



Cultural and historical
heritage protection:
ICT and AR
applications

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«**Man and his Creations, a Perpetual Metamorphosis**»
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ICCS

Institute of Communication and Computer Systems (ICCS) of the National University of Athens (NTUA)

Research & International Profile

Important research results with numerous awards and prizes of excellence, having participated in more than 4000 EU projects.

4000+ Projects

Research Funding

Ranked among the top 20 European Organisations in terms of research funding and within the top 3 positions in Greece.

Top 20 EU Research institutions

Personel & Infrastructure

More than 800 researchers, scientists and Faculty Members. 41 Labs in the fields of Electrical Engineering. 6 Research Groups/Units

800+ Researchers

Innovation & Partnership

ICCS actively supports the creation of startups, spin offs and clusters

6 Spinoffs & clusters

- ❖ 20+ years of Research in ICCS
- ❖ More than 90 ongoing research projects
- ❖ More than 150 highly qualified researchers
- ❖ 10 research teams



Cooperative Connected Automated Mobility

Intelligent Network Systems

Multimodal Logistics & Maritime Operations

Circular Economy & Tracing

Industry 5.0 & Smart Manufacturing

Smart Mobility Applied Systems

Extended Reality (AR/VR/XR)

Health Technologies

Earth Observation & Environmental Monitoring

Crisis Management & Secure Societies



Technology in the Service of Cultural Heritage Preservation

- AR/VR
- Three-dimensional digital technologies (3D modelling, 3D Scanning, 3D Visualization)
 - IoT
 - Sensors
 - Gamification
- Digital restoration
 - Social networks
 - Web technologies
- Information systems/ Big Data



Augmented Reality technologies and applications

FOCUS AREA

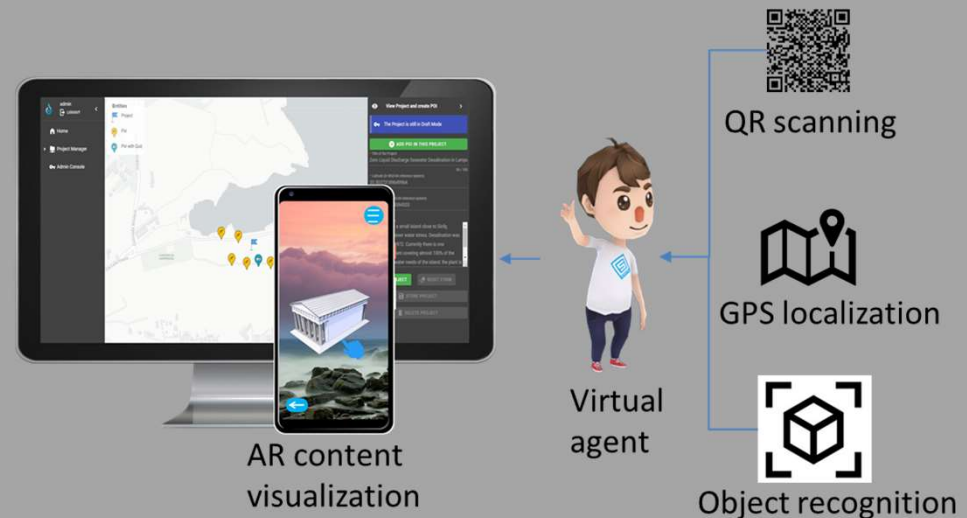


Immersing the audience

- AR for community engagement/Crowdsourcing tools
- AR for visualization

Augmented Reality for Digital Heritage

- Interacting with surroundings enriched with virtual elements
- Engaging attention
- Recreating conditions that are not easy to do in a non-virtual world or environments that don't exist anymore
- Experiencing concepts in novel ways
- Promoting enjoyment, engagement and even learning
- Acquiring knowledge and skills in an environment rich in sensations, perceptions and emotions



EU R&D Projects

TAPPING THE POTENTIAL OF CULTURAL HERITAGE

RESEARCH AND INNOVATION TO SUPPORT THE ACCESS TO OUR COMMON HERITAGE THROUGH TECHNOLOGIES, HIGH QUALITY DIGITIZATION AND CURATION OF DIGITAL HERITAGE ASSETS AND BY DEVELOPING SOLUTIONS FOR SUSTAINABLE AND INCLUSIVE CULTURAL TOURISM IN EUROPE

CULTURAL HERITAGE

AUGMENTED REALITY
FOR DIGITAL HERITAGE



Applications of Situated Simulations
(AR, VR, 3D modeling)
Developed three AR and VR "tours" and 3D models for selected monuments and demo sites.



