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H2IOSC
Humanities and cultural Heritage Italian Open Science Cloud

Trans-National and National Access to the H2IOSC RIs Cluster Services

LIST OF SERVICES

June 2025

www.h2iosc.cnr.it

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H2IOSC PILOTS

PILOT Interlumo: Analytics services for remote interactions

The Interlumo service provide a comprehensive suite of functionalities design to capture, process and inspect interactive sessions performed in remote infrastructural nodes/equipment, public exhibits or web-applications, with a strong focus on Visual/Immersive Analytics.
This service enables remote applications to define and track custom attributes for interactive sessions. These attributes may include spatial data (such as virtual/physical 3D locations, 2D eye movements, focal points, HMD location in physical space, GPS coordinates, etc.), interaction states related to application logic or equipment (e.g., EEG voltages from BCI headsets, signals from wearable device, sensor data, etc.) or other relevant attributes.
Interlumo operates as an integrated pipeline, consisting of three stages, encompassing a series of web-based services tailored for analytics workflows. The process begins with data tracking and recording (Kapto), allowing remote applications, equipment or installations to capture raw interactions. It is followed by the examination and filtering of incoming raw data, processed using advanced techniques and Machine Learning models (Procezo). Finally, such data can be analyzed through Visual/Immersive Analytics inspection tool (Merkhet): this end-to-end solution ensures a seamless and efficient approach to deriving actionable insights from complex interactive sessions, including real-time collaboration with remote analysts in the virtual space.
CATEGORIES: Analytics and descriptive statistics; Data analysis; Data representation & visualization; Query and data extraction; Data curation and preservation; Data processing; XR interaction & spatial interfaces; Machine Learning

Slide show

Max number of Users/User teams for the call: 1
Specific data policy on reuse: Captured records (sessions) will be stored on the hub for a period of 6 months. The User/Team can access and save a copy of the data at any time via session ID provided by the service. For the last stage (Visual/Immersive Analytics) the User/Team is required to upload 3D data on ATON service preferably under an open license.
Providers: CNR ISPC | Operating Units: Rome
Contact person: Bruno Fanini
Email: bruno.fanini@cnr.it

PILOT ArchaeoHub - Open Digital Archaeology Hub

The Open Digital Archaeology Hub (ArchaeoHub) is a comprehensive digital infrastructure designed to facilitate the integration, exploration, and analysis of archaeological and heritage data. It enables seamless access to heterogeneous data sources, fostering findability and accessibility for long-term data preservation and usage.

The platform aggregates diverse resources, including scientific texts, images, bibliographic metadata, datasets, interactive resources, and research projects. These resources are accessible through a common interface, spatially organized on a map, and structured into thematic collections with an archaeological focus. Currently, six collections are available, focusing on Cerveteri, Etruria, Sabina, Pompeii, Sicily, and Sardinia. These are based on data from the scientific journal *Archeologia e Calcolatori* and its associated image repository, enriched with digital projects and datasets related to these locations and areas.

As an open and dynamic platform, ArchaeoHub enhances data findability and accessibility, making it a valuable tool for the digital archaeology and heritage science communities. This approach allows researchers to explore and efficiently contextualize heterogeneous data, promoting collaboration and new research opportunities. The system is designed to be open, allowing the integration of new image and text repositories from academic journals, cultural associations or research institutes, provided their use of standard metadata and data exchange formats.

The present call is aimed at users who wish to:

- freely **explore** the portal, the collections and provide feedback
- learn how to **share** and expose **data** from their own repositories through ArchaeoHub.

CATEGORIES: Data representation & visualization; Query and data extraction; Data curation and preservation; Bibliography

Slide Show
Demo Video

Max number of Users/User teams for the call: Consultation access: unlimited. Data integration access: up to 5 users.

Specific data policy on reuse: The User/User team is required to share the data produced during the TNA/NA activities under the terms of an open access license, such as those defined by Creative Commons.

