




A European Cancer Image Platform Linked to Biological and Health Data for Next-Generation Artificial Intelligence and Precision Medicine in Oncology

## Deliverable D3.7: Integrated EuCanImage web-portal

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## Version log

Issue Date	Version	Involved	Comments
26/09/2023	v 0.1	Josep Ll. Gelpí, Laia Codó	First Draft
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29/09/2023	V 0.3	Josep Ll. Gelpí, Laia Codó	Final Draft
29/09/2023	Final	Xènia Puig, Oliver Díaz, Karim Lekadir	Final revisió

## Executive Summary

This deliverable offers a comprehensive overview of the EuCanImage integrated web portal, a site designed to act as a common entry point for all the components of EuCanImage infrastructure. The structure, backend and front-end layout of the portal are presented in detail in this document. The portal interconnects all project's services and resources in a comprehensive manner, and it is meant to be easily updated with new content as new functionalities are offered by the consortium. The site is hosted at the Barcelona Supercomputing Center and is publicly available at <http://platform.eucaimage.eu/>.



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## Acronyms

Name	Abbreviation
Artificial Intelligence	AI
Barcelona Supercomputing Center	BSC
Collective Minds Radiology	CMRAD
Data Access Committee	DAC
Domain Name System	DNS
European Genome-Phenome Archive	EGA
European Institute for Biomedical Imaging Research	EIBIR
General Parallel File System	GPFS
Open Id Connect Protocol	OIDC
Virtual Research Environment	VRE



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## 1 Introduction

The integrated portal has been designed to quickly and schematically address the key questions that image-based cancer researchers, clinicians and innovators are expecting. These questions include what the project is about, what data resources are being generated, how and where are they submitted, what legal framework is protecting them, and how AI models could be applied to them. Through these user-cases, the user is guided towards the components of the EuCanImage data platform that better could answer the question.

Firstly released during “M30 Consortium Meeting”, the content of the portal has been regularly reviewed, and it is expected to be extended as the project evolves and develops new resources and features (see section “Roadmap”). This document is describing in detail the first prototype of the portal, reporting the motivation behind its creation, how it looks like from user’s perspective, and what is the technical backend supporting it. The site is publicly accessible at <http://platform.eucanimage.eu> and linked under the homepage of the official project page (<https://eucanimage.eu>).

## 2 Conceptual design

During the evolution of the project, EuCanImage has opted for the building of a distributed platform, locating each component on the most appropriate infrastructure, minimizing data transmission, and assuring ELSI compliance. Therefore, instead of building a centralized infrastructure, the portal has been finally conceived as a lightweight umbrella joining together the different components of the EuCanImage platform.

This is how the portal accomplishes its primary objective: to provide a single-entry point for accessing the set of services, tools, resources and guidelines that conform the EuCanImage platform in an intuitive and comprehensive way. The portal acts as a central EuCanImage gateway that engages stakeholders onto the data platform. Additionally, references to documentation material and contact details for support are provided in case more information is needed.

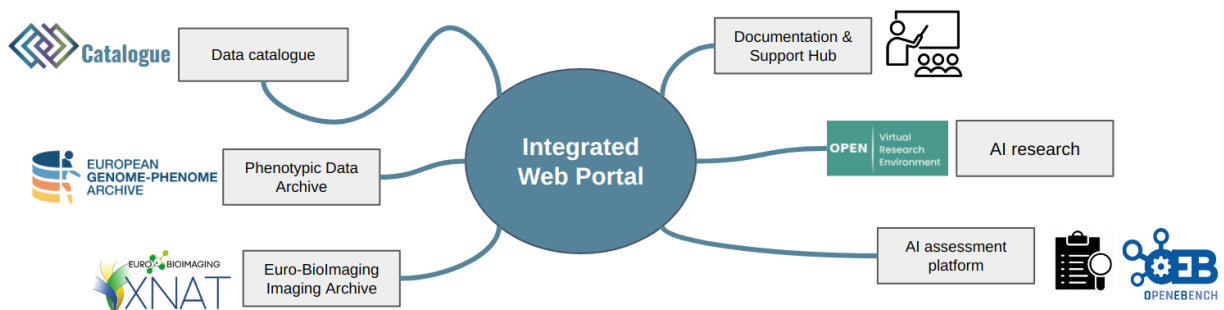


Figure 1: Conceptual design of the EuCanImage integrated portal.



