

UALGTEC HERITAGE

CENTRE
OF EXCELLENCE

Vision

UAlgTec Heritage (UTH) is a pioneering initiative that will establish the first Centre of Excellence in **HeritageTech**, a new field of innovation where cutting-edge digital technologies meet archaeological and heritage science to unlock the social, economic and environmental potential of archaeological heritage.

The initiative is led by **ICArEHB**, a research centre at the **University of Algarve** that recently secured six European Research Council (ERC) grants, among the most competitive research funding in Europe. Together with **Kiel University** (CAU), **ERA Arqueologia S.A.** (Portugal's largest archaeology company) and **Zartis Ltd.** (a global leader in digital transformation), UTH will transform the way heritage is researched, managed and valued worldwide.

The European Commission recently awarded the initiative €15M under the Teaming for Excellence programme. A further €16.5M in co-financing from the Portuguese Government, CCDR-Algarve and Património Cultural IP brings the total investment to €31.5M over six years.

Structural Challenges

Europe's cultural heritage is rich, but the sector that studies and protects it faces structural challenges. UAlgTec Heritage is designed to address them.

- **Low technology adoption.** Advanced scientific methods are rarely translated into practical tools for heritage professionals and policymakers.
- **Fragmented data.** Heritage information is scattered across disconnected formats. It needs to be integrated into shared platforms that support collaboration and evidence-based decisions.
- **Weak integration into public policy.** Heritage intelligence is not yet systematically embedded in spatial planning or in regional and social development.
- **Limited risk-assessment capacity.** Gaps in risk assessment in territorial projects jeopardise both heritage and sustainable development. Archaeological assessments need to be faster, more reliable and more efficient.

Science that transforms

The Centre will operate across three strategic pillars to transform the heritage sector.

1. Scientific and Technological Excellence

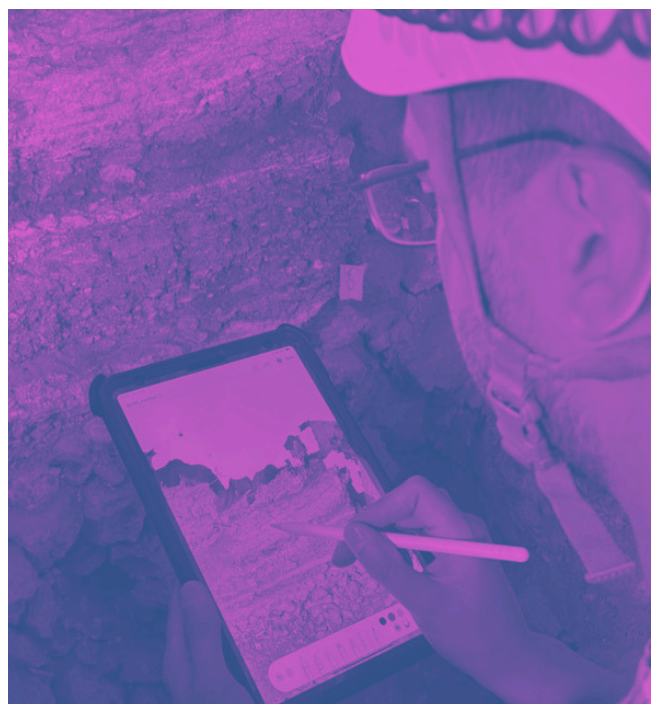
Building a world-class research and innovation ecosystem at the intersection of archaeological science and digital transformation. Developing open infrastructures and platforms, fostering interdisciplinary research and transferring knowledge to the market, placing Portugal at the forefront of heritage innovation.

2. Heritage for Territorial Development and Social Resilience

Integrating heritage into public policy and embedding heritage intelligence in spatial planning, climate adaptation and regional development. Co-developing strategies with public authorities that turn heritage into a driver of sustainable growth and territorial cohesion.

3. Global Leadership and Cooperation

Strengthening assessment capacity and international cooperation through advisory services, contributing to UNESCO and EU instruments, and establishing the Centre as a knowledge hub. Building a network of more than 50 partner entities that will amplify impact through replication and knowledge transfer.



