11th FORTH Retreat, 2017

Session 5

Science and Technology in the Service of Culture and Society

Cross-disciplinary Interactions Produce Enabling Tools in the Service of Heritage Science

Heraklion

14 October 2017

Cultural Heritage Science and Technology

Motivation

CH preservation, protection and promotion is an issue of worldwide importance,

… with key economic impact particularly in Greece, where CH can be a national "heavy industry".

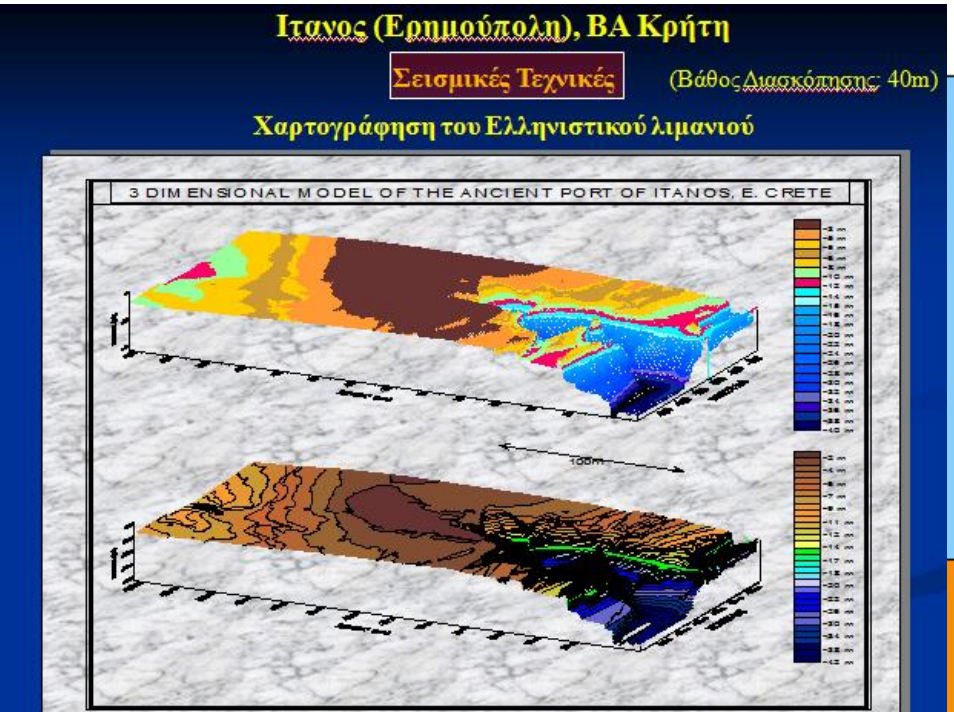
Also, a fertile ground for cultivating highly inter-disciplinary, competitive research and for creating opportunities for innovation, technology and education.

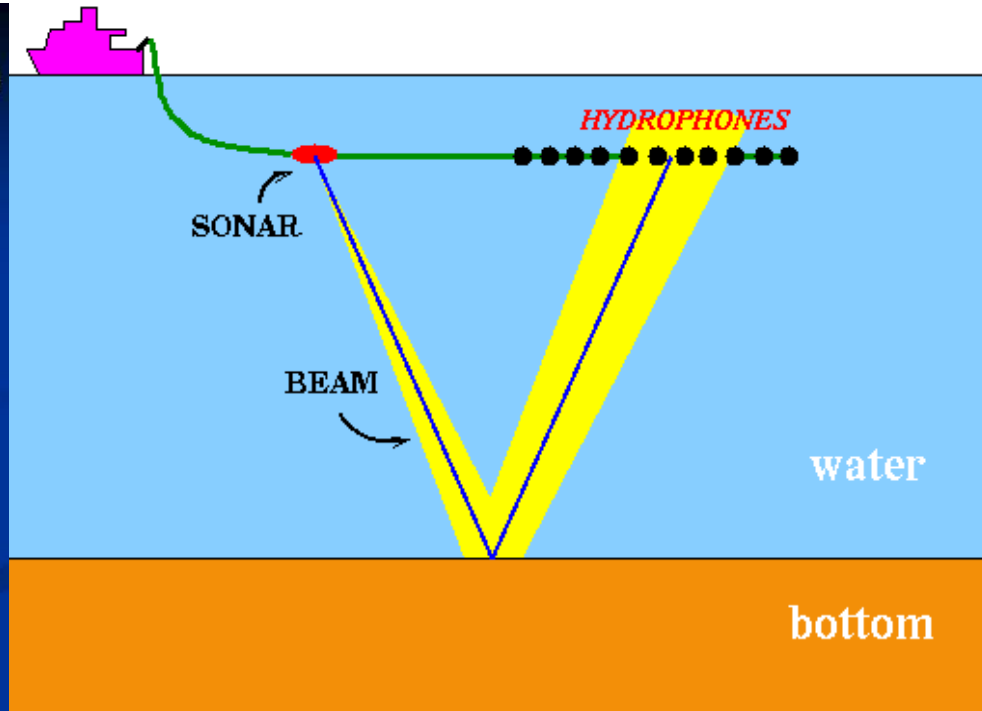
FORTH researchers maintain a strong international presence in many aspects of CH S&T.

