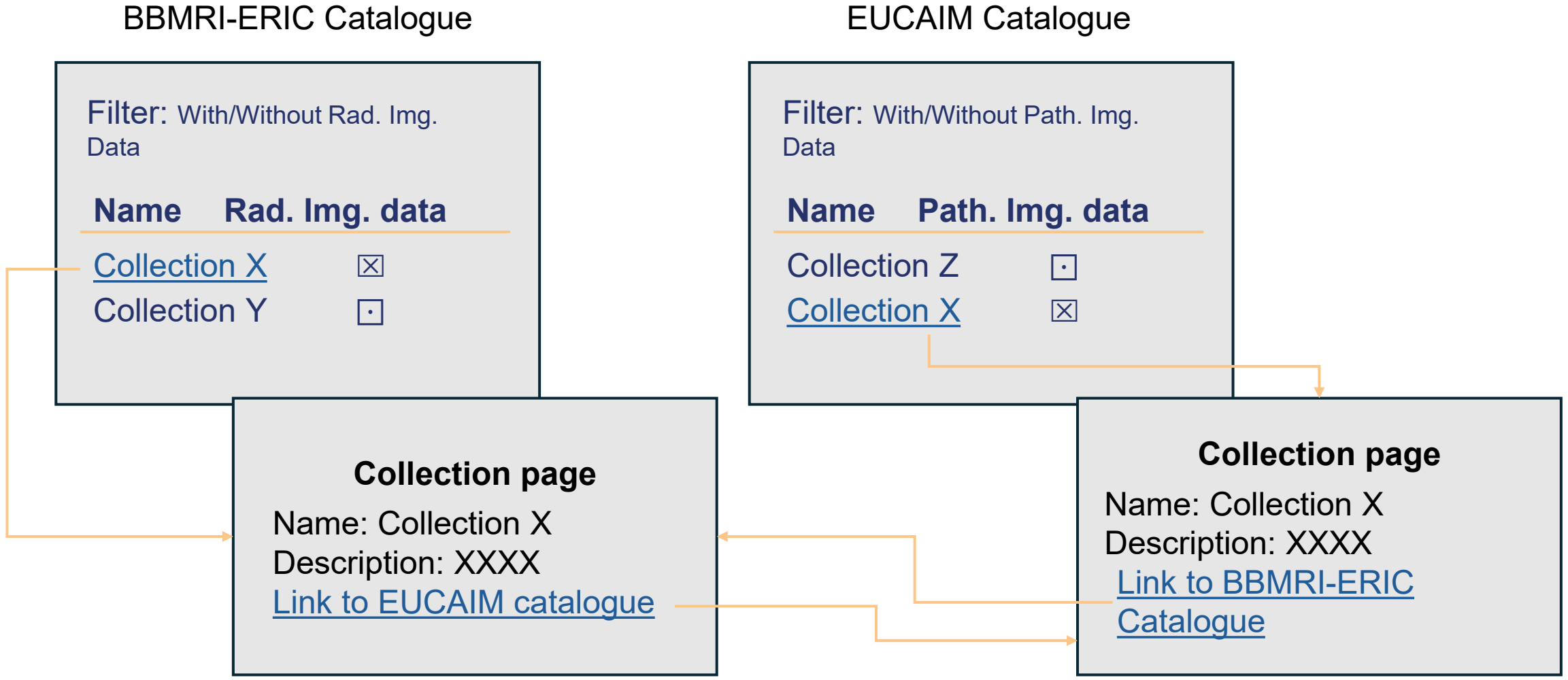
Data Interoperability



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Tier-1 Interoperability

Data Interoperability

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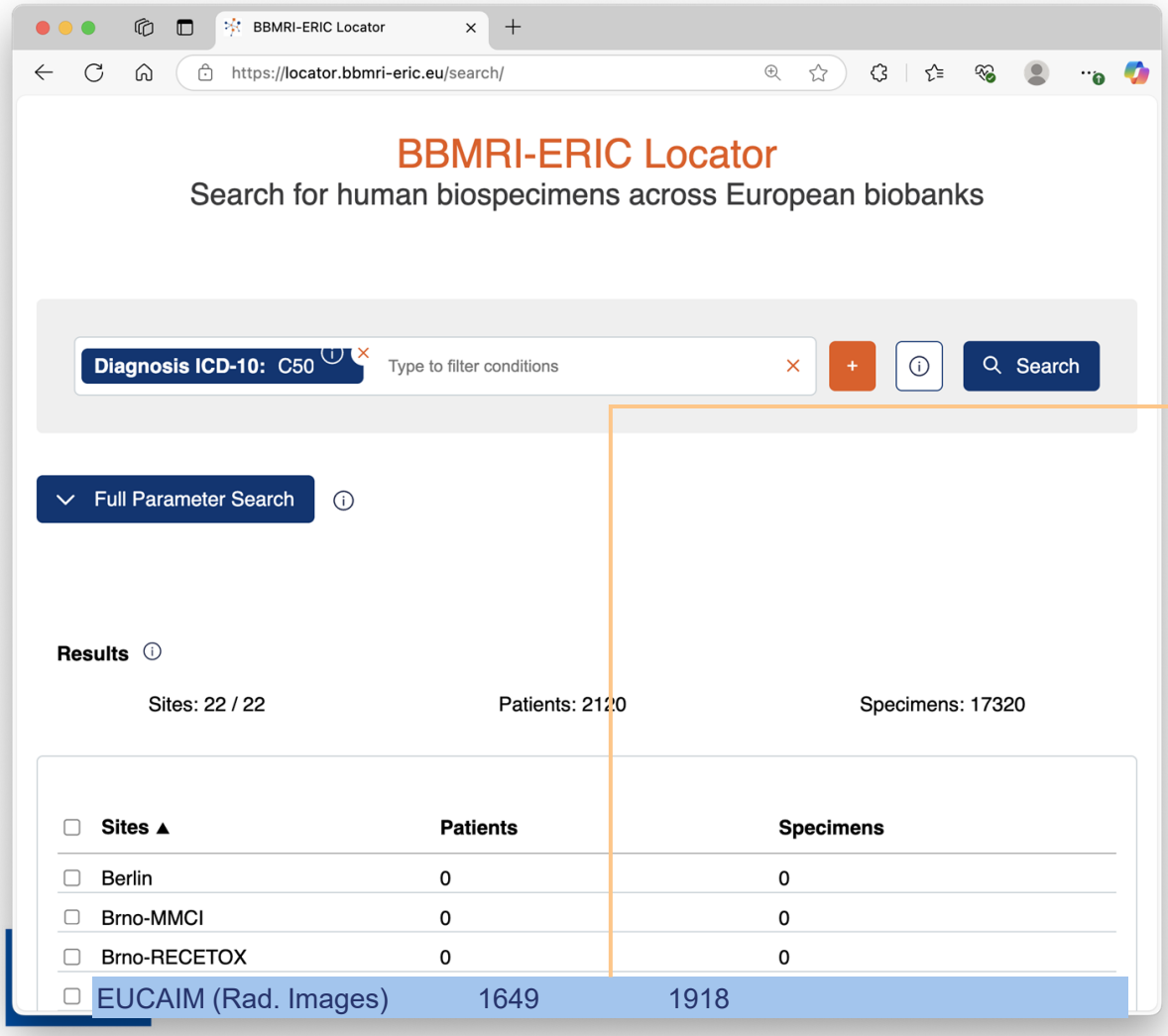
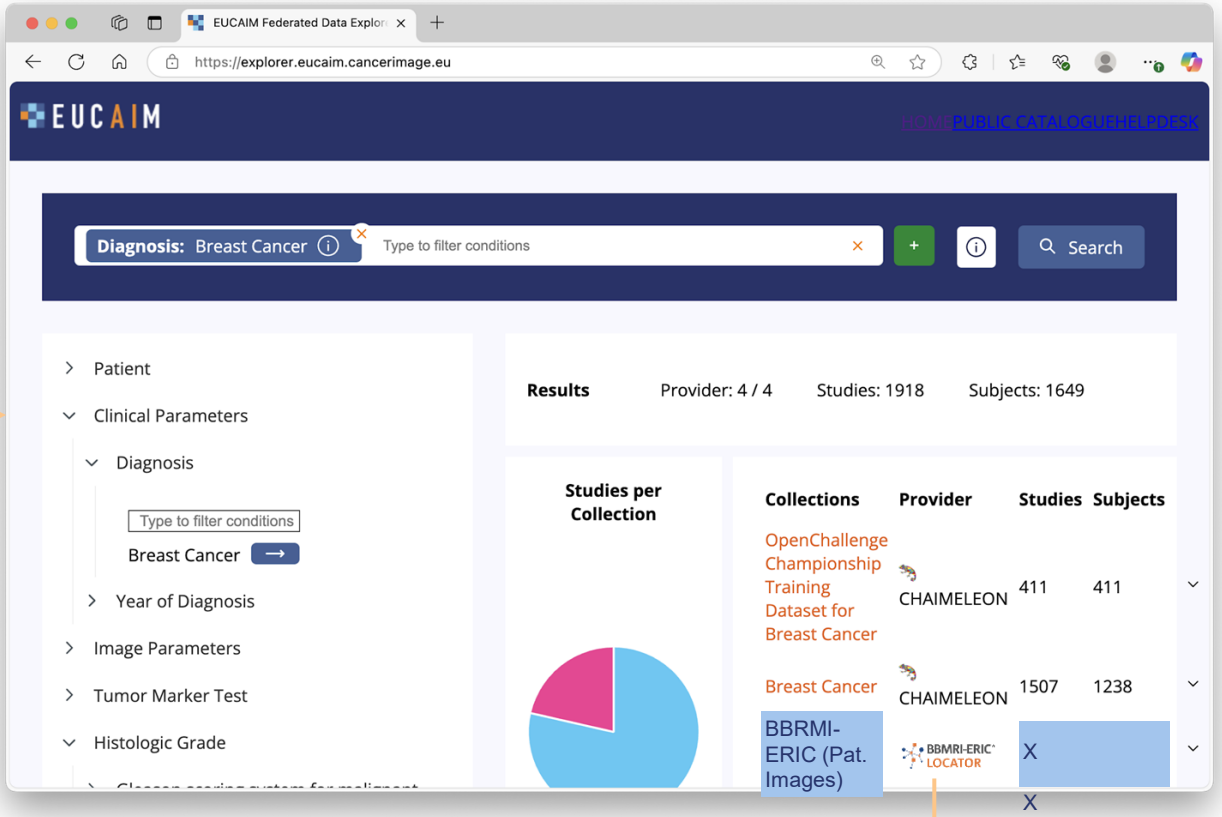
BBMRI-ERIC Federated Search



