

## Societal Challenges

Thousands of different cultural heritage objects are scientifically studied, interpreted and preserved for future generations, using techniques that require complementary skills from a range of disciplines and from different institutions from all over Europe. The underlying research questions are exceptionally complex, and due to their inherent characteristics, experiments

on cultural heritage artifacts are especially challenging. Opening digital data will support researchers in preserving, protecting and enhancing the significance of tangible cultural heritage. Furthermore, strengthening the cohesion of the Heritage Science digital ecosystem will foster long-term sustainability for heritage data.

## Technical Challenges

Data variety - the structural heterogeneity of the data (a mix of structured, tabular, unstructured and semi-structured) means it lacks the organisation required for machine readability;

No common framework and environment of FAIR data: incompatibility of data formats, heterogeneity of data representation (metadata schemas) and lack of common interdisciplinary understanding/interpretation of the data;

Development and adoption of "universal" protocols and standards to generate valuable information and

suitable metadata to be stored, accessed, queried, shared and reused among institutions, scientists and conservation professionals in various contexts and research scenarios;

Exchange and creation of new knowledge across disciplines, actions, research and services put in central focus the efficient interoperability of data;

Standardised and shared descriptions for analytical protocols and best practices in the field of Heritage Science.

## How EOSC can help and add value

### *Enabling an Open Science environment of FAIR data for European Heritage*

Many institutions, organisations and projects are working to enable an Open Science environment of FAIR data for European Heritage in EOSC. Building on the experiences of PARTHENOS and [ARIADNE](#), an international aggregation infrastructure specifically for archaeological data with a mandate to include data from the range of scientific methods in use by archaeologists, and the COST Action *Saving European Archaeology from the Digital Dark Age* ([SEADDA](#)) which is also working to build capacity for open data, including scientific data, within archaeology across Europe (and beyond), [IPERION CH](#) and [IPERION HS](#), the Social Sciences and Humanities EOSC project [SSHOC](#) is developing an open data framework in the Heritage and Archaeological Sciences in alignment with [PaNOSC](#), [ExPANDS](#) (through [collaborative links](#) between [CERIC-ERIC](#) and E-Rihs), and [EOSC-Life](#). Topics being covered include 16th century Italian paintings and specifically the artist Raphael, and the analysis of archaeological remains such as human bone fragments.

A similar effort to tackle data and metadata interoperability in the heritage field was also undertaken by [CLARIN-ERIC](#) and [Europeana](#), the European web portal which contains digitised museum collections from over 3,000 institutions across Europe. The continuing partnership between the two organisations resulted in the integration of a selection of Europeana Collections material into the CLARIN Virtual Language Observatory (VLO) portal.