Providers: CNR ISPC | Operating Units: Rome

Contact person: Giacomo Mancuso
Email: giacomo.mancuso@cnr.it

PILOT LLOD: Linked Open Data for Linguistic Resources

The LLOD pilot enables the publication and management of linguistic resources as Linked Open Data (LOD). The system integrates tools for creating, validating, and publishing RDF/SKOS resources, with a focus on multilingual vocabularies and controlled lexicons. The platform leverages Skosmos (see below the SKOSMOS Vocabulary Service) as a vocabulary browser and offers a dashboard for quality assessment, ensuring interoperability and long-term accessibility. Through federated access and intuitive editing interfaces, users can upload, modify, and share resources. The pilot also supports training through interactive tutorials, fostering the adoption of LOD practices within the research community. We therefore provide the possibility of helping users in converting and hosting their linguistic linked open data on our dedicated triple store.

CATEGORIES: Linguistics Linked Open Data, Web Semantic, FAIR

Slide show

Max number of Users/User teams for the call: N/A (unlimited users)

Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is encouraged to share the data produced during the TNA/NA activities under an open license and, in the case of inclusion of data in the Pilot LLOD triple store, the deposit of said data on the repository **ILC4CLARIN**

Providers: CNR ILC | Operating Unit Pisa

Contact person: Michele Mallia, Fahad Khan

Email: **michele.mallia@ilc.cnr.it; fahad.khan@ilc.cnr.it;**

PILOT DPH - Digital Philology HUB

The Digital Philology HUB (DPH) is a platform for the development of a workflow to make born digital critical editions of texts in ancient Italian with manuscript tradition.
The Digital Philology HUB consists of an application workflow for digital philology that aims at the construction of a critical edition assisted by digital and, in part, (semi-)automatic tools. The added value of the DPH lies in the modular architecture of the system, whereby all services necessary for the construction of the critical edition will be available in the same environment.
Currently, the DPH is divided into modules corresponding to the phases of philological work:

- Manuscripts addition
- Transcription
- Collation
- Varia lectio analysis
- Critical text and apparatus

The user will be able to use a single service, concentrating vertically on a single phase of philological work, or use several services linked together to produce a digital edition.
CATEGORIES: Data processing; data collection; digital philology; workflow

Slide show

Max number of Users/User teams for the call: 2
Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is recommended to use open licenses and deploying data in the DARIAH-IT repository to make it more accessible and reusable.
Providers: CNR OVI | Operating Unit Florence
Contact person: Federica Spinelli
E-mail: federica.spinelli@cnr.it

E-RIHS.it for H2IOSC

ATON: WebXR services for Heritage Science

ATON is an open-source framework to present and interact with 3D models and scenes on the web, primarily targeting Heritage Science communities. Its adaptive presentation layer allows interactive, liquid 3D visualization - ranging from mobile devices, museum kiosks, workstations, up to immersive XR devices - without any installation required for final users. The adoption of robust open-source ecosystems and international standards, alongside a REST API, maximize interoperability and integration with other platforms and H2IOSC services. The E-RIHS.it service offers public access to research institutes, laboratories, museums, experts and researchers, willing to rapidly integrate interactive 3D tools into their workflows. User-friendly interfaces, modular components and multi-user capabilities allow wide customizations for different use cases. Furthermore, a plug&play architecture provides an accelerator for development and deployment of cross-device and interoperable Web3D/WebXR applications or pilots.

CATEGORIES: 3D Presentation; Immersive Visualization; PWA; Data representation and Visualization; Data curation and Preservation; Data collection

Slide show

Demo Videos

- → **Built-in tools**
- → **Multiresolution 3D models**
- → **Navigation tools**
- → **Immersive VR (WebXR) and Multiresolution**
- → **Mixed Reality presentation (WebXR)**
- → **Plug&Play Apps**

Max number of Users/User teams for the call: 3

Specific data policy on reuse: The User/User team is required to share the data produced during the TNA/NA activities under an open license.