EUCAIM Federated Search



Tier-2 Interoperability

Data Interoperability

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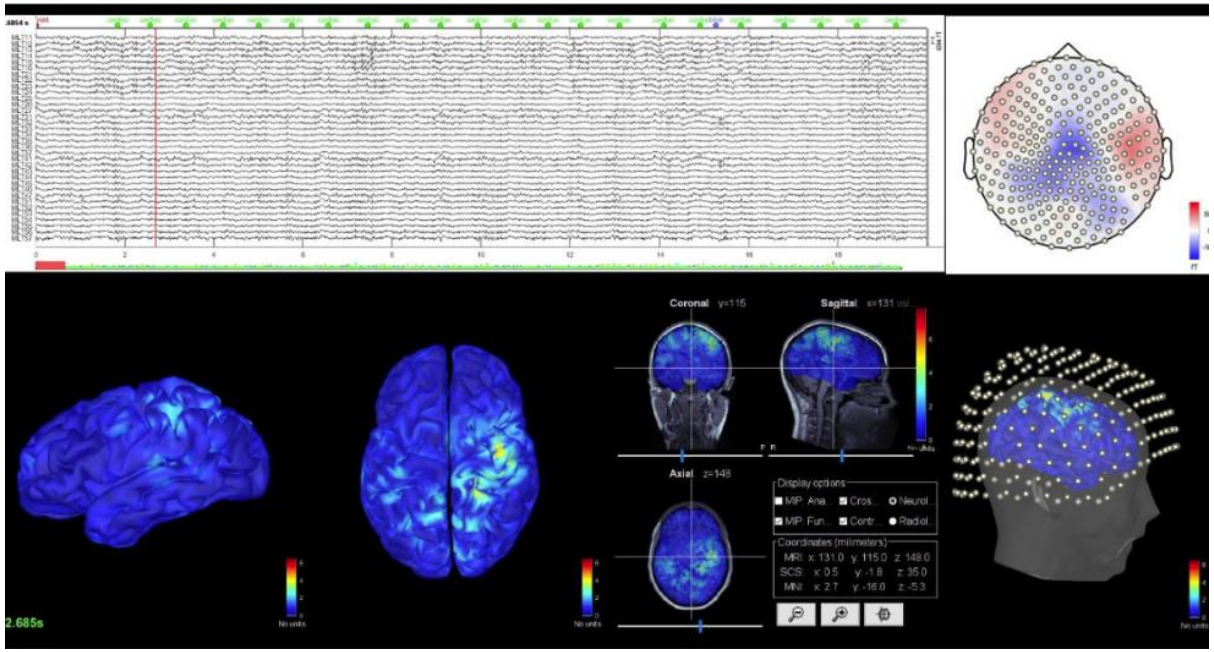
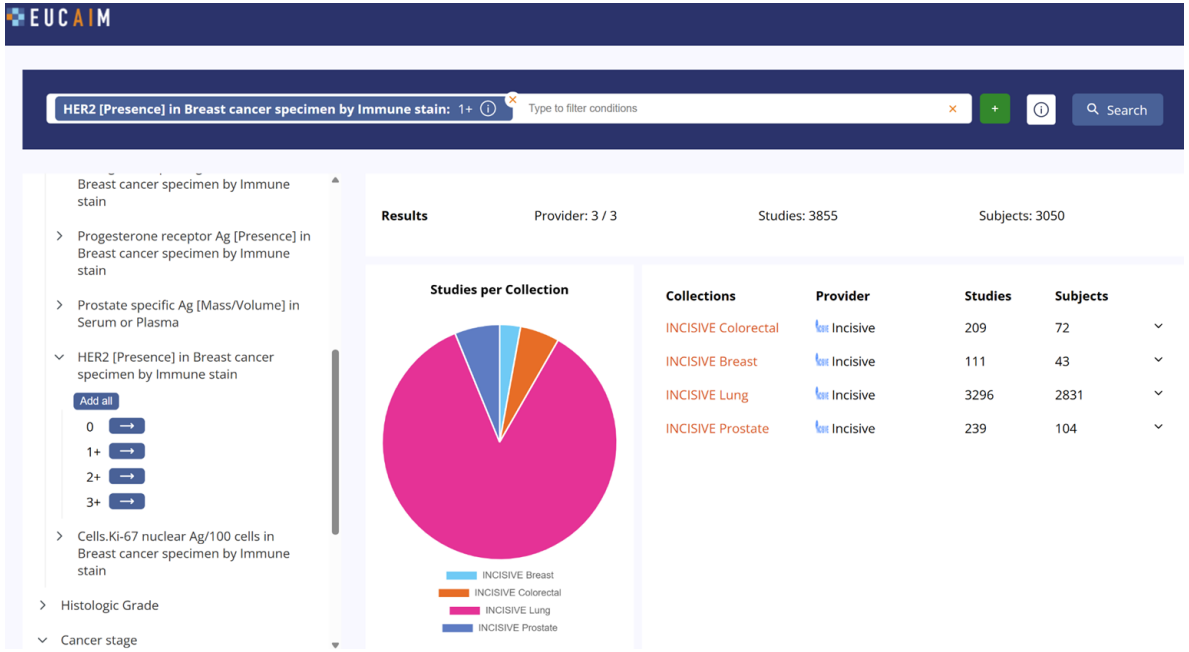
Radiology and Sensor Data