Coordination

Technologies and methods for improved resilience and sustainable preservation of underwater and coastal cultural heritage to cope with climate change, natural hazards and environmental pollution (underwater and offshore sensors, AUV, 3D modelling, crowdsourcing, LL)



<https://op.europa.eu/en/publication-detail/-/publication/9e16c9a5-5cdf-11ee-9220-01aa75ed71a1/language-en>





Greece 2.0
NATIONAL RECOVERY AND RESILIENCE PLAN

GREEK CULTURAL HERITAGE MEDIATED BY TECHNOLOGY: TRANSFORMING CULTURAL EXPERIENCES

- The APSIM project aims to promote the Greek culture using innovative technologies, assisting both the general public and the new generations to get familiar and love the archaeological wealth of Greece.
- Using an **Augmented Reality (AR) and Virtual Reality (VR) applications**, visitors of archaeological sites and museums will have the opportunity to enjoy a completely different tour-experience in the archaeological sites, resembling one of a video gaming! In particular, the visitors, using their smartphone, are able to admire the exhibits they select in their original form, being able to move and rotate their device, enjoying an interactive visiting experience.



Epigraphic Museum



Archaeological Site of Delos



Excavation of Dion Pieria



APSIM: Three Use Cases

Two emblematic archaeological sites and a museum:

Delos island

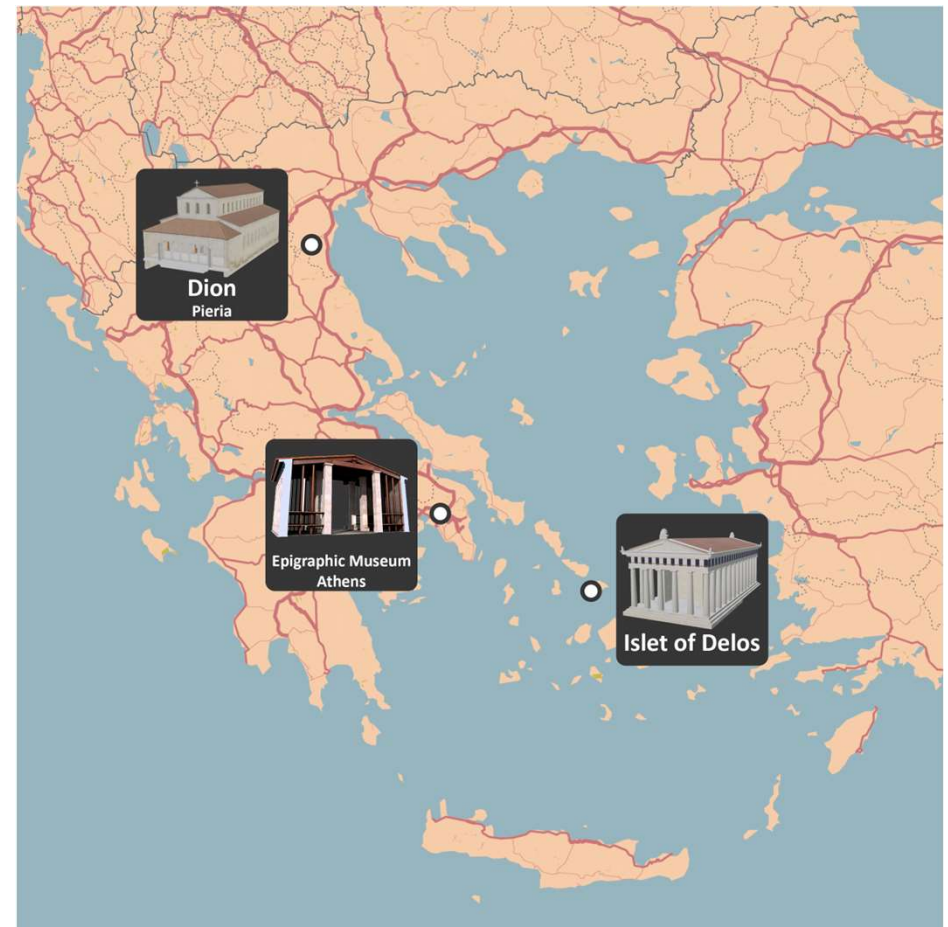
- Athenian Temple of Apollo
- Propylaea
- House of Naxians

