

# Knowledge transfer through the ATHENA Twinning project: Remote sensing for cultural heritage

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## abstract

The project aims to establish a “Remote Sensing Science Center for Cultural Heritage” in Cyprus. The Center foresees to support the current Cultural Heritage (CH) needs through the systematic exploitation of Earth Observation technologies. For the establishment of the center, the existing Remote Sensing and Geo-Environment Research Laboratory of the Eratosthenes Research Center (ERC) based at the Cyprus University of Technology (CUT), is twinned with internationally-leading counterparts from the EU, the National Research Council of Italy and the German Aerospace Centre (DLR). Through this network, the ATHENA twinning project strengthens the remote sensing capacity in cultural heritage at CUT’s ERC.

The ATHENA project aim is knowledge transfer, achieved primarily through intense training activities (including virtual training courses, workshops and summer schools) with an ultimate scope to enhance the scientific profile of the research staff and to accelerate the development of research capabilities of the ERC as well as to promote Earth Observation knowledge and best practices intended for Cultural Heritage.

The scientific strengthening and networking achieved in Cyprus through the ATHENA project, could be of great benefit for the entire Eastern Mediterranean Region bearing a plethora of archaeological sites and monuments urgently calling for monitoring and safeguarding.

## Twinning is more efficient!

“ATHENA” seeks to improve and expand the capabilities of collaboration between low performing and leading institutions, involving professionals dealing with remote sensing technologies for supporting CH sector.

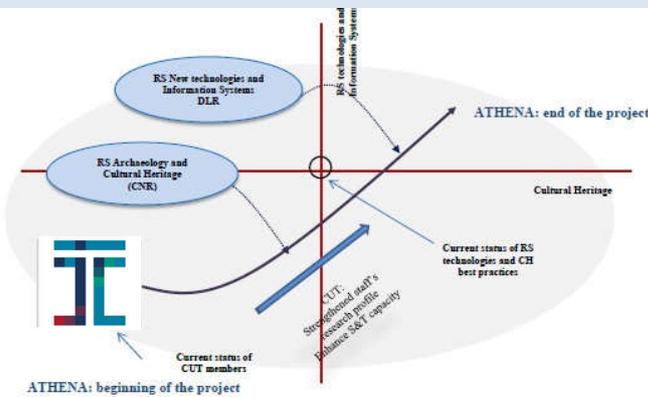


Figure 1: Internationally-leading research institutions supporting CUT Lab in different aspects related with Remote Sensing Archaeology

## EU policies and (S<sup>3</sup>Cy)<sup>3</sup>

The “ATHENA” project is built around EU policies and international conventions related to Cultural Heritage protection, management and best practice (e.g. Europa Nostra policy documents; COM (2014) 477; UNESCO and EU conventions and multilateral treaties related to the protection of tangible Cultural Heritage). ATHENA is further in line with the Smart Specialisation Strategy for Cyprus – (S<sup>3</sup>Cy)<sup>3</sup> Protection, Utilization and Promotion of Cultural Heritage is one of the primary goals for Cyprus. During the phase of analysis and the results the Study Group of S<sup>3</sup>Cy proposes that in the S<sup>3</sup>Cy special emphasis should be given to CH where particular perspectives emerged and / or serious problems and risks. In addition S<sup>3</sup>Cy suggest the exploitation of high-level researchers and young innovative entrepreneurs, as well to ensure continuous training and development of human resources, particularly in regards to use of new technologies.

The Center will be developed and organized in both Horizontal (H) and Vertical (V) Key Research Domains (KRD) based on the existing center’s operating scientists and personnel. The domains are fully compatible with the Smart Specialisation Strategy for Cyprus – (S<sup>3</sup>Cy) in order to increase the efficiency of European investment in research, innovation and entrepreneurship. Moreover, these domains are compatible with the Smart Specialisation Strategies of Mediterranean coastal regions and countries (Creative Med RIS3 Strategies).

In addition, the Center goals are interconnected with the three priorities established by the EU in the framework of

the Europe 2020 Strategy, for EU’s vision for a social market economy which aims at:

- √ smart development, through education, research and innovation,
- √ sustainable development based on the protection of CH
- √ inclusive development, with a strong emphasis on new job creation, pursued through the enhancement of economic, social and territorial cohesion.

## Motivation

In periods of economic instability, national considerations are overruling the process of European integration. Cultural Heritage (CH) is an integral element of a European set of values and respect for heritage is vital for developing a common European identity. CH sector has always been facing a number of challenges that have increased with the financial crisis that has hit Europe. To name a few, these challenges include the decrease of public budgets, urbanisation, globalisation and technological changes. Within this context, CH professionals are seeking to improve currently used methodologies, in order to better understand, protect and valorize the common European past and common identity.



Figure 2: Example of the use of RS technologies for monitoring the status of CH sites in conflict regions. A comparison of imagery revealed that the site of Palmyra had been substantially altered from its preconflict state. New roads, flanked by earthen berms, were cut through the center of the Northern area of the Palmyra Archaeological Park, and groups of military vehicles were visible occupying fortified positions at that location, as well as at a parking area built atop the ancient city wall, which was destroyed by this construction (from: AAAS Geospatial Technologies Project).

## Scientific Novelty

The use of satellite and other remote sensing technologies has progressively been established in the field of environmental monitoring. In the domain of CH and landscape, and in particular with regards to archaeological sites, these technologies have made a significant contribution to research and analysis over the past few decades. The potential use of Remote Sensing (RS) technologies for the understanding, documenting, monitoring and valorization of CH has long been recognised not only by RS experts and archaeologists, but also by the public authorities involved in heritage management, that suggested an increasing use of **non-invasive** technologies (Valletta Convention, 1992). These benefits are also of importance for policies regarding policies and management vast portions of territory, such as European Landscape Convention (Florence, 2000). Remote sensing benefits are also emphasized in regions where conflicts or wars are taken place (i.e. Middle East and Northern Africa), since it can be used for detection of looting and destruction of World Heritage Sites (WHS). Further to the satellite imaging, “Remote Sensing” within ATHENA purposes considers various non-destructive distant techniques including aerial imaging using planes and Unmanned Aerial Vehicles (UAVs), ground-based reflectance spectroscopy and geophysical surveys. While the use of some of these techniques is well established in archaeology, new technological achievements have been made recently that are not yet fully applied to CH investigations, such as the use of hyperspectral and radar satellite data with high spatial resolution, or motorised geophysical measurements with multiple instruments. Most of all, these techniques have often been used separately; therefore, the benefits of combining them to gain new archaeological insights have seldom been realized.

### Info



www.athena2020.eu



### Consortium

CYPRUS



Cyprus University of Technology

ITALY



National Research Council

GERMANY



German Aerospace Centre

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