Radiology and Omics Data



EUCAIM Federated Search

Tier-2 Interoperability

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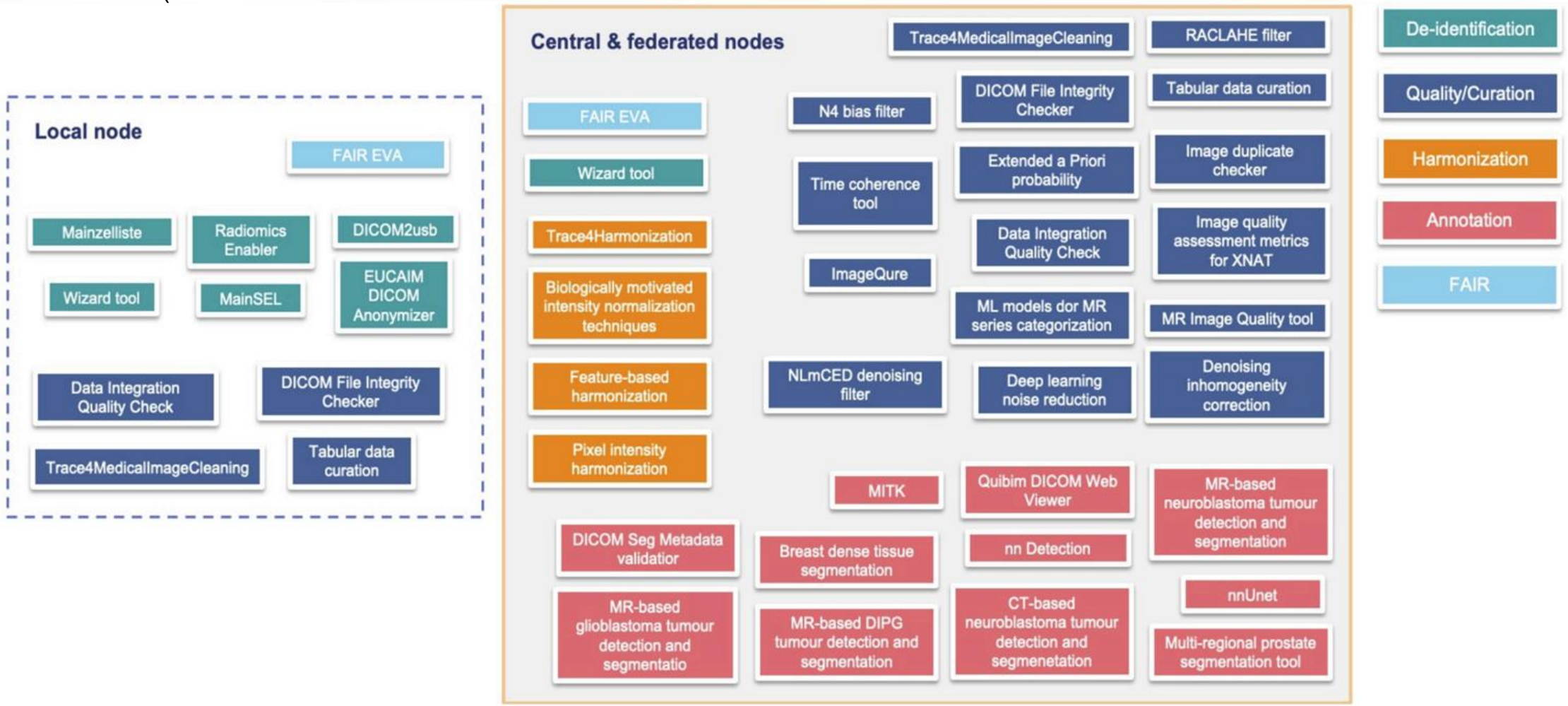
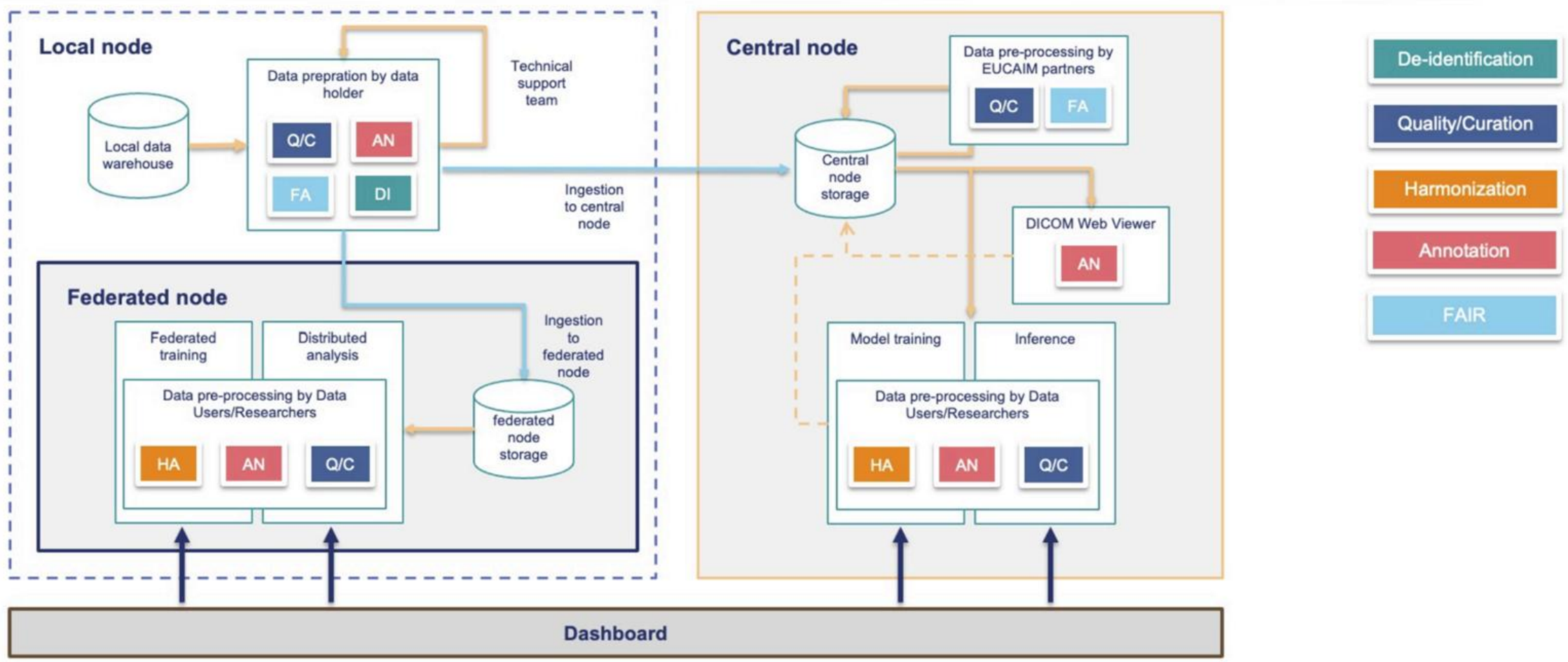
EUCAIM's preprocessing tools

Preprocessing tools and their location within the EUCAIM infrastructure (local or central/federated nodes).



Workflow of the preprocessing tools

Preprocessing tools are distributed across many locations within EUCAIM and cover several critical scenarios, assisting with the data preparation for different tasks and to different EUCAIM Stakeholders



Conceptual, technical and integration validation

Preprocessing tools validation process

Goal: Monitor, anticipate and assess the correct delivery of the tools

Validation	Goal	Documentation	Demo
Conceptual	Tool aligns with EUCAIM purpose	Tool description, task, data, input/output formats…	Presentation to the Focus Group
Technical	Tool is technically well-prepared for EUCAIM platform	Methodology description, hardware requirements, traceability/monitoring…	Demo/video of the tool running in a local environment
Integration	Tool is correctly integrated into the EUCAIM infrastructure	Communication channel, common errors, FAQs, tool usage	Demo/video of tool running on the platform

Registration in bio.tools

Tool is well documented for:
- Integration into EUCAIM
- Tools users

Allows to:
- Give feedback
- Spot possible errors

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Development of AI models

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Automated Image Interpretation

Enhancing detection of abnormalities (e.g., nodules in chest X-rays, tumors in MRI scans).

Multimodal Learning

Integrating imaging with genomics and clinical data for holistic disease modeling.

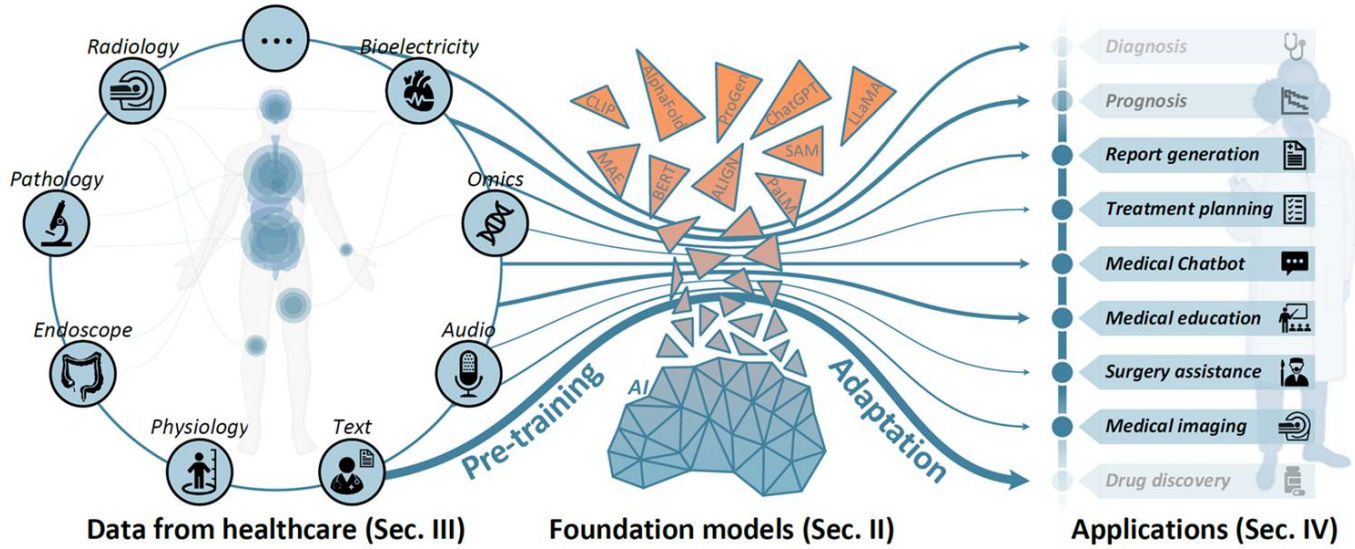
Synthetic Data Generation

Addressing data scarcity by creating high-fidelity synthetic medical images.

Workflow Optimization

AI-driven report generation, automated segmentation, and decision support.

Foundation models can integrate multimodal data to enhance diagnostic precision and prognostic accuracy across diverse clinical scenarios.



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Clinical Decision Support Systems

Integration of clinical and imaging data for AI-based diagnosis

Neuroblastoma Panel

Diagnosis stratification

VERSION 1.0.0

Phisician	Not given	Patient ID	95f551A5	Predicted Risk Score
Site		Birthdate	undefined	Intermediate
Study Date	13-03-2018	Age (months)	139	
Report Date	30-08-2023	Sex	Female	

Patient Characteristics

Clinical variables	
Age (months)	139
Sex	Female
LDH (U/l)	551.0
MYCN status	Not amplified
Risk group INRG	High
INSS	4
Bone marrow aspirate	Positive
Bone marrow trephine	Positive
Tumor localization	Abdomen
Tumor histology type	Neuroblastoma
Grade of differentiation	Poorly differentiated

Imaging variables

Radiomics features	
Skewness	0.45
Maximum 2D diameter	97.00
GLCM informational measure of correlation	0.63
GLSZM zone percentage	0.02
GLRLM graylevel non-uniformity	2922.55

1. Skewness measures the asymmetry of the distribution of values about the mean intensity value.
2. Maximum 2D diameter measures the largest transversal diameter of the lesion
3. Zone percentage measures the ratio of number of zones and number of voxels in the lesion (fraction of habitats in a lesion).
4. Gray level non-uniformity measures the similarity of gray-level intensities. Lower values are related to more homogeneous tissues.