Cultural Heritage Science and Technology

Major Research Activities across FORTH

Integrated mapping of the archaeological landscape, on the ground, underground, along the coastlines and sub-aquatically via the development of innovative methodologies based on geophysical surveys, satellite imaging, advanced acoustic sensing methods.



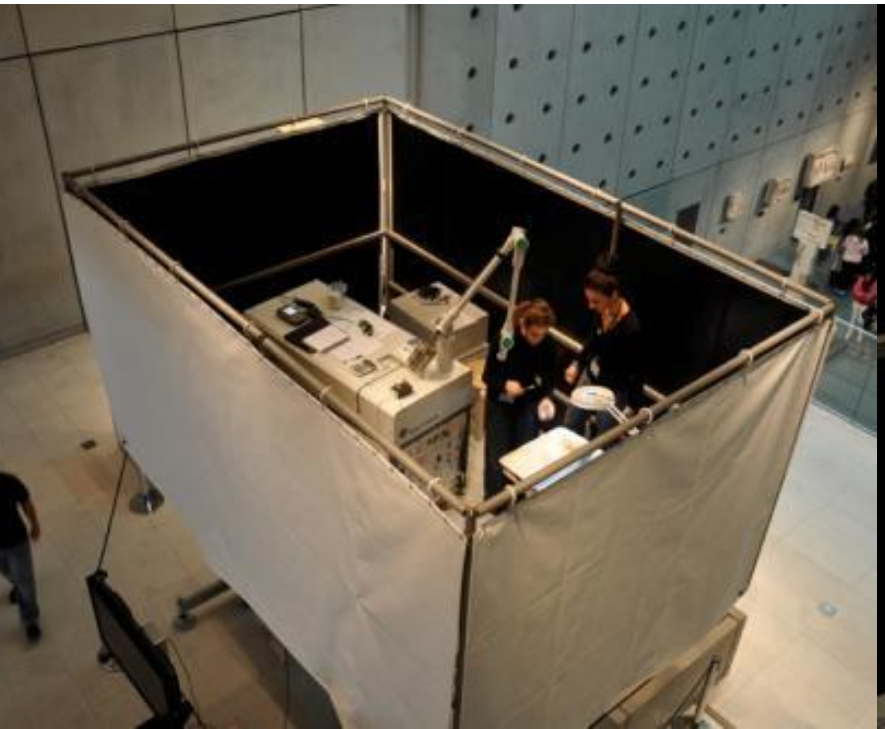


Cultural Heritage Science and Technology

Major Research Activities across FORTH

Versatile and mobile photonic tools for analysis, diagnostics and conservation at museums, field campaigns and excavation sites.

Smart lab tests for assessing mechanisms underlying monument damage. Optimizing materials selection for conservation.