Dion, Pieria

- Episcopal Basilica

Epigraphic Museum, Athens

- Arsenal of Philo



Augmented Reality Application The CircularAR approach

- 🏛️ Easily accessible from personal smartphone devices;
- 🏛️ Sensors utilization;
- 🏛️ AR camera functions;
- 🏛️ UI friendly and adaptable;
- 🏛️ Gamification;
- 🏛️ Educative mechanisms;



Virtual Reality Experience for Cultural Heritage

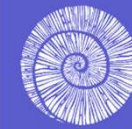


Follow APSIM's Progress



The dual challenge of climate change and protection of cultural heritage

THETIDA



THETIDA
PRESERVING UNDERWATER
AND COASTAL HERITAGE



Funded by
the European Union

- **Coastal threats:** Erosion, heat, drought, earthquake, anthropogenic influence, flooding, soil subsidence, seepage, salinization of soil.

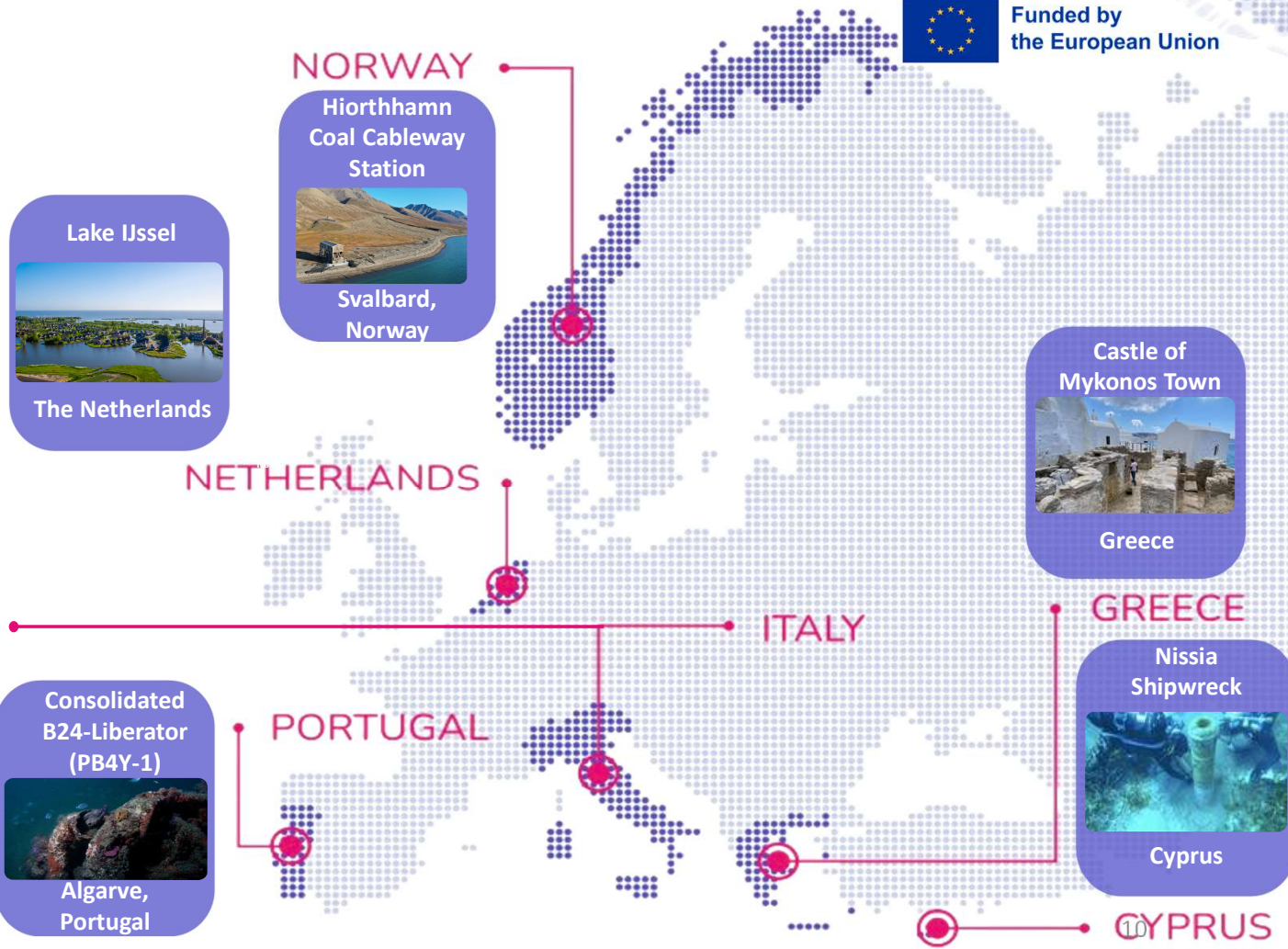


17 partners

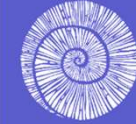


7 pilot sites

- **Underwater threats:** Temperature, water pollution and acidification, human-induced activities, fouling, over blooming, earthquake, currents