Representative tissue

Primary tumor automatic segmentation, defining the area where the radiomics features are extracted.

Tumor volume:157.49 cm3

Risk prediction

Clinical and radiomics features: importance of the clinical and radiomics features to make the final OS and EFS prediction.

This report aims to be a prototype of how the neuroblastoma clinical decision support system will look like. Its intended use is for research purposes only.

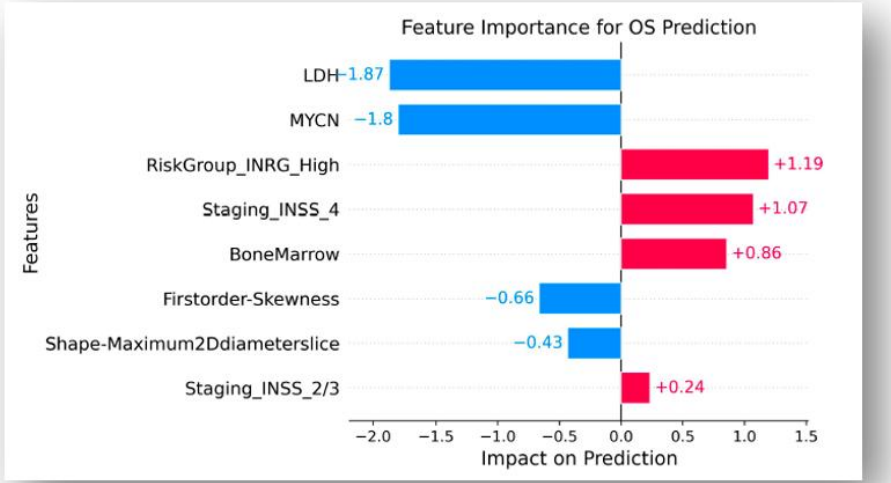
Explainability

Input variables:

- Sex: Female
- Age: 139 months
- LDH (IU/L): 551
- Histology: Neuroblastoma
- Degree of differentiation: Poorly differentiated
- MYCN: Not amplified
- Primary tumor location: Abdomen
- **INRG: High**
- INSS: 4

Clinical outcomes:

- Overall survival: 1484 days
- Status: Alive



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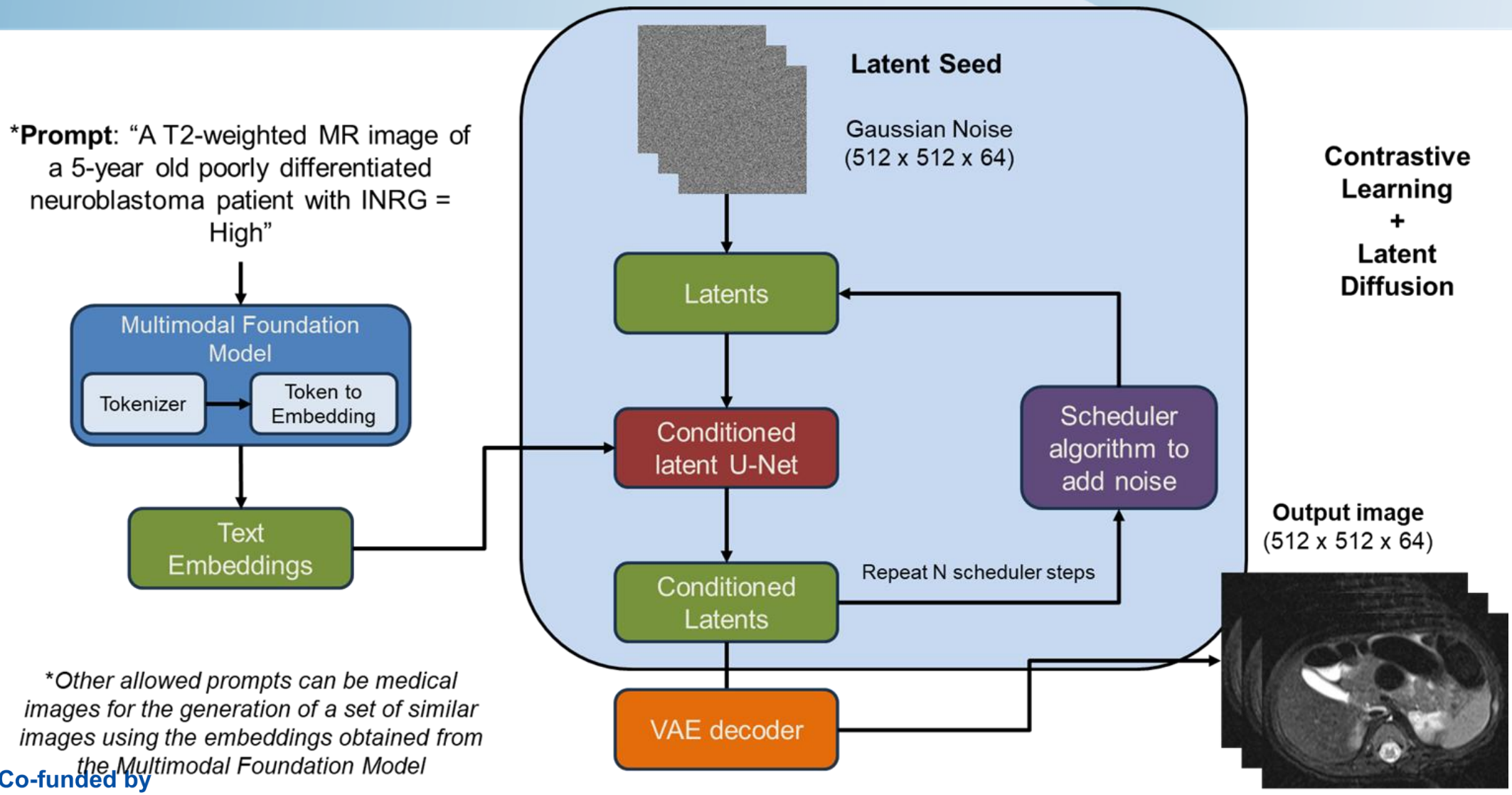
Generative AI



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Software Benchmarking

Importance of Evaluation: Key to ensuring success in EUCAIM and gaining patients' trust, crucial for adoption in healthcare.

Evaluation Scope: Data, tools, AI models and platforms to be assessed on bias and fairness, scientific outcomes, user experience, software quality, performance and clinical outcomes.

OpenEBench platform: EUCAIM's benchmarking portal for data visualization, analysis, and evaluation.

Goal: Ensure tools, AI models, and datasets meet high standards of performance, fairness, and reliability.

Metrics Purpose: Define minimum acceptance criteria for inclusion in EUCAIM and showcase strengths of tools, models, and datasets.

Efficacy and Performance Metrics

General Metrics: TN, TP, FN, FP, FNR, FPR, OA (Overall Accuracy), Precision.

Fairness Metrics: Statistical Parity (SP), Equal Opportunity (EO), Predictive Equality (PE).

Task-Specific Metrics:

- Segmentation: Dice Similarity Coefficient, Jaccard Index, Hausdorff Distance, etc.
- Detection: Sensitivity, AUC, False Positives Per Image (FPPI), etc.
- Classification: Accuracy, Sensitivity, AUC, Precision, F1-score, Cohen Kappa, etc.

Fairness & Bias Metrics:

- Sex/Gender Bias: Metrics like Treatment Equality (TE), Accuracy Difference (AD), Disparate Impact (DI).
- Ethnicity & Race
- Shapley Values / Feature Importance

Technical Metrics

Scientific Outcomes: Impact on research (citations, peer reviews, etc.).

Software Quality: Code quality (e.g., complexity, updates, adherence to standards).

Overall Performance: Speed, accuracy, efficiency in task performance.

Robustness Metrics

Stress tests

Adversarial attacks

Out-of-distribution detection

Extreme case analysis

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Software Benchmarking: Dataset

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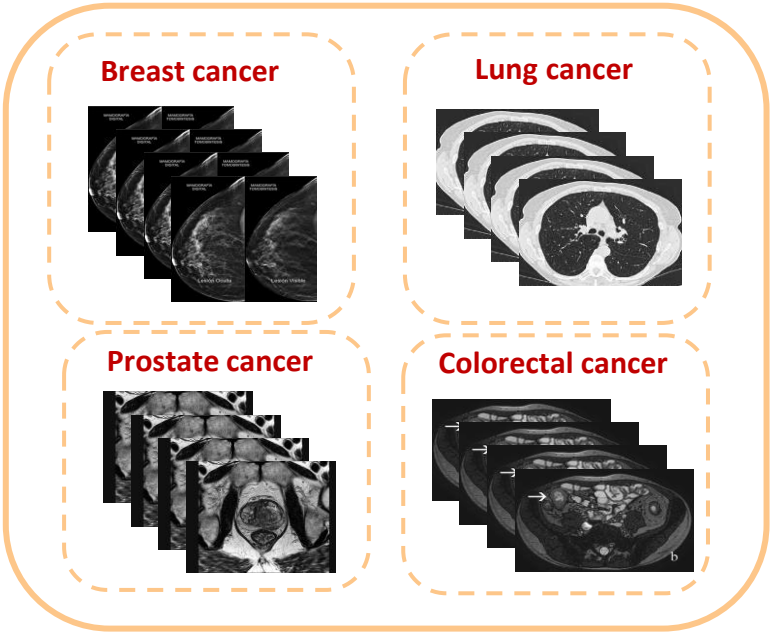
The importance of selecting a multicenter, representative dataset for software benchmarking.