Providers: CNR ISPC | Operating Units: Naples and Rome

Contact person: Bruno Fanini

Email: **bruno.fanini@cnr.it**

H2IOSC Project - Humanities and cultural Heritage Italian Open Science Cloud funded by the European Union - NextGenerationEU - NRRP M4C2 - Project code IR0000029 - CUP B63C22000730005

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SENNSE

SENNSE is a hardware/software platform for the monitoring and preservation of cultural heritage assets through the acquisition and subsequent analysis of multiple data feeds acquired from a large-scale wireless sensor network. The sensors and related nodes, based on widely used commercial technologies and microcontrollers such as Arduino, Esp32 and Raspberry PI, cover a wide range of micro-environmental measurements such as temperature, humidity, air quality, light quantity and many others. SENNSE natively implements the MQTT IOT protocol, ensuring that the data sent from the sensors, through the relevant nodes, will be small in size, and that transmission, even under difficult conditions and poor network coverage, will occur correctly.

The open infrastructure can be easily customized facing the needs of users who, thanks to the implemented software platform can create their own dashboards and have the clearest possible information about the status of the monitored property. SENNSE can implement customized alarms to inform the user that certain preset thresholds are exceeded. In the future, thanks to the use of actuators, users will be able to respond to these alarms by activating direct and effective countermeasures, and thanks to the use of artificial intelligence modules (under development) the system will be able to discovery data trends, to predict possible site Issues and to suggest correct tasks to be performed.

Thanks to the immersive 3D visualisation of the monitored locations, an innovative method of viewing data via vr-headset, mobile phone or tablet is available.

CATEGORIES: Remote monitoring; Diagnostic; Analytics and descriptive statistics; Data representation & visualization; Data processing; Documentation, Virtual research environment; XR interaction & spatial interfaces; Data analysis; Query and data extraction

Slide show

Max number of Users/User teams for the call: 1
Specific data policy on reuse: to be defined with the providers
Providers: CNR ISPC | Operating Units: Lecce
Contact person: Alberto Bucciero, Francesco Valentino Taurino
Email: alberto.bucciero@cnr.it, francescovalentino.taurino@cnr.it

Painting Collection Hub: Digital and Analytical services for micro-scale mechanochemical investigations of painting materials and samples

This service provides access to digital and analytical resources for the study of paintings through a hardware and software laboratory platform for mechanochemical measurements of (micro)samples/stratigraphic sections. Compositional characterization and viscoelastic properties of the materials are correlated by combining vibrational microspectroscopies, namely infrared (IR), Raman and Brillouin (BLS). Micro-IR, in the different modalities (transmission, reflection and ATR modes) is performed at varying spatial resolutions with MCT and FPA detectors providing scanning and hyperspectral imaging of the paint material composition exploiting the high analytical strengths of the mid and near IR spectral ranges. Correlative Raman and BLS microspectroscopies (BRaMS) measurements are carried out by a combined set-up able to map composition and mechanical characteristics of painting materials. The study at the micro-scale of the materials, their layering sequence, micro compositional and structural heterogeneities enable to inform about the original paint technique, the material state of conservation, to unveil possible degradation and monitor the effect of conservation treatments. The analytical platform, yet developed for investigating painting materials, is also accessible for the more general studies of material science.
The access includes data processing and elaboration tools through workstations for analysis of spectral data with data processing including chemometrics and machine learning approaches (Python and RStudio environments), of samples provided by the Users.
CATEGORIES: Innovation services. Exploration of instrument synergies and novel innovative research capabilities. Data and digital services: Data analysis; Data processing; Query and data extraction; Analytics and descriptive statistics