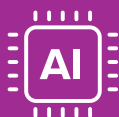
Innovation at the Crossroads of Heritage and Technology

Four research labs spanning a
broad spectrum of innovation



Biomolecular and Biogeochemical Sciences

Advanced techniques to reconstruct
past diets, mobility and
environments, developing affordable
solutions for everyday professional
use.



Artificial Intelligence and Computational Archaeology

AI-based frameworks for predictive
modelling, data synthesis and
decision-support systems.



Non-Invasive Methods and Remote Sensing

Integration of LiDAR, drones,
multispectral imaging and
geophysics for non-destructive
diagnostics, rapid assessments and
high-resolution documentation.



Digital and Immersive Heritage

Virtual and Augmented Reality
platforms, 3D reconstructions and
digital storytelling tools that connect
science and society, creating new
formats for education, tourism and
public policy.



Economic, Social and Territorial Impact

Concrete transformations across multiple dimensions:

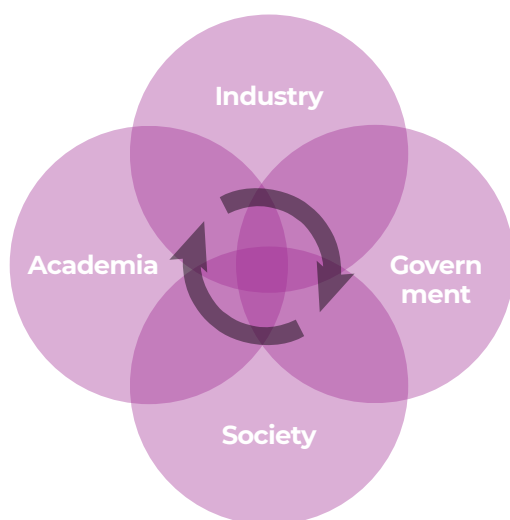
Professional upskilling of the sector. Advanced training and micro-credentials will raise qualification standards and build bridges between research, professional practice and public policy, addressing a critical gap in the European workforce.

Revolutionary operational efficiency. Digital tools will significantly reduce the cost and duration of archaeological assessments, benefiting public and private developers in territorial intervention projects.

Boosting cultural tourism. Immersive experiences will attract new audiences and diversify the offer beyond the traditional season, supporting local economies in low-density regions.

Social and territorial cohesion. Heritage becomes a driver of inclusion through scientific literacy, the recognition of local identities and the creation of opportunities in peripheral regions.

Expansion into high-value markets. HeritageTech solutions have direct applications in geotechnology, spatial planning, climate-risk management and renewable energy.



*From lab to territory:
the dynamics of the Quadruple Helix model*



10-Year Targets

- +15** HeritageTech solutions
- +50** entities involved
- +1,000** professionals trained
- +150** new jobs
- +6** spin-offs/ins
- +40** PhDs in the non-academic sector
- +20** international contracts
- +€50M** competitive funding

A Collaborative and Inclusive Model

Circular innovation ensures impact from the very first year. Through systematic collaboration between academia, industry, government and civil society, every solution is co-created, tested and refined with end users in real-world settings.

Stable and flexible governance. To ensure long-term viability, the Centre will be established as a non-profit scientific association created jointly by the four founding partners. This legal model grants full operational, financial and decision-making autonomy.

A growing ecosystem. The structure allows new institutional members to join over time: municipalities, NGOs, museums, archaeological parks and technology companies. This capacity to expand ensures rapid adaptation to new challenges and opportunities.

European alignment. The governance model follows European R&I principles and fosters a collaborative ecosystem that strengthens impact and sustainability with each new member.

Pilot Missions

Four pilot missions translate scientific innovation into concrete solutions for the main challenges facing archaeological heritage in Portugal. Each mission is developed together with end users (public authorities, companies and communities), ensuring real-world applicability and measurable impact from the first year.

1 Aligning heritage risk assessment with the pace of territorial development

The assessment of archaeological heritage remains fragmented and inefficient. Professionals work with disconnected data sources and unstructured reports, and authorities lack decision-support tools, which results in reactive rather than proactive management.

Objective: to develop AI-based tools that transform heritage documentation workflows, enable predictive risk triage and create interoperable data infrastructures.