## 2.1 EuCanImage Platform

One of the goals of the EuCanImage project is to build an EU-wide cancer integrated data platform for medical cancer imaging research. As described in detail in the “Architectural overview & data models” deliverable (D20220112), EuCanImage has focused on leveraging and extending existing services and repositories when building such a platform. Here is a brief summary of how these functional components interact among them to build up.

The data platform includes the capabilities to cover a full cancer data-driven research cycle. The following picture briefly describes the overall flow. First of all, a pseudo-anonymization pipeline is provided for *in-premises* data processing before images are fully annotated in the CMRAD cloud platform. Data is loaded, archived, and eventually distributed, through the associated long-term data repositories: EuroBioimaging for imaging data and EGA for the corresponding clinical data. A central data catalogue interrelates both systems to discover and explore EuCanImage studies. A sub-portal for managing DACs provides a central mechanism for data access. Finally, data is exploited using a full library of AI-based tool boxes accessible via AI-VREs, while benchmarking services are offered through the ELIXIR OpenEBench benchmarking platform.

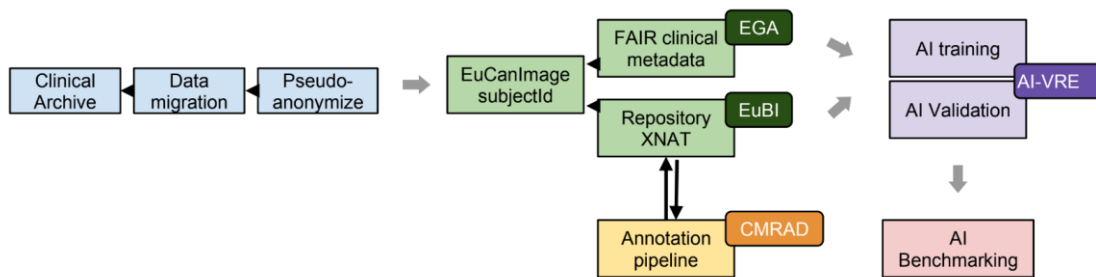


Figure 2: Summary of EuCanImage platform components.

## 3 General Description

### 3.1 Technical implementation

The site is implemented as a traditional server-side web application mostly written in PHP (v7.4). Based on a Wordpress (v5.6) instance for easily managing and maintaining the content’s website, the installation includes also a MySQL (v8.0) database, a Nginx (v2.1) web server configured as a reverse proxy, and a Certbot service for managing TLS and SSL certificates with Let’s encrypt. All services are implemented as Docker CE containers and deployed using Docker Compose. Data volumes containing the site's configuration and content are backed up in a shared GPFS-based storage.

BSC hosts the full deployment in a dedicated virtual server allocated at the *in-premises* Starlife cloud facility. As such, autoscaling provisioning tools could be adopted to deliver flexibility and support future website needs. The portal is publicly accessible under the URL <http://platform.eucanimage.eu>, a new DNS record managed by EIBIR.



### 3.2 Layout design

A new layout has been designed and implemented as a customised WordPress theme. Following EuCanImage branding guidelines, the design takes as reference the feel and look of the main's project website (<https://eucanimage.eu>). Offering a common styling at consortium's level promotes the project's identity on the internet, while giving visitors the sense of a seamless navigation across EuCanImage decentralised portals and sub-portals.

The template of the page layout supports responsive web design for multiple devices and consists of three differentiated parts:

- The top header division that displays the portal logo image and the main navigation menu in a dynamic and a non-scrollable container box. The menu consists of a list of clickable items with dropdown submenus that lead to the different sections (see section Structure for more details).
- The main body occupies the central page space and displays the content with white wide margins and a clean and fresh typography.
- The footer is mostly dedicated to the sponsors, including a reference to the project's grant contract and the EU funding agency. It also displays the *Cookies* policy.

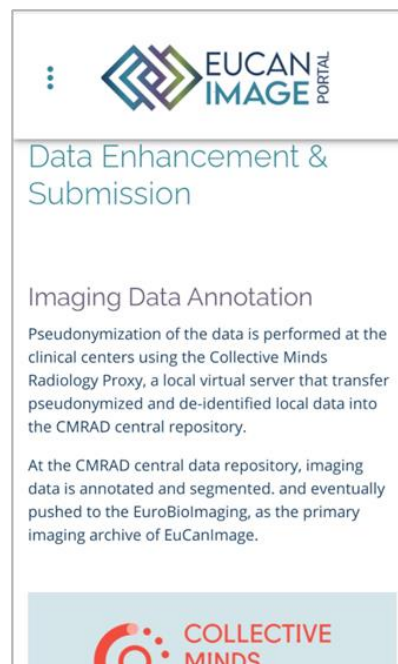


Figure 3: Layout page on a phone device.