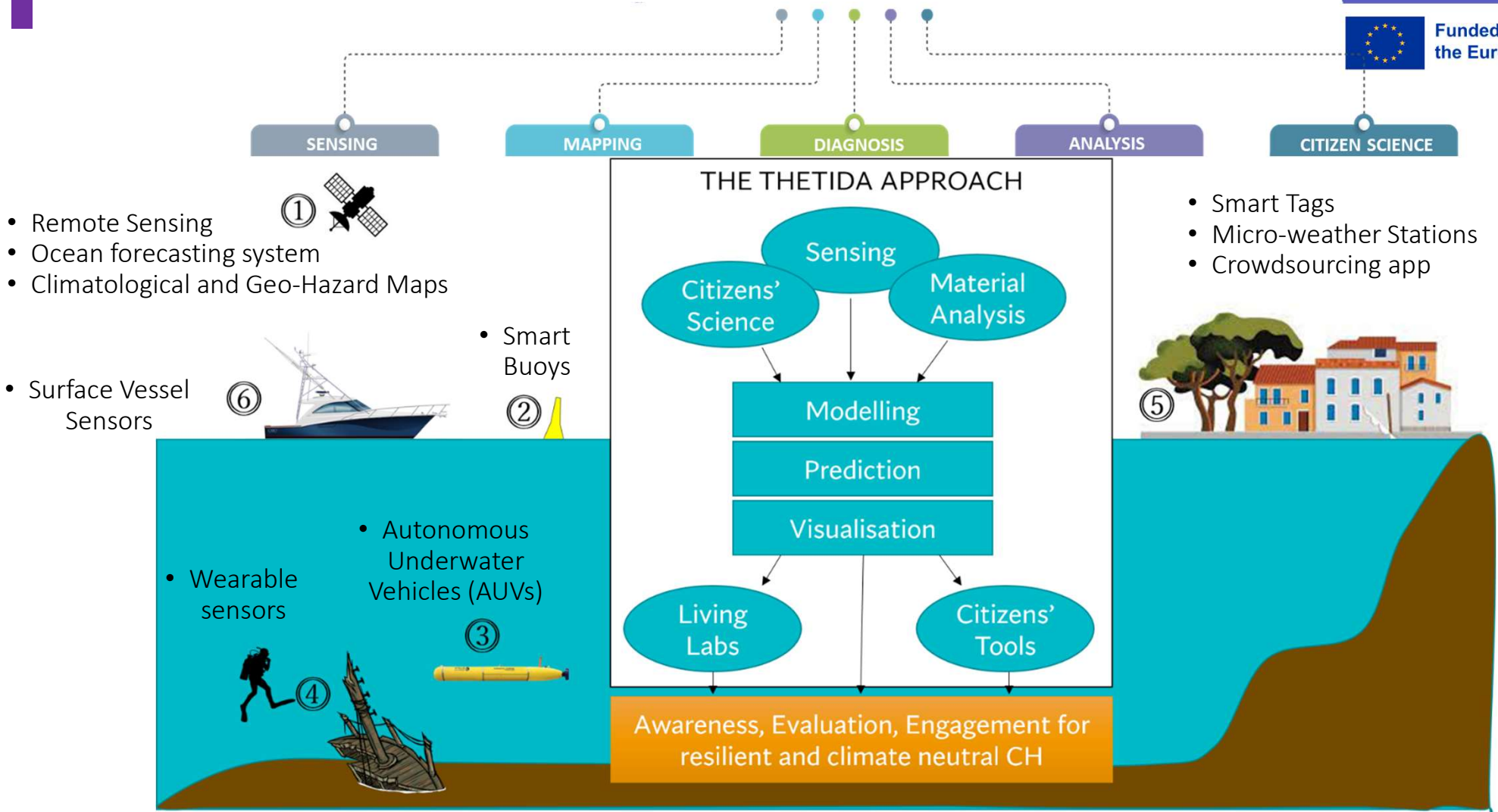
THETIDA Concept



THETIDA
PRESERVING UNDERWATER
AND COASTAL HERITAGE



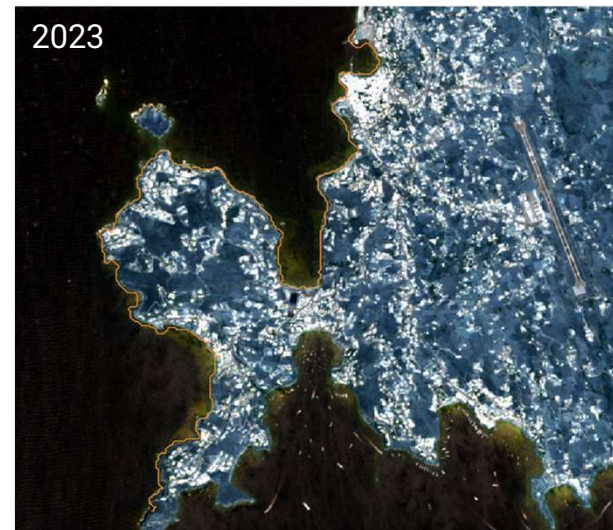
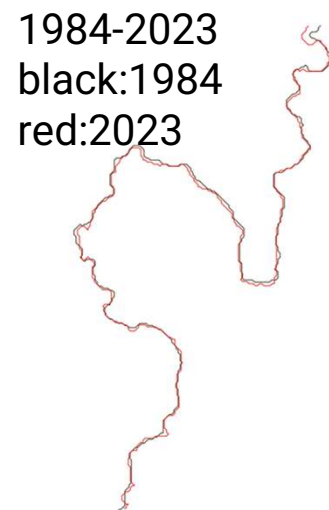
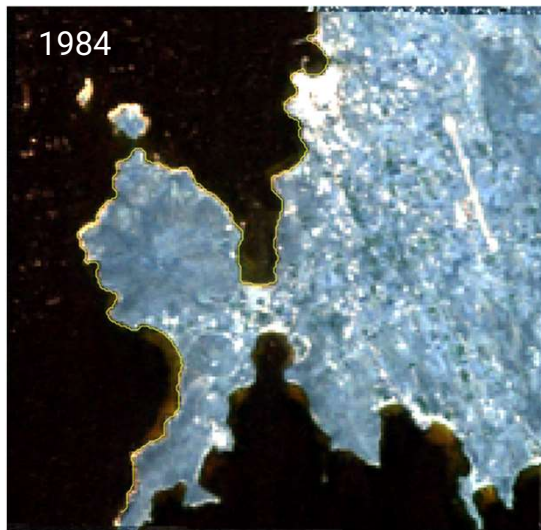
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THETIDA technologies

Long-term mapping of coastline changes and coastal erosion using satellite data

2nd step: Coastline extraction for every year.