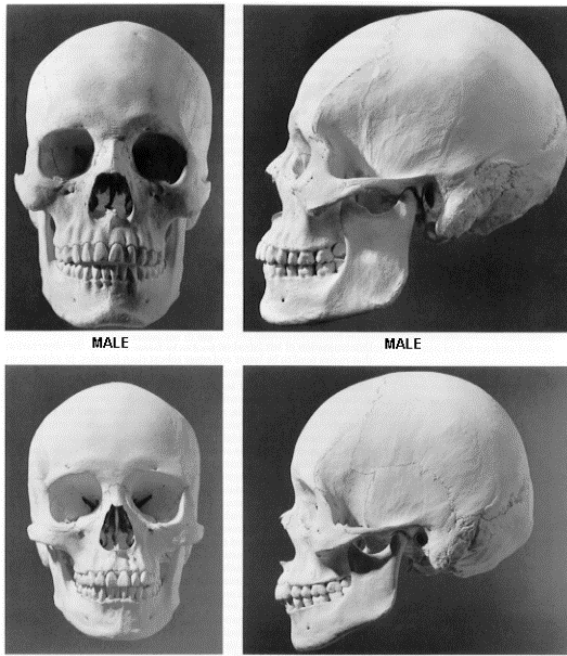


Cultural Heritage Science and Technology

Major Research Activities across FORTH

Establishing advanced genomics methods and protocols for the detailed characterization of ancient DNA from human, animal and plant remains.

Palaeoanthropology research involves several research disciplines and requires the use of heterogeneous technologies



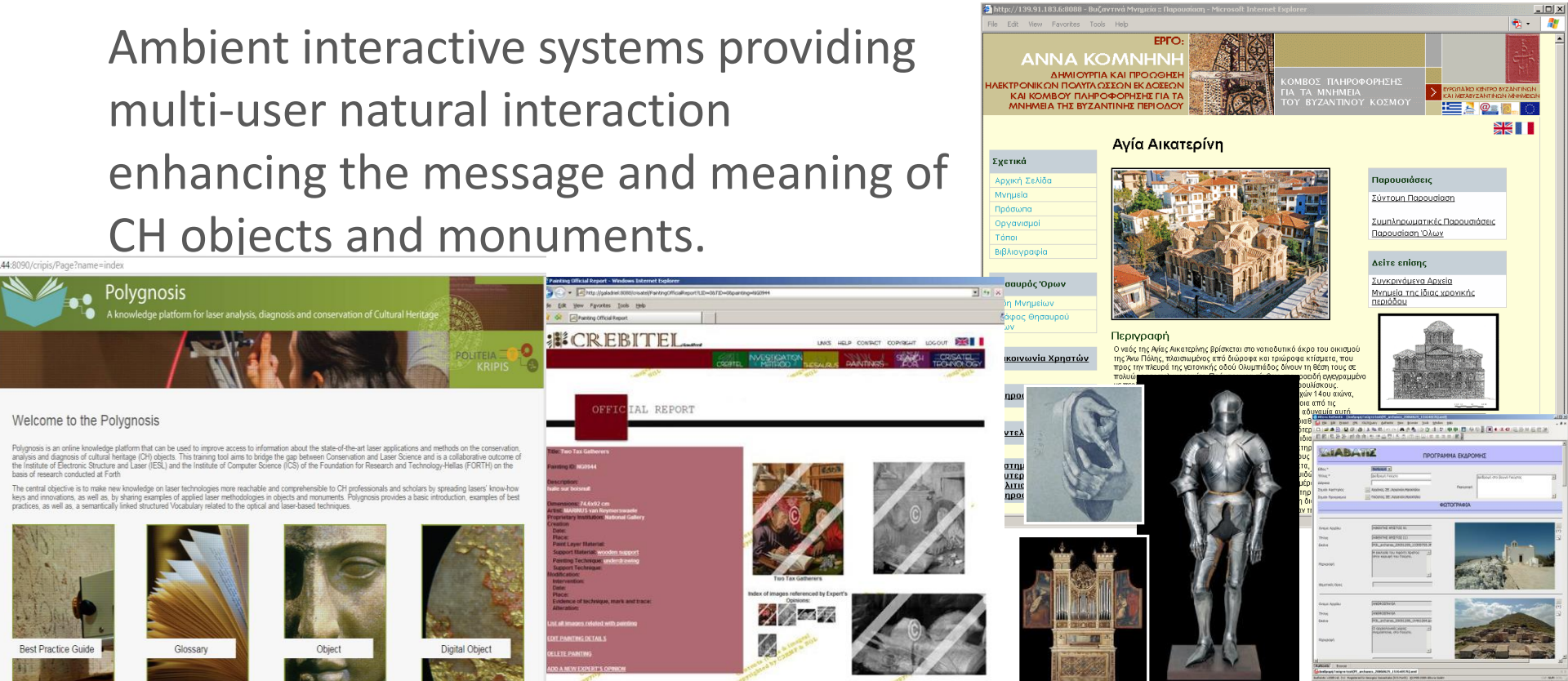
Cultural Heritage Science and Technology