## 4 Structure

The following section describes each of the entries found under the top navigation menu, which correspond to the content structure described in the following figure:

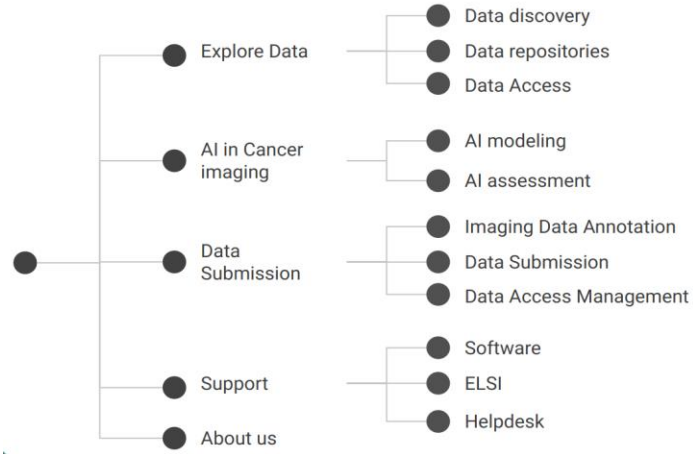


Figure 4: Website structure.

### 4.1 Home page

The Home page has the objective to provide a bird's-eye view of the overall's project concept while highlighting the main platform functionalities - which are going to be individually expanded in dedicated sections. After the initial introduction, the user is led to two highlighted actions: "Explore Data" and "AI in cancer imaging". These suggestions engage the user to start navigating and discovering the portal, while already defining its interests, either data focused tasks or AI oriented research.

For those visitors looking for more specific actions, the top navigation menu lists all available sections, further described below in this section.





**EUCAN IMAGE PORTAL**  
EXPLORE DATA AI IN CANCER IMAGING DATA SUBMISSION SUPPORT ABOUT US

**A trusted data management and curation platform for enhancing AI cancer imaging**  
leveraging the most established, secure and tested data infrastructures and curation tools

**Cancer Data-driven Research**

**Clinical Centers**

**Data Discovery**

**AI-enhanced research**

EuCanImage consortium has built a secure, federated and large-scale European cancer platform, with capabilities to greatly enhance the potential of artificial intelligence (AI) in oncology. As a result, completely new data resources **over 25,000 single subjects** are being curated, annotated and made public at the platform to investigate unmet clinical needs. The platform includes:

- Novel curated and annotated imaging data cross-linked to biological and health records.  
[Explore Data](#)
- Multi-scale AI solutions that integrate organ-level, molecular & clinical predictors for cancer fingerprints.  
[AI in Cancer Imaging](#)

Figure 5: Homepage screenshot.

## 4.2 Explore Data

The page is divided into subsections that cover those services more relevant for a clinician or researcher willing to discover and gain access to EuCanImage data:

- Data Discovery
- Data Repositories
- Data Access

In “Data Discovery”, visitors interested in browsing euroBioImaging studies with cancer imaging, biological and health data find the “Catalogue” entry, with a button that links to the data catalogue application.



The screenshot shows the 'Data Discovery' section. On the left, under the heading 'Data Discovery', there is a paragraph: 'EuCanImage is compiling an open-access catalogue to search for relevant **oncologic data collections for AI experiments**. It includes a complete search engine that enables data filtering by both, imaging and non-imaging parameters:'. Below this is a bulleted list of parameters: Imaging modality (CT, MRI, PET, US), Scanned Organ (e.g. liver, breast or colorectal), Image acquisition parameters, Data formats, Image annotations and segmentations, Quantified imaging biomarkers, Clinical variables, Physical measurements, Pathology specimen data, and -omics. On the right, there is a 'Catalogue' section with the heading 'Explore EuCanImage datasets' and a bulleted list: 'Discover studies with cancer imaging, biological and health data.', 'Locate associated imaging and non-imaging data collections.', and 'Hosted by the European Institute for Biomedical Imaging Research'. A 'GO' button is at the bottom of the catalogue section.

