

Establishing Blue Culture Technology Excellence Hubs as regional innovation ecosystems for the sustainable protection and preservation of Underwater Cultural Heritage

Angelos Manglis¹, Anastasia Fourkiotou¹, Elena Tilegrafou¹, Polyvios Raxis¹

¹Atlantis Consulting, Steliou Kazantzidi 47 Str., 57001 Thermi, Thessaloniki, Greece



Context and Need

Over the last decade, **digital innovation** has reshaped the way Underwater Cultural Heritage (UCH) is documented, accessed and managed. Digital technologies such as **VR/AR, 3D and 4D representations, digital platforms and immersive applications** have created new opportunities for the documentation, protection and promotion of UCH. However, the long-term impact of these technologies depends on their **integration into wider, sustainability-oriented strategies**. There is a clear need for regional innovation ecosystems that bring together **research, industry, cultural heritage actors, public authorities and blue economy stakeholders**, connecting technological capacity with real heritage management needs.

Blue Culture Technology (BCT) Excellence Hubs

The **Blue Culture Technology (BCT) Excellence Hubs** are regional innovation ecosystems developed within the **BCThubs project** to support the **sustainable protection, preservation, accessibility and promotion of UCH**. Three hubs are being established in **Greece, Malta and Bulgaria**, bringing together stakeholders from research and academia, industry, public authorities, cultural heritage institutions and civil society. The hubs support **collaboration, knowledge exchange, capacity building** and the **uptake of innovative Blue Culture Technologies**. Within these ecosystems, stakeholders can connect, exchange expertise and integrate R&I solutions as practical services for underwater research, monitoring, accessibility, safeguarding and diver safety.



R&I Services & Products

BCThubs develops a portfolio of **Research and Innovation (R&I) solutions** addressing **key needs in protection, accessibility and valorisation of UCH**, including:

- ✓ Augmented Reality Diving App - DIVY
- ✓ Physiological Monitoring System for Diver Safety
- ✓ Marine High Resolution Electro Resistivity Methods
- ✓ Virtual Diving App
- ✓ 4D Image Analysis Tool for Safeguarding Underwater Assets
- ✓ Shallow Water Sediment Extraction Device
- ✓ 3D Reconstruction Tool for UCH sites

These solutions support underwater mapping, sampling, monitoring, 3D reconstruction, immersive access and safer diving operations.



Strategic Pillars

The approach is built upon **key strategic pillars**:

- A ICT-enabled underwater research**
Digital tools support research activities, documentation workflows and data-driven analysis of underwater cultural sites.
- B Physical and remote access to UCH**
VR/AR, 3D/4D representations and immersive applications enable alternative forms of access to submerged heritage.
- C Monitoring and safeguarding**
Technological solutions support the observation, protection and long-term preservation of underwater cultural assets.
- D Safe underwater operations**
Tools and services contribute to diver safety and more controlled underwater field activities.

Matching needs with solutions

The **BCThubs BCT Marketplace** is a free online platform to support the **visibility, promotion and exploitation** of the R&I solutions. It acts as a digital access point where technologies, services and innovation outputs can be **presented, discovered and connected with potential users and adopters**, including heritage managers, public authorities, tourism professionals, researchers, SMEs and blue economy actors.

Sustainability and Growth

The **long-term vision** of this approach is to **expand beyond** the three regional hubs and create a **wider network of Blue Culture Technology ecosystems**. Under the umbrella of an **EU BCT Cluster**, future hubs in EU Widening countries and beyond can support cross-border collaboration, knowledge transfer, investment readiness and the wider uptake of Blue Culture Technologies for the **sustainable valorisation of UCH**.



Project Partners



BCT hubs **Funded by the European Union** www.bcthubs.eu

This project receives funding from the **Horizon Europe Programme** of the European Union under **grant agreement No 101087146**. Call: WIDERA-2022-ACCESS-04-01 — "Excellence Hubs".