Major Research Activities across FORTH

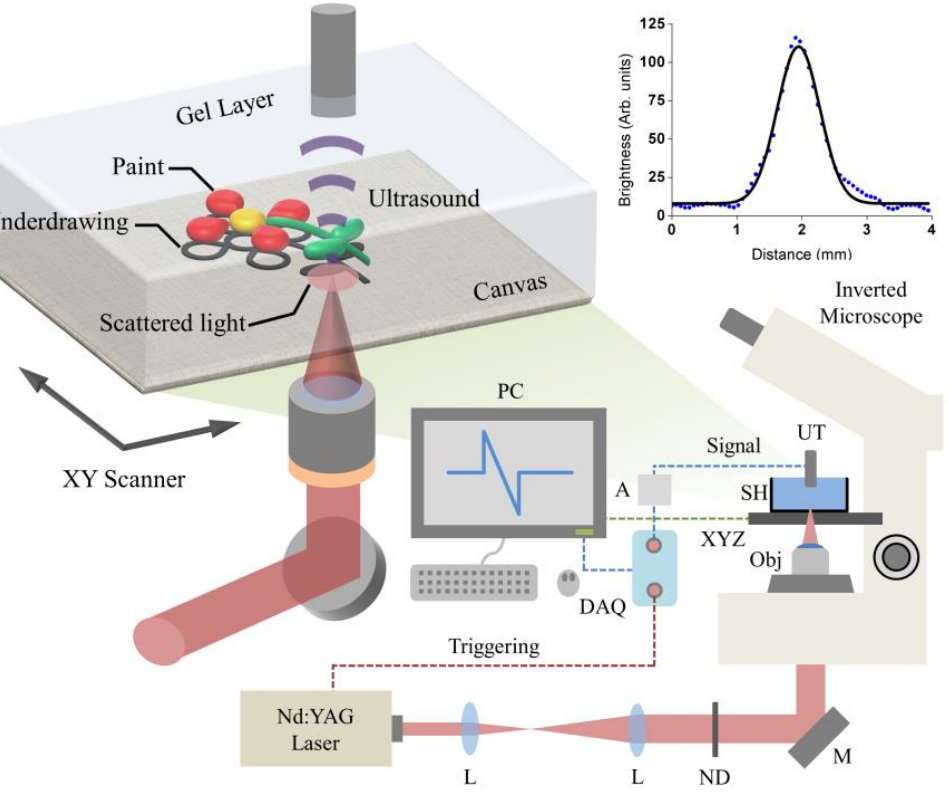
Digital CH

Interoperability standards across all types of data for effectively approaching research questions in CH research.

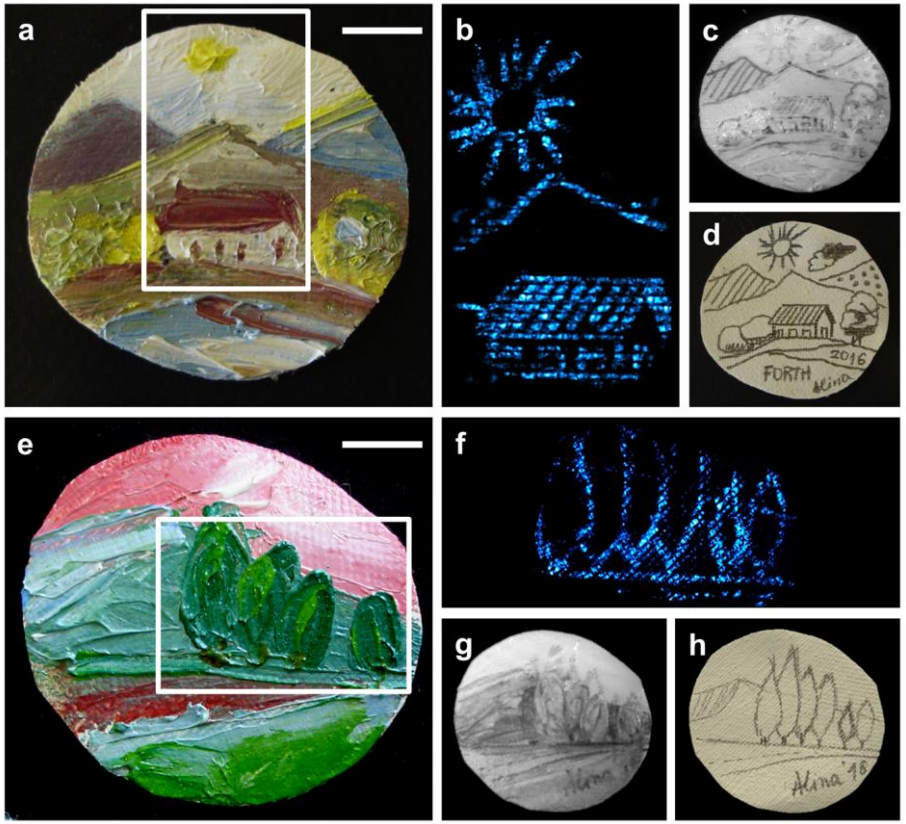
Ambient interactive systems providing multi-user natural interaction enhancing the message and meaning of CH objects and monuments.