Examples: automatic classification and entity extraction from archaeological reports to create searchable datasets; predictive probability models for undiscovered heritage; decision-support dashboards for authorities; end-to-end digital pipelines, from field recording to regulatory submission.

3 Improving heritage detection rates through non-invasive methods

Geophysical and remote-sensing methods are applied inconsistently in preventive archaeology. Heterogeneous equipment produces incompatible formats, interpretation protocols vary, and limited access to specialists creates bottlenecks that constrain scalability.

Objective: to establish standardised protocols and integrated processing workflows for non-invasive survey, enabling rapid and reproducible assessment at scale.

Examples: standardised multi-method protocols for geophysics and remote sensing; semi-automated pipelines for processing and feature detection; interpretive frameworks that combine multiple sources into confidence-weighted readings.

2 Connecting archaeological tourism with the priorities of the communities living near heritage sites

Tourism demand in Portugal is concentrated in time and space, which leaves many heritage assets underused. Visitor experiences often lack integrated digital interpretation, and the communities near the sites remain weakly connected to tourism value chains.

Objective: to co-develop immersive heritage experiences and community-based tourism models that diversify demand, extend the visiting season and secure local benefits through replicable approaches.

Examples: on-site immersive experiences (modular VR and AR for indoor and outdoor use); digital tools for visitors (wayfinding, multilingual interpretation, itineraries, accessibility); digital twins for virtual access and conservation monitoring.

4 Integrating environmental evidence from the past into climate-adaptation planning

Archaeological deposits hold environmental records spanning millennia, yet these records remain underused in planning because the analytical processes are too slow and too costly for the pace of public decision-making.

Objective: to develop cost-efficient protocols and tools that extract policy-relevant environmental intelligence and underpin evidence-based spatial planning.

Examples: simplified protocols for lipid biomarkers and stable isotopes (fire, vegetation and climate history); sedimentological reconstruction of floods and erosion; multi-proxy integration into interpretable environmental narratives; translation into risk zones and recommendations for territorial management.

A Beacon for Europe and the World

UAlgTec Heritage is designed as a **beacon and a replicable model** for other regions and global contexts. All resources developed by the Centre will be shared through Europe's main research infrastructures: the European Collaborative Cloud for Cultural Heritage (ECCCH), E-RIHS and Europeana. The Centre will contribute real use cases, open datasets and technical feedback, strengthening European capacity in cultural-heritage data and infrastructures.

The solutions serve multiple European agendas at once. They range from climate-risk platforms aligned with the European Green Deal to immersive experiences that promote the values of the New European Bauhaus, and they also contribute to the Smart Specialisation Strategies (RIS3) and the Digital Europe Programme. This integrated approach shows how archaeological heritage can actively shape sustainable and inclusive futures.

Through the founding partners' international networks, UAlgTec Heritage is connected to more than 20 countries and positions itself as a catalyst for worldwide transformation. Technically robust and economically viable, its solutions will be adaptable both to countries with advanced infrastructures and to resource-limited contexts, **democratising access to heritage innovation.**

This is a unique generational opportunity to place Portugal and **Europe at the forefront of heritage science and public-interest AI**, generating concrete and measurable benefits for communities, economies and ecosystems. The model validated in the Portuguese context will create a multiplier effect on a global scale while consolidating European sovereignty: better-governed cultural data, more trustworthy models, and a lasting capacity to innovate with autonomy, impact and values.

Project Details

Coordination: ICArEHB - University of Algarve, Portugal
Partners: Kiel University (Germany), ERA Arqueologia S.A. (Portugal), Zartis Ltd. (Ireland)
Duration: 72 months
Total Investment: €31.5 million
Funding: European Commission, Government of the Portuguese Republic, CCDR-Algarve, Património Cultural IP

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Partners



ICArEHB



UAlg

UNIVERSIDADE DO ALGARVE



Kiel University

Christian-Albrechts-Universität zu Kiel

ERA,
ARQUEOLOGIA

CONSERVAÇÃO
GESTÃO DE PATRIMÓNIO

zartis

Funders



Funded by
the European Union

CCDR
ALGARVE
Comissão de Coordenação e
Desenvolvimento Regional do Algarve I.R.



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