Biases:

- Undersample: number and diversity of cases
- Image harmonization and robustness
- Data Quality
- Protocols, vendors, releases of images
- Country of origin
- Demographic descriptors (age, sex/gender, ethnicity…)
- Comorbidities and risk factors (smoking, COPD, dense breast…)
- Spectrum of the disease (genotype, phenotype, histology grade…)
- Data leaking: imaging duplicates detection.



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In-Silico Clinical Validation

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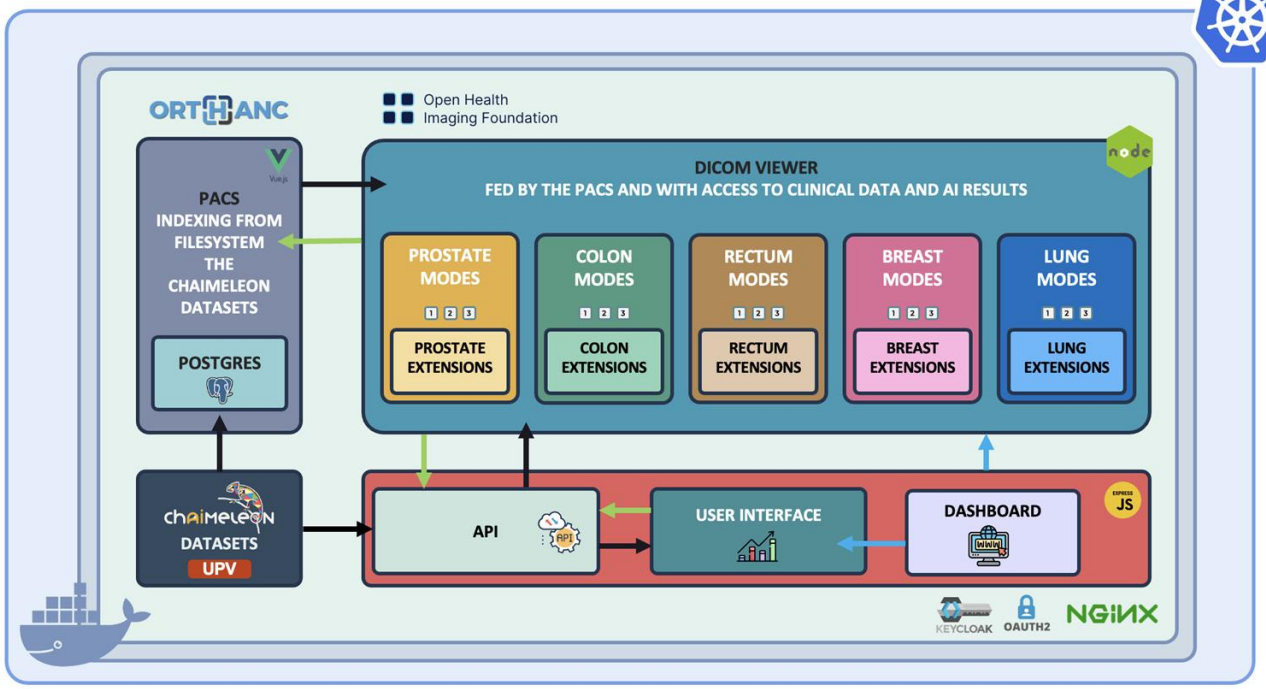
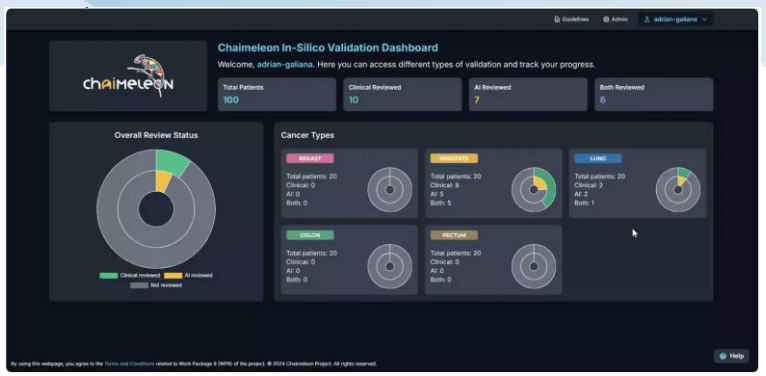
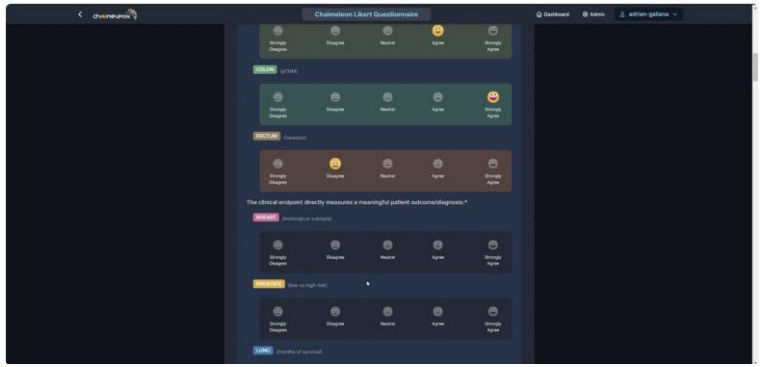
In collaboration with the CHAIMELEON Project







- A user-friendly platform developed to improve user experience during clinical validation (timing per case evaluated with/without potential result biases, feedback and comments through a survey.

the European Union

chaimeleon

In-Silico Validation

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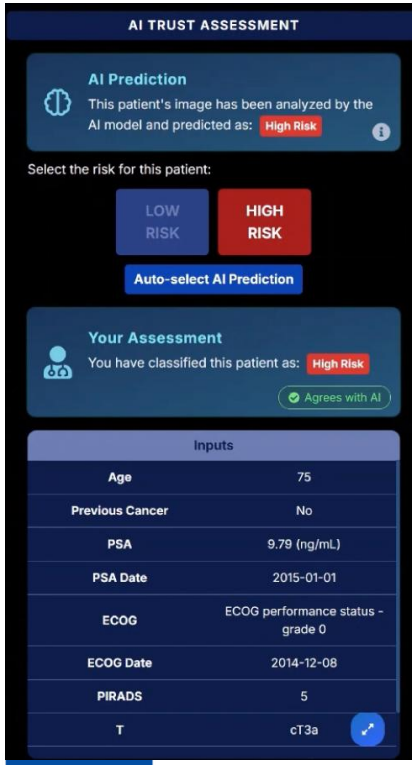
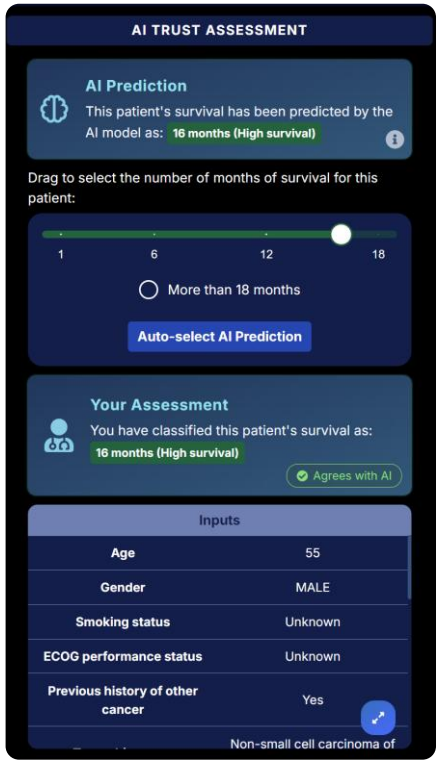
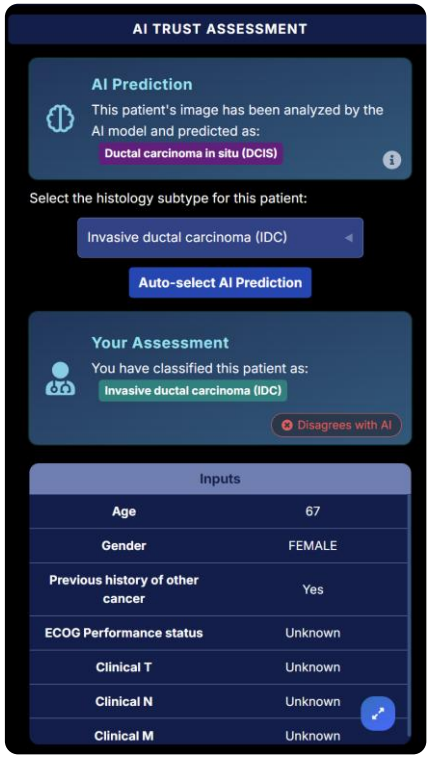
PROSTATE