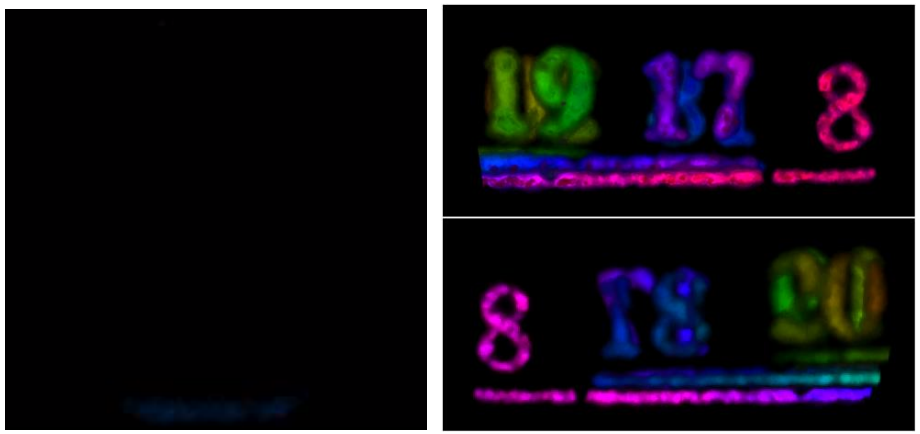


Listening to art



G. Tserevelakis et al, Sci Rep (2017)

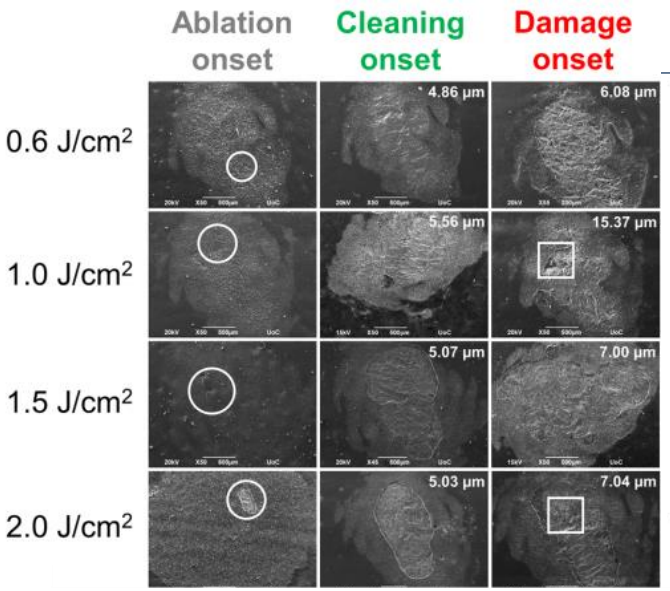


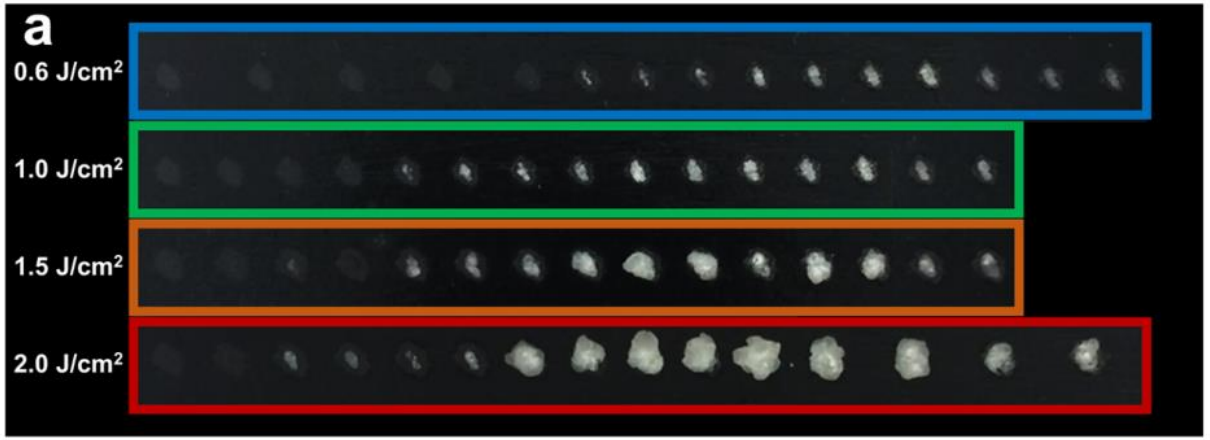


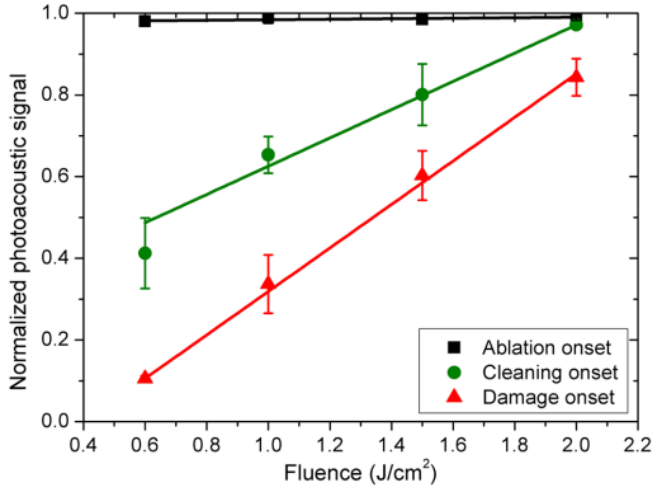
Applying photoacoustic imaging to reveal hidden features in painted art objects