Figure 6: Screenshot of Data Discovery section.

In the “Data Repositories” section, euroBioImaging and EGA are presented as the EuCanImage Central Data repositories. Users are instructed about which type of datasets are achieved in each system, and how to access them.

Under “Data Access” visitors are referred back to “Data Repositories”, after a brief explanation detailing that data access petitions are not currently managed at project level but addressed by the corresponding data repository hosting the access-controlled dataset of interest.

The screenshot shows the 'Data Repositories' section. At the top, it says 'Data Repositories' and 'Well-established European data infrastructures are used for **long-term archive** of the cancer imaging, -omics and health data collections that are being curated, annotated and harmonized in the consortium.' Below this are two repository cards. The first card is for 'EURO BIOIMAGING' with the tagline 'Image life, discover the future'. It is titled 'Euro-BioImaging Archive' and 'Imaging repository for EuCanImage'. It lists: 'Large-scale multi-cancer, multi-centre and multi-modal image repository' and 'Co-managed by Erasmus Medical Centre (EMC)'. The second card is for 'EUROPEAN GENOME-PHENOME ARCHIVE'. It is titled 'European Genome-Phenome Archive' and 'Biological & health data repository for EuCanImage'. It lists: 'Permanent archiving and sharing of personally identifiable genetic, phenotypic, and clinical data' and 'Hosted at Centre for Genomic Regulation (CRG)'. Both cards have a 'GO' button at the bottom.

Figure 7: Screenshot of EuCanImage Data Repositories section.



### 4.3 AI in cancer imaging

This section is targeting AI researchers and data-scientists willing to process their data with EuCanImage AI models, predictors and assessment metrics. Two subsections are created in this area:

- AI modelling
- AI assessment

Under “AI modelling”, the toolboxes and pipelines of radiomics methods and AI algorithms developed in the project are made available through portable analysis platforms, *i.e.* AI Virtual Research Environments. The section explains how to install them and provides access to an online instance deployed for demonstrations and testing.

In the “AI assessment” section, the portal displays the online AI benchmarking services currently accessible - in this case, OpenEBench, the ELIXIR benchmarking service.

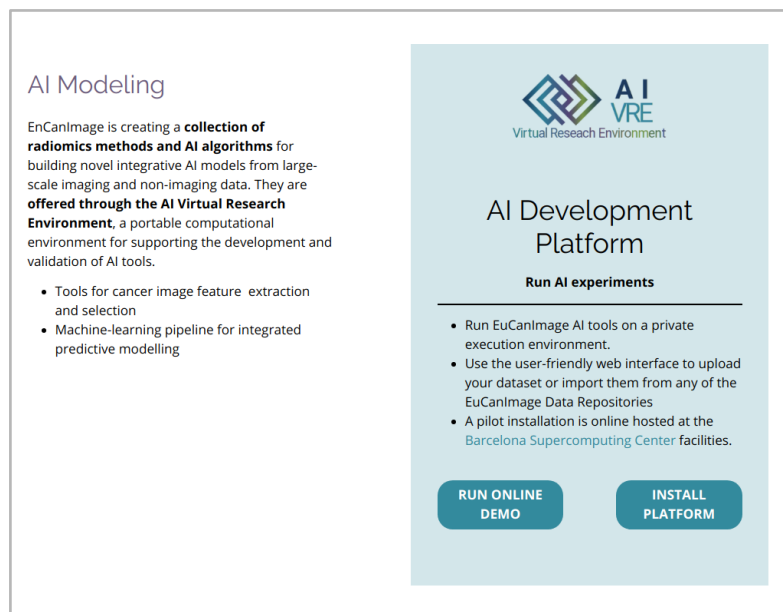


Figure 8: Screenshot of AI modelling section.

### 4.4 Data Submission

This section groups all the relevant services for researchers and clinicians willing to share their data in the platform. It is divided into the following subsections:

- Imaging Data Annotation
- Data Submission
- Data Access Management

Under “Imaging Data Annotation”, the user will find information on how to install the necessary tooling for securely pre-processing sensitive data before exporting it. The section also provides access to the annotation platform.



“Data Submission” section aggregates relevant references to learn how to deposit imaging and non-imaging datasets to EuCanImage Central Data Repositories.

Finally, section “Data Access Management” links the DAC sub-portal, for managing data access requests.