Slide show

Max number of Users/User teams for the call: 5
Specific data policy on reuse: The user/user team is required to share the data produced during the TNA/NA activities under an open license. Where necessary, this may follow a defined embargo period, as previously discussed and agreed upon with the providers, in accordance with the sensitive nature of the research data.
Providers: CNR SCITEC | Operating Units: Perugia
Contact person: Francesca Rosi, CNR SCITEC
Email: francesca.rosi@cnr.it

X-ART: X-ray fluorescence Artificial intelligence Reasearch Tool for cultural heritage

X-ART is an AI powered digital platform designed for advanced interrogation and analysis of macro X-ray fluorescence (XRF) datasets. The platform leverages state-of-the-art convolutional neural networks trained to enable automated spectral analysis of XRF datasets, obtained from Macro XRF scanning systems, and provides resulting elemental maps. The platform features an intuitive web-based dashboard that provides researchers with interactive tools for real-time exploration and investigation of XRF datasets. Users can visualize elemental distribution maps and perform additional spectral datacube analysis including spectra comparison, ROI selections, and scatter plots.
Built on a cloud-native architecture, X-ART uses containerized microservices that are deployed on high-performance computing infrastructure with GPU support.
X-ART supports non-invasive cultural heritage diagnostics by providing practical tools for XRF data interpretation and documentation. It is designed to integrate with the MOLAB and E-RIHS.it research infrastructures, facilitating collaborative analysis of cultural heritage materials through standardized data processing workflows.
CATEGORIES: Data analysis, data processing, data representation & visualization

Slide show

Max number of Users/User teams for the call: 3
Specific data policy on reuse: To be defined with the providers
Providers: CNR ISPC | Operating Units: Catania
Contact person: Zdenek Preisler, Francesco Paolo Romano
Email: zdenek.preisler@cnr.it, francescopaolo.romano@cnr.it

CLARIN-IT for H2IOSC

EpiLexO Editor

EpiLexO is an interface for creating lexica for epigraphic languages conformant to Semantic Web principles linked to their testimonies (encoded in TEI-EpiDoc) and related bibliographies.
EpiLexO is a web-based platform designed for the creation, editing, and linking of lexical resources for ancient languages. It is based on a Service-Oriented Architecture exposing RESTful APIs. The platform facilitates historical linguists in encoding multilingual lexica, linking lexical data to inscriptions, bibliographies, and other external Linked Open Data resources. Its user-friendly interface supports collaborative editing and is particularly aimed at scholars in historical linguistics and digital humanities, providing essential tools for managing and interlinking lexical information and inscriptions.
CATEGORIES: Data representation & Visualization

Slide show

Max number of Users/User teams for the call: 2 (teams of max 5 collaborators each)
Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is encouraged to share the data produced during the TNA/NA activities under an open license and, possibly, the deposit of said data on the repository **ILC4CLARIN**
Providers: CNR ILC | Operating Unit Pisa
Contact person: Michele Mallia, Valeria Quochi
Email: michele.mallia@cnr.it, valeria.quochi@ilc.cnr.it

eScriptorium: a web platform for Handwritten Text Recognition (HTR)

eScriptorium is a web platform which integrates Handwritten Text Recognition (HTR) through kraken HTR engine and cooperative proofreading of automated transcriptions. Through the HTR United Project not only new performant HTR models are provided, but the entire process of image acquisition / recognition / HTR model refinement / proofreading / deposit of digital resources is open and replicable, in compliance to the principle of Open Science.