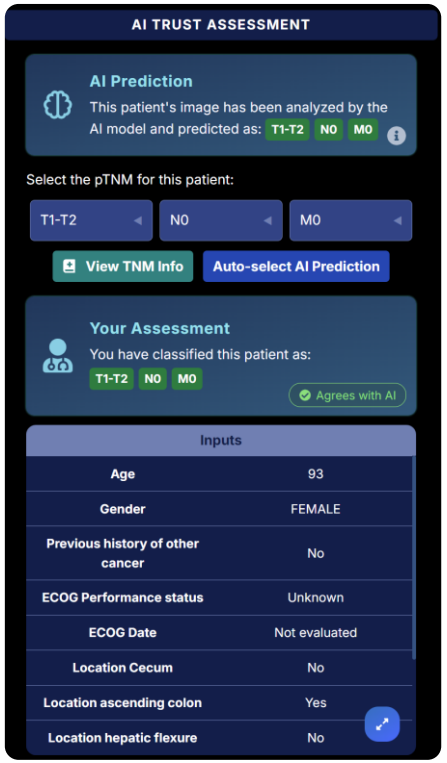
LUNG



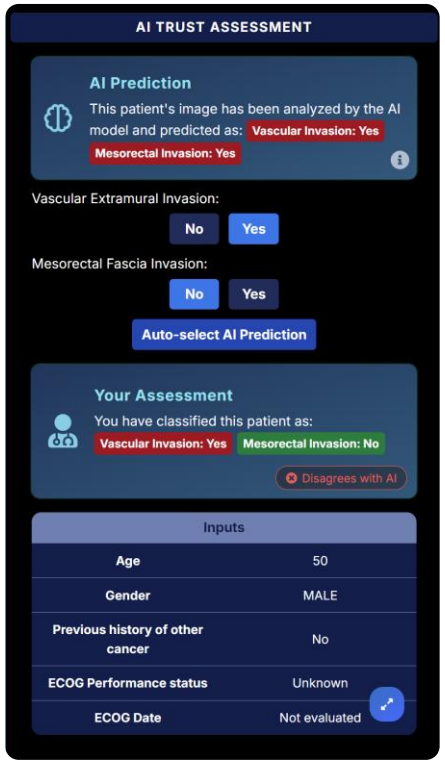
BREAST



COLON



RECTUM



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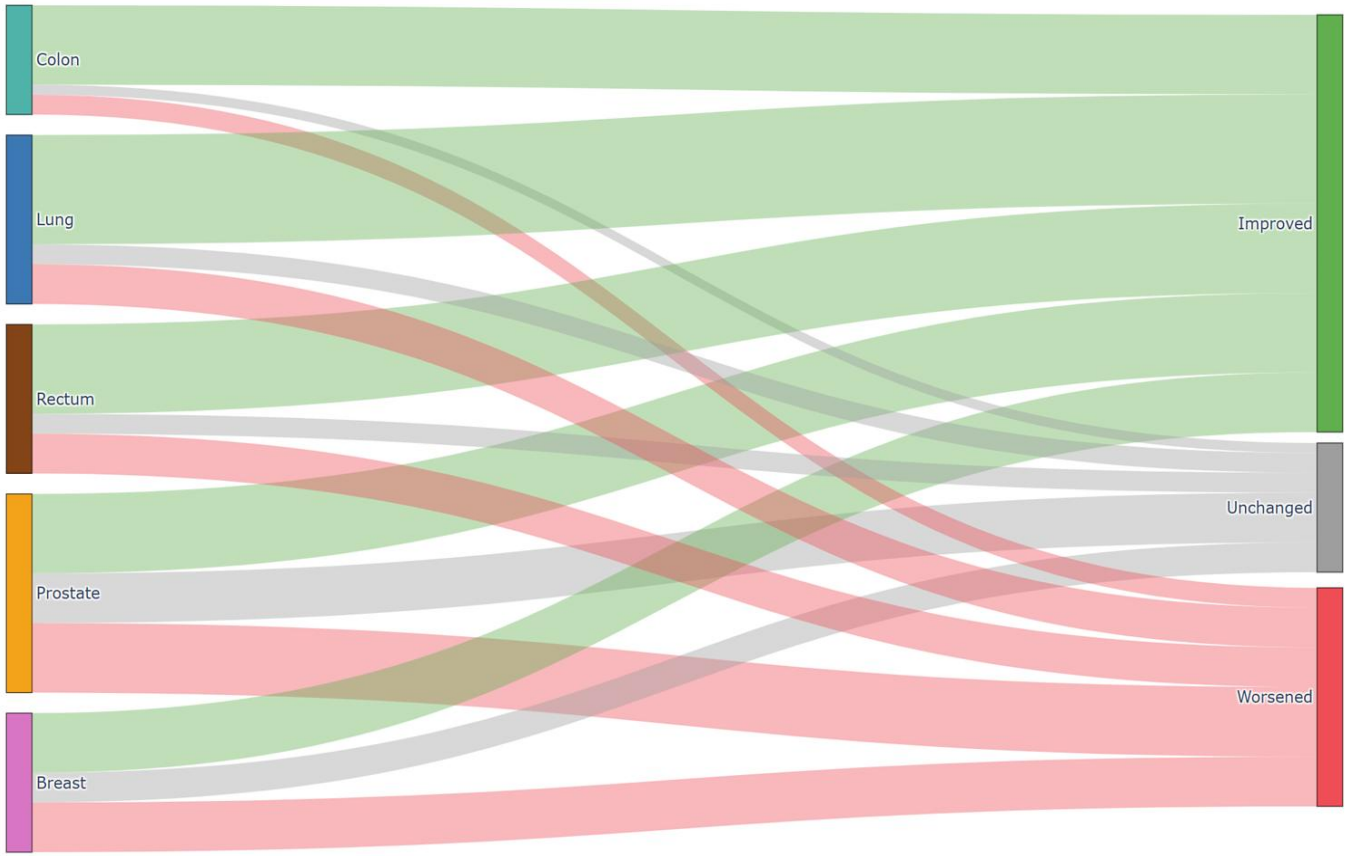
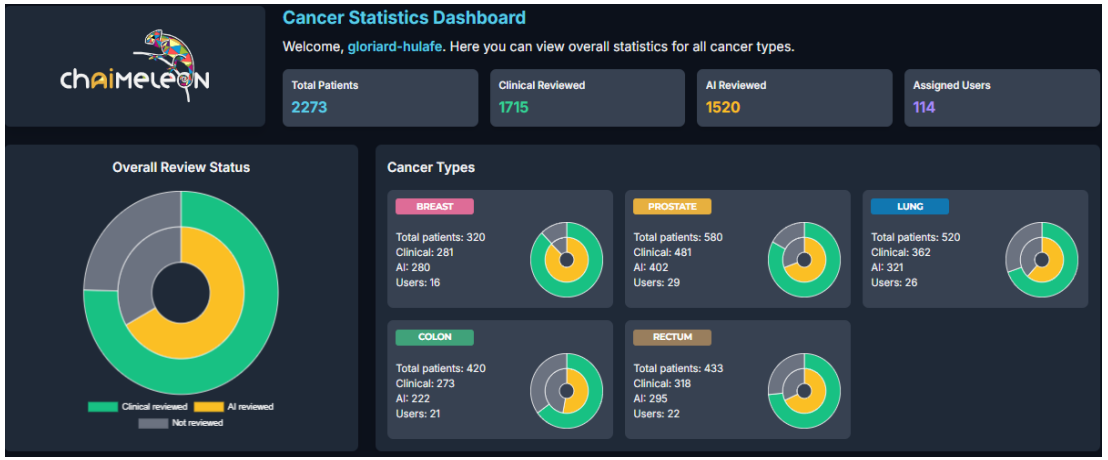
chAImeleon

In-Silico Validation





- Cases: 1,553 (5 tumors).
- Observers: 77 (34 radiologist and 43 physicians).
- Different Experience Level (14: <5 year, 7: 5-10 years, 56: >10 years).
- 54% improved, 17% unchanged, 29% worsened.