Next steps: Validation, Refinement, Coastline trends

THETIDA technologies

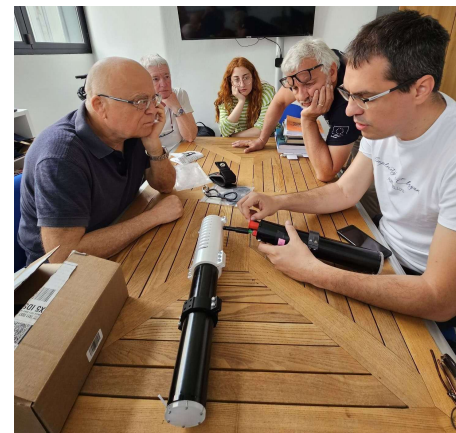
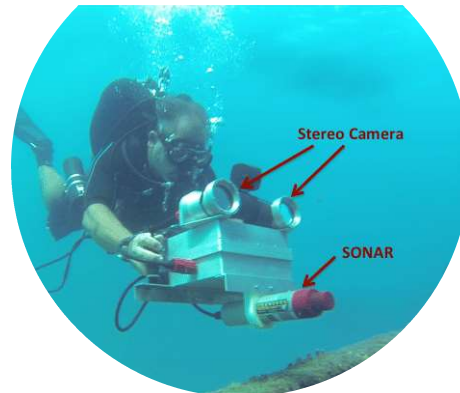
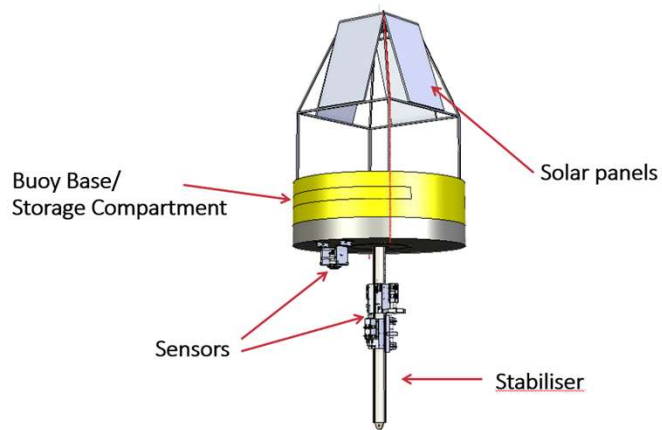


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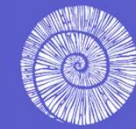


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In-situ sensing (smart buoy, wearables, boat sensors, smart tags, micro-climate stations)



THETIDA technologies

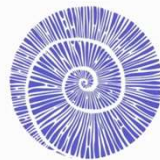
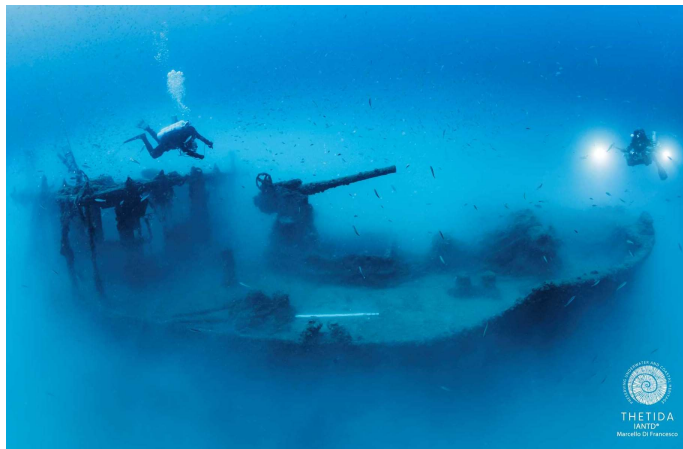