The screenshot shows the 'Imaging Data Annotation' section. On the left, there is text explaining the pseudonymization process at clinical centers using the Collective Minds Radiology Proxy and the CMRAD central repository. On the right, there is a light blue card titled 'CMRAD Annotation Suite' with the 'COLLECTIVE MINDS RADIOLOGY' logo. The card has a sub-header 'Pseudonymize, transfer & annotate' and two columns: 'CMRAD Proxy' with an 'INSTALL' button and 'CMRAD Central Repository' with a 'GO' button.

Figure 9: Screenshot of Imaging Data Annotation section.

The screenshot shows the 'Data Access Management' section. On the left, there is text explaining the controlled access catalogue and the role of Data Access Committees (DACs). On the right, there is a light blue card titled 'DAC Portal' with a logo of overlapping squares. The card has a sub-header 'Manage data access requests' and a list of actions for data owners, followed by a 'GO' button.

Figure 10: Screenshot of the Data Access Management section.

#### 4.5 Support

Under “Support” section, a heterogeneous set of resources grouped as follows is offered:



- Software
- ELSI
- Helpdesk

The “Software” section enumerates the tools, pipelines and frameworks being produced or supported in the EuCanImage platform. The list includes a reference to the documentation with instructions on how to deploy and start using it.

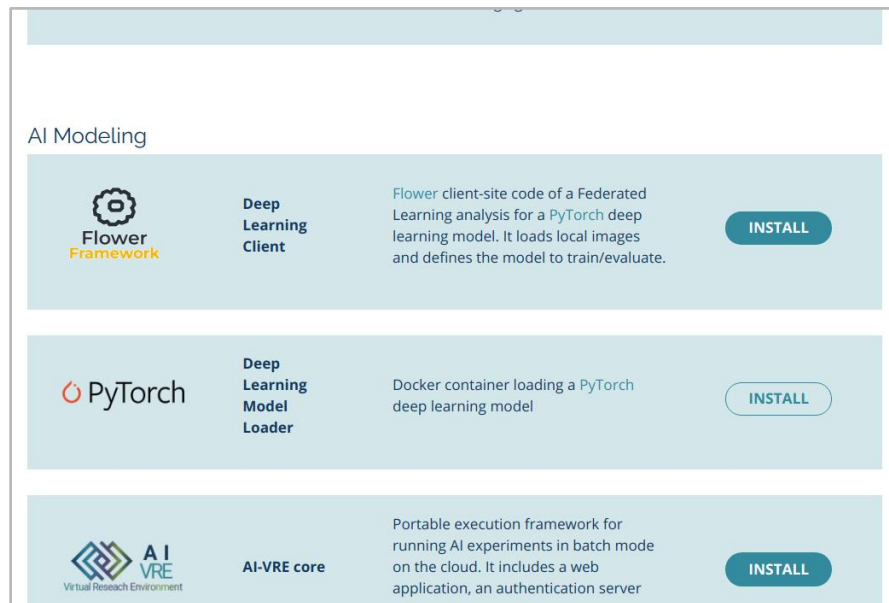


Figure 11: Screenshot of the Software Section.

The “ELSI” section is meant to define the legal framework developed in the consortium to enable the creation of the EuCanImage data platform. Still under construction, WP1 is preparing a light version of the Data Policy of the project, with reference to relevant documents and templates and list of Frequently Asked Questions.

Finally, the “Helpdesk” section includes a mail contact form that centralises user’s support requests. The form is targeting the official support mailing list of the project ([eucaimage\\_support@bsc.es](mailto:eucaimage_support@bsc.es)). It is managed by the BSC, who initially receive and filter these support petitions and forwards them to the relevant partner when required.

#### 4.6 About us

This section just includes an external cross reference to the main project website (<https://eucaimage.eu>).

### 5 Future actions

The integrated portal reported here is fully operational, publicly available, and with a well-defined structure that well interconnects all the components of the current EuCanImage platform. Yet, most of these components are evolving, new resources are being created, new



protocols put in place, etc. Hence, the content of the portal is expected to be regularly updated, enlarged or newly compiled, like the ELSI subsection still under construction.

Moreover, the possibility to adopt a central OIDC-compliant authentication system across platform modules is being explored. Adopting a common authentication server with multiple identity providers would permit not only Single-Sign-On functionalities for a seamless user experience, but also a better interoperability level between, for instance, between EuCanImage Central Data Repositories. EGA already supports OIDC, and euroBioImaging's is including it in its short-term roadmap.