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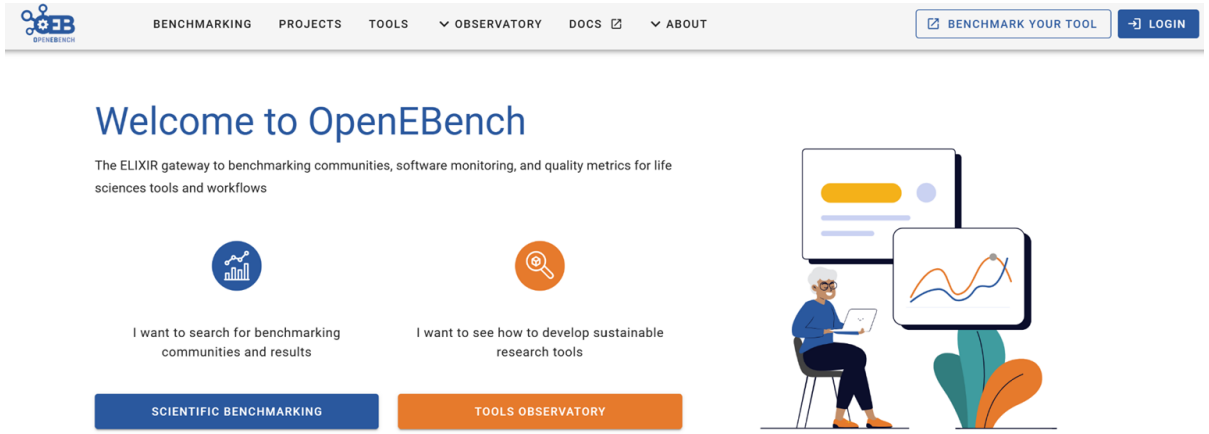
Software Benchmarking

- Contribution to **multicentric datasets from new hospitals** and clinical centers in Europe.
- Benchmarking of pre- and post-market AI solutions in our platform using our own computational and storage resources.
- Use of our defined guidelines and frameworks for **AI benchmarking** including 1) conceptual, technical and integration validation, 2) dataset validation in terms of bias and fairness; 3) performance validation, and 4) clinical validation.
- Use of EUCAIM's **Trustworthy and Explainable AI** guidelines and metrics.
- Use of EUCAIM's pre-processing tools to perform **stress tests** on the AI solutions.
- **Incoporation of all datasets** into the EUCAIM infrastructure (either centralized or federated) for post-market regulatory compliance.



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Use Cases & Engagement Opportunities for Innovators

Ángel Alberich (QUIBIM)

EUCAIM leading private partner

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AI Innovation in Cancer Research

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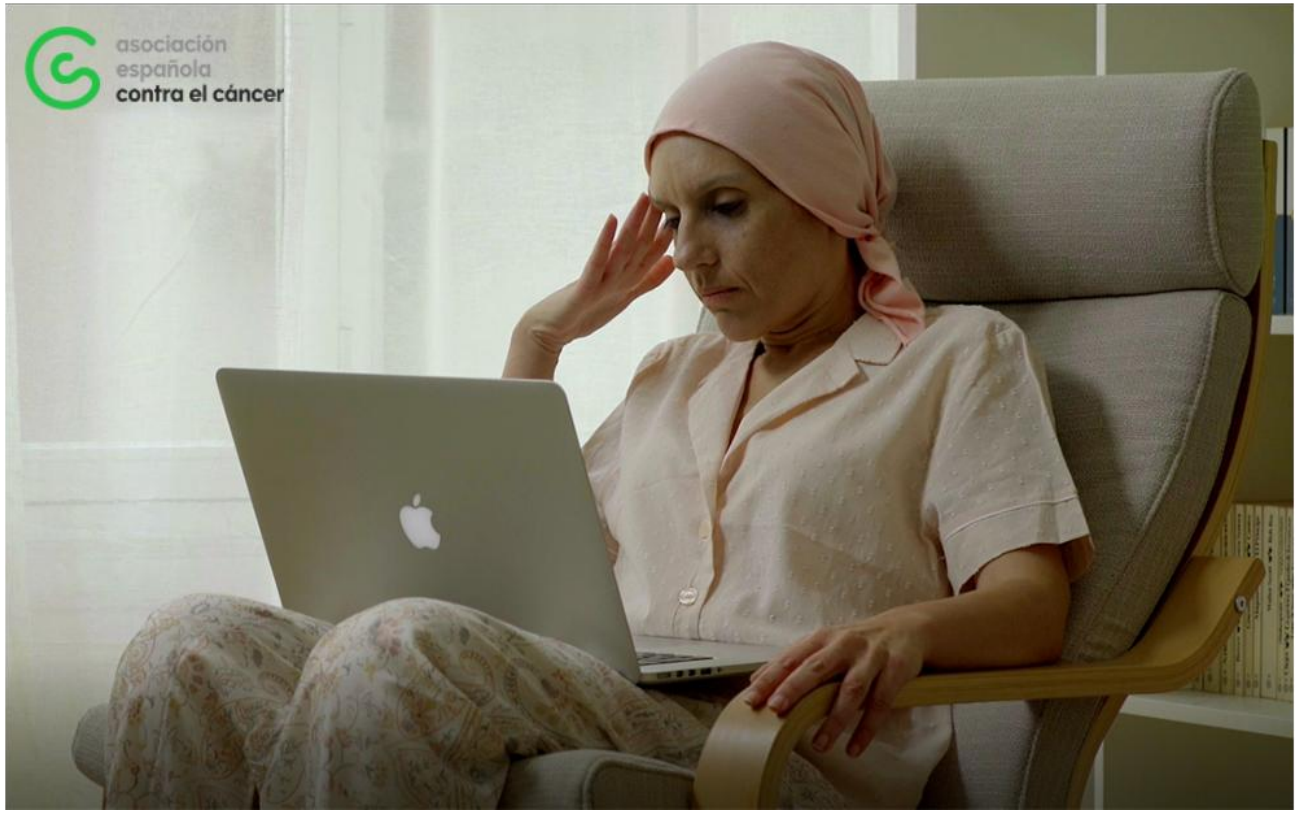
Social impact: patients

Patients benefit from research results in AI and imaging when these are evolved into products to be used in clinical practice.

Medical Devices



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AI Innovation in Cancer Research

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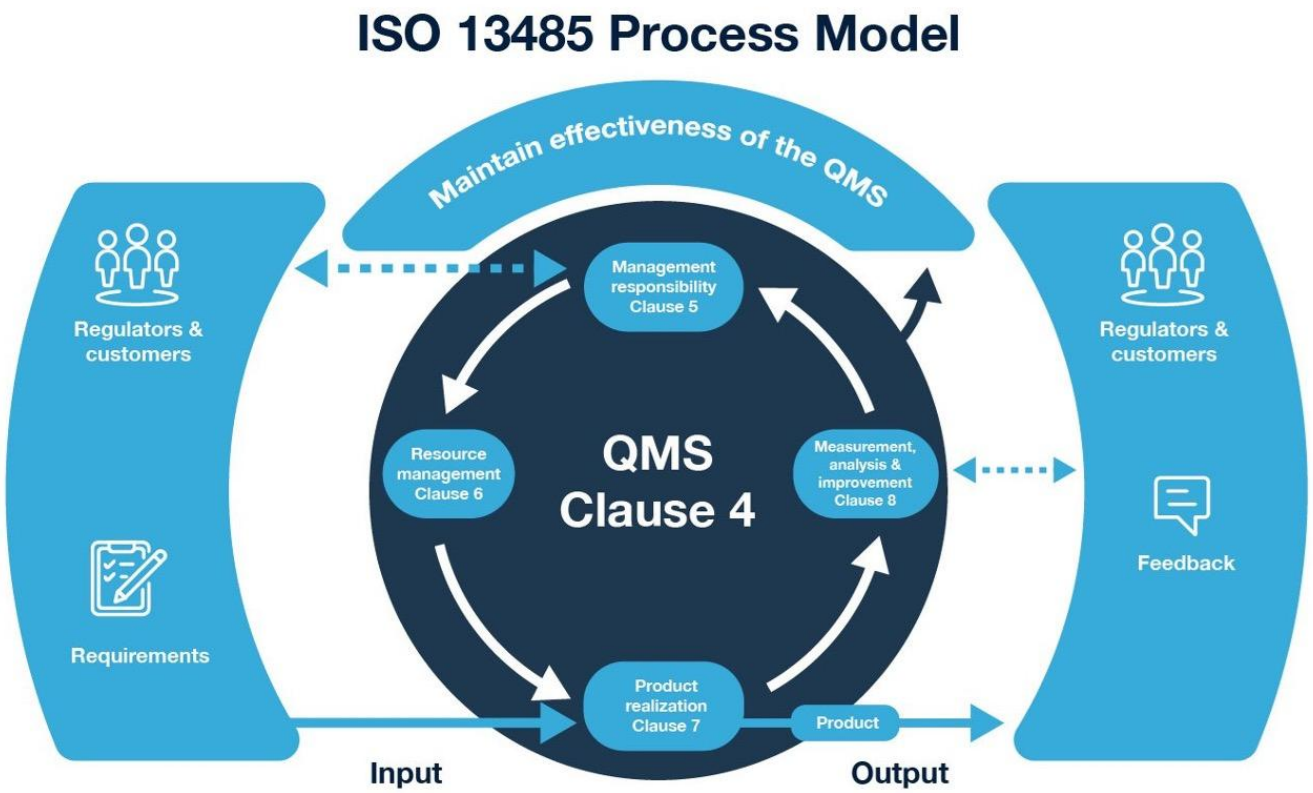