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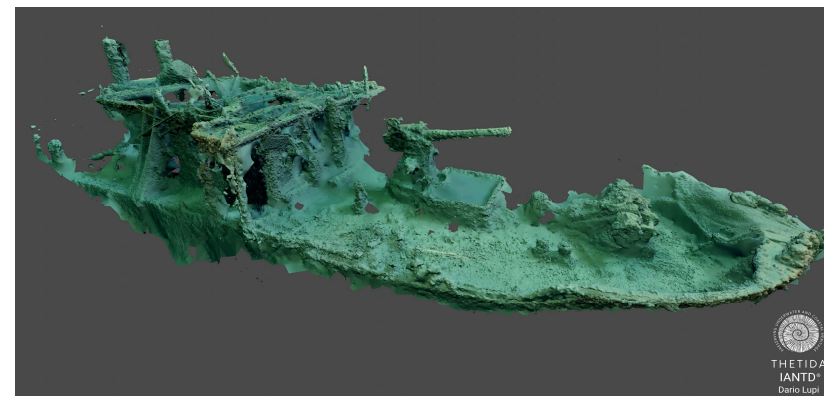
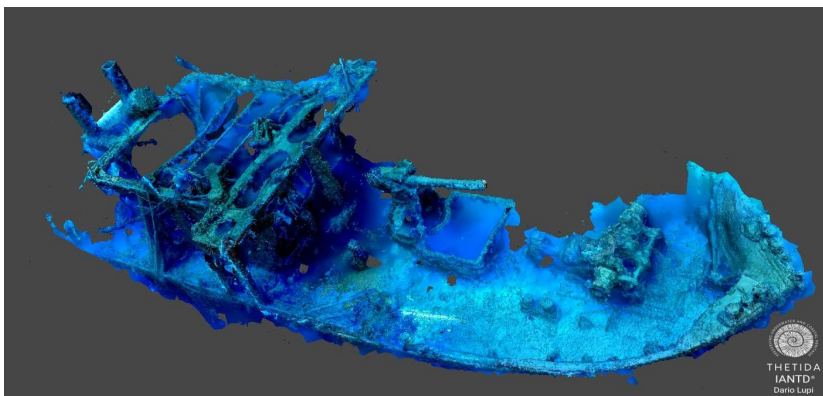
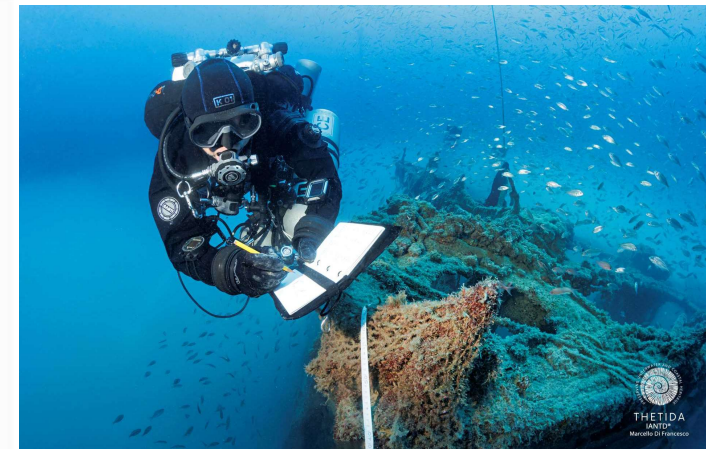


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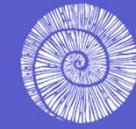
Diving activities for underwater data collection



