The ARTEMIS Pilots

Small-scale
Focusing on mosaics, wall paintings, sculptures, and scientific instruments, these pilots show how RHDTs enable virtual testing, material degradation modelling, AR/VR tools for museum professionals, and predictive conservation via IoT and environmental data integrated into interactive 3D models.

Medium-scale
Based on historic buildings and sites, these pilots explore structural monitoring, energy and humidity control, smart visitor flow modelling, climate risk assessment, decision-support tools, and virtual setups integrating historical and sensor data.

Large-scale
Spanning cities, archaeological parks, and landscapes, these large-scale pilots address disaster mitigation, tourism and urban modelling, climate-threatened heritage, interactive 3D visualisation of urban change, and crowd simulations for safer events.

ARTEMIS redefines how we conserve, restore, and celebrate cultural heritage. With state-of-the-art Digital Twins and AR/VR technologies, the project bridges the gap between heritage and innovation, ensuring the treasures of yesterday inspire the generations of tomorrow.

Find out more

Artemis Twin EU | @artemis.twin.eu | Artemis Twin EU

@ARTEMIS_Twin_EU | ARTEMIS EU | @ARTEMIS_Twin_EU

Funded by the European Union

ARTEMIS is a project funded by the European Union under Grant Agreement n.101188009.

ARTEMIS

Applying Reactive Twins to Enhance Monument Information Systems

Reactive by design. Real-time by nature. Digital twins for cultural heritage.

The Project

Duration: 3 years (2025–2027)

Funding: European Commission
Horizon Europe Programme

Coordinator: CNR-INO
(Istituto Nazionale di Ottica - CNR, Italy)

22 Partners including 3 Conservation Centres

12 Countries involved

ARTEMIS aims to develop a **fully-fledged Digital Twin** approach to support and improve research and practice in conservation, restoration, safeguard and valorisation of Cultural Heritage (CH).

The project enables researchers and conservators to conduct **virtual experiments** and **simulations**, testing various conservation methods and assessing their potential impacts, without risking any damage to the original heritage items, with the goal of more effectively **monitoring** the condition of heritage assets, **predicting** potential risks, and **responding proactively** to conservation challenges.

Objectives

Develop a digital infrastructure

to support the conservation and restoration of Cultural Heritage, utilising advanced digital tools and visualisation technologies.

Implement the Reactive Heritage Digital Twin

RHDTs are advanced data structures containing ordered knowledge about CH objects. RHDTs can react to inputs from the real world with preventive actions aimed at CH safeguarding.

Enhance European research infrastructures for CH

by integrating large-scale digital archives into an overarching heritage knowledge base on which RHDTs can be effectively operated.

The RHDT

A Heritage Digital Twin (HDT) is the digital counterpart of a cultural asset. A **Reactive HDT (RHDT) is dynamic and interactive**, capable of simulating, monitoring, and reacting to real-world events and conditions.

Key Features

- Predictive heritage conservation for example by analysing material degradation over time
- Simulating interventions for safe conservation and restoration testing, planning and evaluation of outcomes
- Providing insight for heritage valorisation and impact evaluation by CH policy makers

Key Components

Integrated Data Management
Access to an extensive archive of over four million scientific and technical reports related to cultural heritage.

Advanced Visualisation & Simulation
Development of RHDTs allowing:
- Virtual restoration experiments to test conservation strategies before physical interventions
- Predictive heritage conservation, for example by analysing material degradation over time

RHDT Technologies
- Simulating interventions for safe conservation
- Restoration testing, planning and evaluation of outcomes

RHDT Capabilities in Action

Fire & Disaster Response
- Real-time detection of fire
- Targeted automated suppression
- Live alerts sent to emergency services

Flood & Environmental Hazards
- Automated risk assessment based on weather and local data
- Immediate activation of protective measures
- No human intervention required

Climate Change & Rising Seas
- Dynamic management of coastal barriers (e.g. MOSE gates in Venice)
- Reaction based on forecast models and sensor data