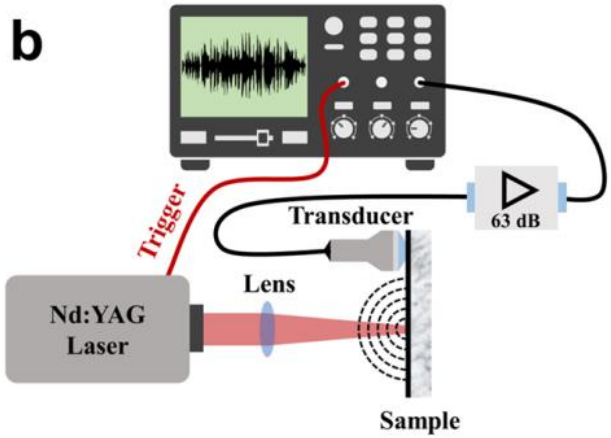
George Tserevelakis : SNF-FORTH post-doc fellow

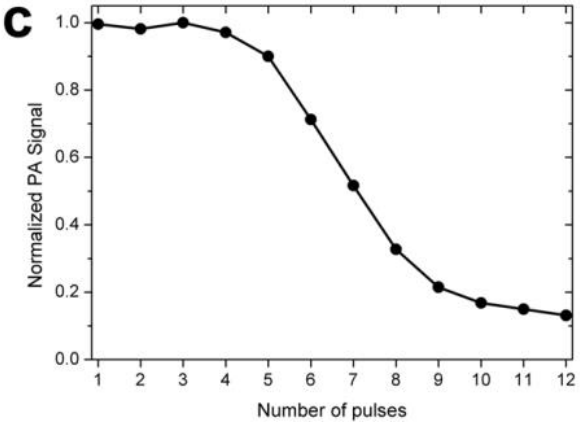
Cleaning “by the ear”











Applying photoacoustic sensing to monitor the progress of laser cleaning of graffiti painted marble