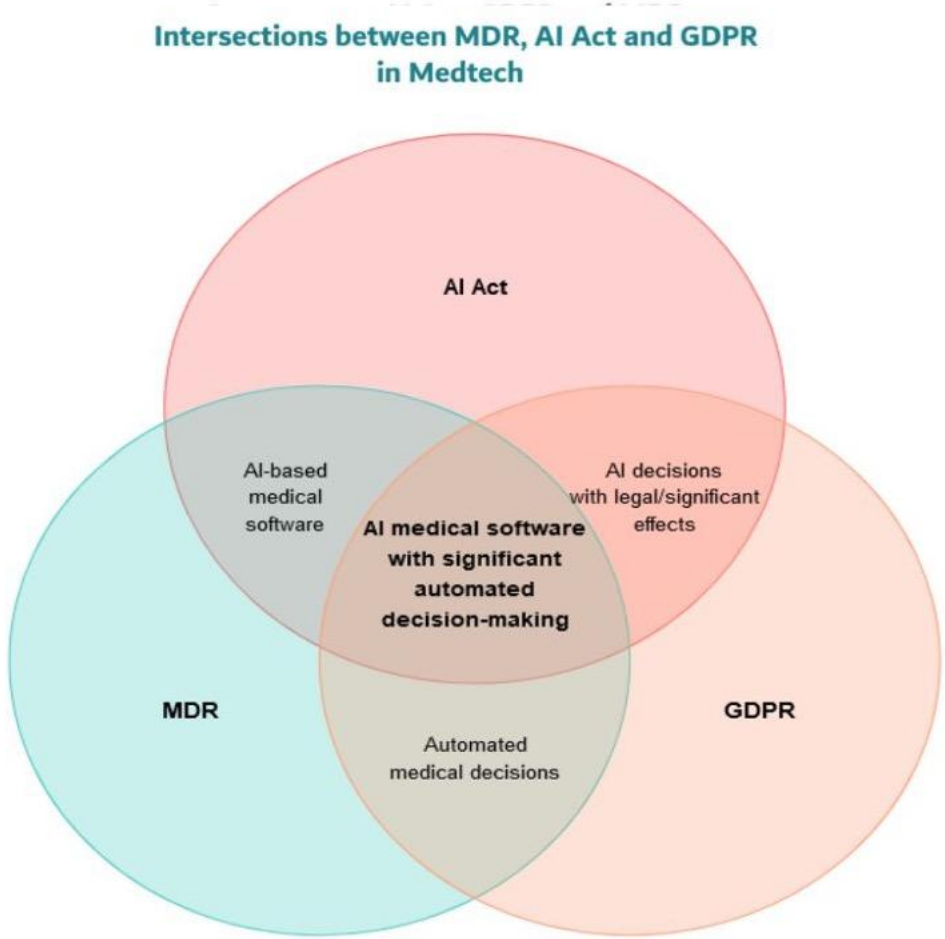

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AXON science based lawyers
cecile.vanderheijden@axonlawyers.com

AI Innovation in Cancer Research

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Economic impact: Medical Devices industry

Cancer Image Europe must catalyze and promote the industry of medical devices for cancer and medical imaging in Europe:

- AI and Medical Imaging companies
- Equipment manufacturers
- Providers of PACS and EHR information systems

KPI: % Growth in Certified AI Medical Imaging Devices in Europe during the post-Cancer Image Europe phase

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AI Innovation in Cancer Research

EUCAIM
CANCER IMAGE EUROPE

Economic impact: Medical Devices industry

To facilitate the access to data and decrease the cost of developing new AI products.

Lower cost, more products, more access.

Results

Conclusions

11.33 products for every $1 billion in funding, assuming 6-year lag between funding and product approval.

Average $88m per product!

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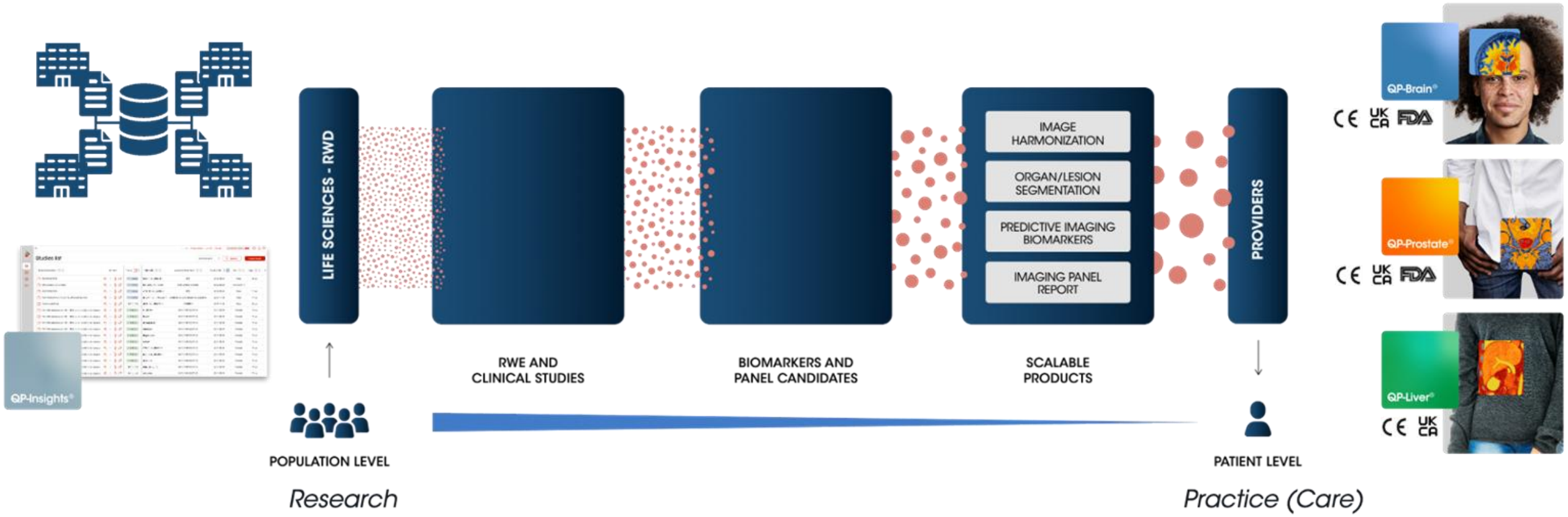
Use cases



nature research *Quibim: Empowering biopharma to turn images into actionable predictions using artificial intelligence. Nature – Biopharma dealmakers. June 2023*

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Use cases

EUCAIM will transform the development of medical devices in Europe

- What is needed to catalyze the innovation process?
- Highly available, cyber-secure technical infrastructure with strong technical and organizational information security measures.
- Datasets compliant with data interoperability standards.
- Integration with multi-modal clinical data: electronic health records, pathology and molecular biology data, among others.
- Audit trail mechanism.

- **For model training**: data download under licensing agreements. The manufacturing process requires that manufacturers have access to the data to train AI models on auditable and traceable infrastructures (AI Act compliance).
- **For model validation**: integration of AI modules as Docker containers on the platform, meeting EUCAIM validation requirements.

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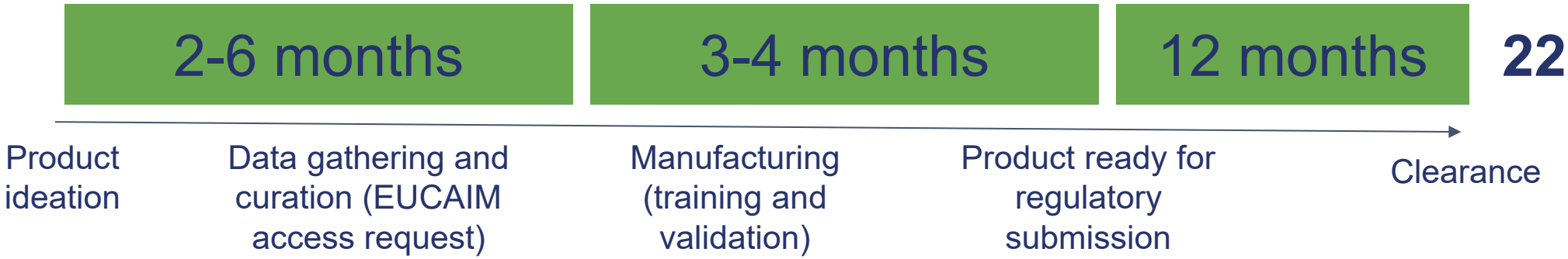
Use cases

BEFORE EUCAIM:

WITH EUCAIM:



25-30% reduction in time, translating into €300m yearly savings for all European startups and scaleups in medical imaging.

*F6S lists 100 top medical imaging companies and startups,

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EUCAIM offer to innovators

EUCAIM will transform the development of AI-powered, imaging-based medical devices in Europe

- **Access to Large-Scale, Multimodal Cancer Imaging Data**: Datasets from across Europe: MRI, CT, PET, mammography, among others. Annotated, harmonized, and linked to clinical data in many cases. Covers diverse patient populations, institutions, and imaging protocols. Enables real-world AI model generalization across different scanners, populations, and clinical workflows.
- **Benchmarking and Validation Tools**: Evaluate AI models on external, standardized datasets. Generate evidence for MDR regulatory submissions. Contribute and test models in a secure and auditable environment. Frameworks and blind-access datasets for the benchmarking and licensing.
- **Support for CE Marking / Regulatory Readiness:** EUCAIM provides traceability, audit trails, and a compliance-friendly infrastructure (aligned with EU AI Act requirements).
- **Secure access via cloud and edge infrastructure,** ensuring fine-grain access control to datasets
- **Container-based model integration and testing**
- **Metadata harmonization using HEALTH DCAT-AP schema and datasets following the FAIR principles**
- **Licensing frameworks and access control for data usage**

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Discussion

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