CATEGORIES: Data processing; HTR & Proof Reading

Slide show

Max number of Users/User teams for the call: 12

Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is encouraged to share the data produced during the TNA/NA activities under an open license and, possibly, the deposit of said data on the repository **ILC4CLARIN**

Providers: CNR ILC | Operating Unit Pisa

Contact person: Federico Boschetti, Michele Mallia

Email: federico.boschetti@ilc.cnr.it, michele.mallia@cnr.it

SKOSMOS Vocabulary Service

Skosmos is an open-source web application designed to offer a standardised way of publishing and browsing vocabularies, taxonomies, ontologies, and thesauri as linked data, encoded using the popular SKOS (Simple Knowledge Organization System) vocabulary. Skosmos offers an intuitive, user-friendly interface for searching, exploring, and retrieving concepts through hierarchical or alphabetical navigation. The platform supports internationalization and customization, making it ideal for academic, library, and research projects. The service includes data conversion into SKOS from formats such as CSV/TSV or JSON, and vocabulary hosting. Advanced features such as autocomplete, semantic relationship visualization, and output in various formats enhance usability may also be available, in addition to integration with GraphDB, ensuring high performance even with large RDF datasets.
CATEGORIES: Data representation and visualization; Knowledge representation and visualization

Slide show

Max number of Users/User teams for the call: unlimited users
Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is required to share the data produced during the TNA/NA activities under the open license Creative Commons CC BY-SA in the repository **ILC4CLARIN**
Providers: CNR ILC | Operating Unit Pisa
Contact person: Michele Mallia
Email: michele.mallia@cnr.it

DARIAH-IT for H2IOSC

MFE - MetaFAIR Ecosystem

MFE is a Platform for the integrated management of digitised manuscripts. Designed for researchers, scholars, and institutions such as libraries, archives and museums, it enables them to catalogue, preserve and enhance documents in a unified environment.
Some of its key features include:

- **Cataloguing**: Supports national and international cataloguing standards, enabling an accurate description of cultural assets.
- **Digitisation:** Manages digitisation processes, ensuring the acquisition and archiving of images and documents in digital format.
- **Digital Preservation**: Ensures the long-term preservation of digital content, implementing strategies for the preservation of data integrity and accessibility.
- **Access and Use**: Provides tools for consultation and research of digital collections, facilitating public or restricted access to materials.
- **Integration**: Integrates with other information systems and platforms, facilitating interoperability and data exchange between different cultural institutions.

MFE is in the development phase. A dedicated version will be selected from the current development phase for the TNA call. The federation authentication service developed by Nanotec and integrated in the project's API manager is used.
CATEGORIES: Data processing; data collection; query and data extraction.

Slide show

Max number of Users/User teams for the call: 2
Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is recommended to use open licenses and deploying data in the DARIAH-IT repository to make it more accessible and reusable.
Providers: CNR OVI | Operating Unit Florence
Contact person: Federica Spinelli
E-mail: federica.spinelli@cnr.it

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AEON - dAriah sErvice Oriented iNfrastructure

AEON is a digital platform that empowers researchers and professionals in the Social Sciences and Humanities to design, manage, and automate complex scientific workflows. Its key features include:

- a graphical **Workflow Manager** for intuitive service composition;
- multi-level **compatibility checks** (semantic, syntactic, and I/O) via intelligent Connectors;
- integration with **RESTful APIs** described through standardized JSON manifests;
- supporting the **generation of GUIs and scripts** for the seamless execution of workflows;
- secure, federated **authentication and access control** (AAI & ACL);
- orchestration of services via **WSO2 Micro Integrator** and XML-based mediators.

AEON ensures interoperability, reproducibility, and efficiency, making it a reliable and FAIR-aligned solution to support collaborative, scalable, and cross-disciplinary digital research.

CATEGORIES: Workflow management, Service orchestration, Data interoperability, Process automation, Scientific workflow design

Slide show

Max number of Users/User teams for the call: 3
Specific data policy on reuse: The User/User team is responsible for the data redistribution policy. The User/User team is recommended to use open licenses and deploying data in the DARIAH-IT repository to make it more accessible and reusable.
Providers: CNR OVI | Operating Unit Florence
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E-mail: federica.spinelli@cnr.it

Helpdesk Contact

For any questions, please contact the Access Coordination and Management Unit of H2IOSC at **tna.h2iosc@h2iosc.cnr.it**