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THETIDA technologies

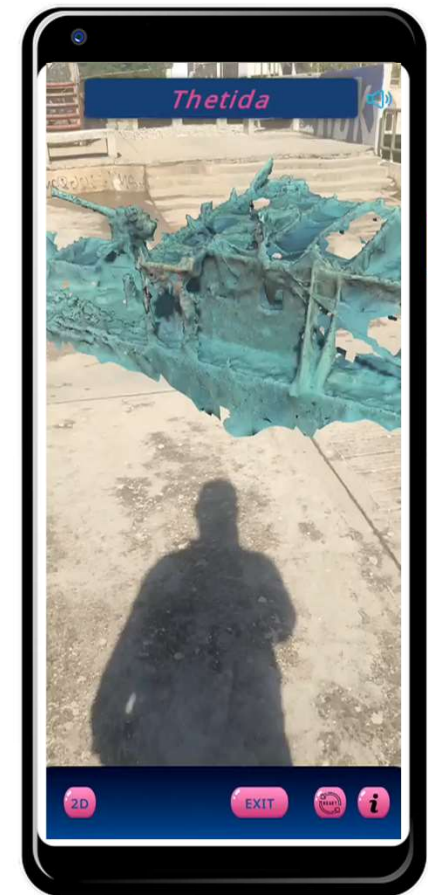


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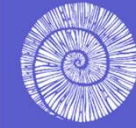


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Crowdsourcing mobile application



THETIDA technologies

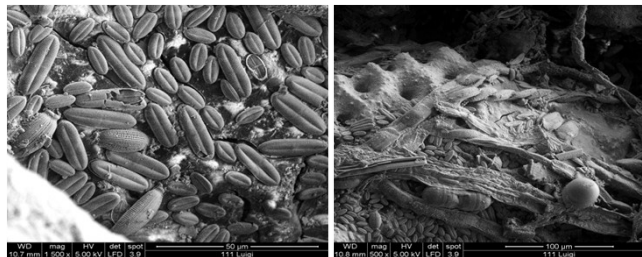
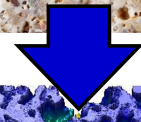
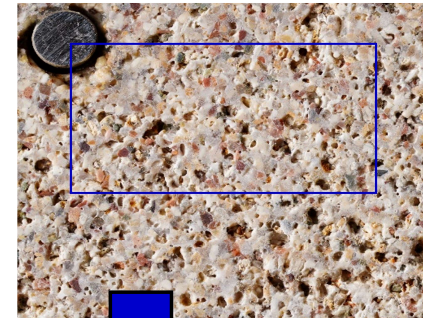


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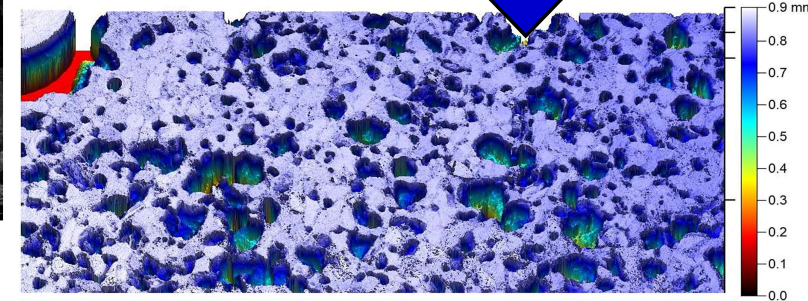


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Analysis of heritage materials, wetting, deterioration, seawater acidification



Microscopic observations of biofouling



x: 20 mm

3D models for studying surface changes



Sampling of Nissia shipwreck (Cyprus)

EU Green Cluster on Cultural Heritage

With a mission to bring together actors from practice, research, and policy to promote the development and adoption of advanced solutions and facilitate researchers to share insights and best practices, identify synergies for dissemination and communication actions, and propose integrated feedback recommendations to policy makers in the EC and beyond

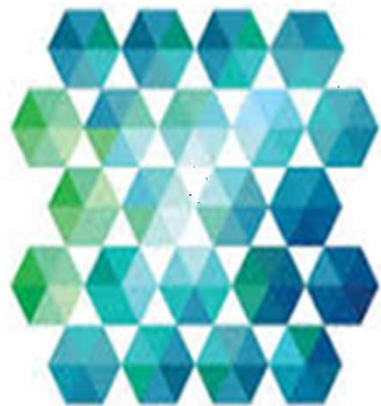
The Green Cluster is promoted by the Horizon Europe Research and Innovation Actions active EU projects THETIDA, RescueME, TRIQUERTA, STECCI



THETIDA



TRIQUETRA



...heritage is not a thing of the past, but more
of a foundation for actively responding to
unforeseen challenges of the future

 Thank you!

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Computer Systems (ICCS) and
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