G. Tserevelakis, P. Pouli

Climate data from sea shells

Shell middens along palaeoshoreline on the Farasan Islands, Saudi Arabia

Niklas Hausmann: Marie-Curie post-doc fellow

www.accelerate-project.com

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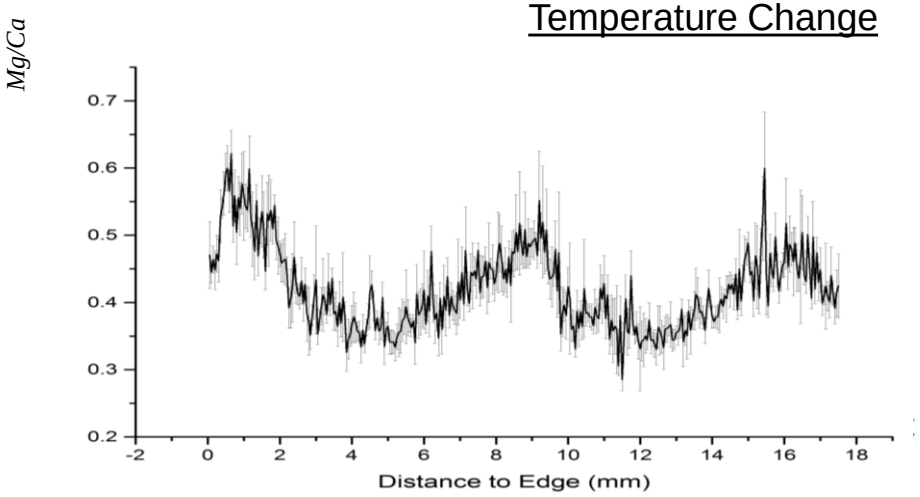
Climate data from sea shells

Elemental concentration ratios in bio-carbonates can reflect temperature changes

Temperature Change



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PAPER

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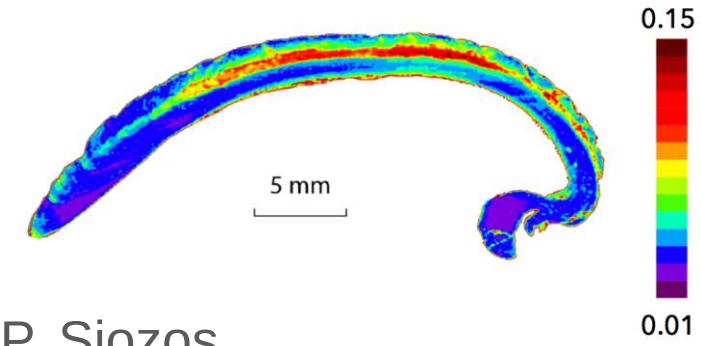
Cite this: DOI: 10.1039/c7ja00131b

Elemental mapping of Mg/Ca intensity ratios in marine mollusc shells using laser-induced breakdown spectroscopy

N. Hausmann, *[ab] P. Siozos,[a] A. Lemonis,[a] A. C. Colonese,[b] H. K. Robson[b] and D. Anglos[ac]

Automated mapping via micro-LIBS analysis rapidly produces large climate datasets



N. Hausmann, A. Lemonis, P. Siozos

E-RIHS.gr

A cross-disciplinary, distributed RI in the service of Cultural Heritage

The vision

Expertise + know-how + infrastructure

Innovative, reliable and efficient tools for addressing demanding challenges in cultural heritage research

The concept

Micro	Macro	Info
Analysis	Geophysical	Data
Diagnostics	Geochemical	Documentation
Conservation	Landscape mapping	Information
Archaeogenetics	Coastal & underwater archaeology	Management

Funding background for RI projects

National (2013-2020)

KRIPIS – POLITEIA I and II : 1.3 + 0.8 M€

E-RIHS.gr : 0.9 M€ on the National Roadmap of RIs

H-2020 (2016-2020)

IPERION-CH : 0.3 M€ European RIs for CH science [IESL]

ARIADNE : 0.5 M€ European RIs for digital Archaeology [ICS]

PARTHENOS : 0.7 M€ European RIs for digital CH

ESFRI-2016 Roadmap for new RI's

E-RIHS : European RI for Heritage Science

E-RIHS P2 : 0.2 M€ Preparatory Phase for E-RIHS

EUROPEAN COMMISSION

[CHECK AGAINST DELIVERY]

Máire GEOGHEGAN-QUINN
European Commissioner responsible for Research, Innovation and Science

International Conference on Research Infrastructures 2014

Conference
Athens, 2 April 2014

Ladies and gentlemen, I'm delighted to be with you in Athens today.

Who can come to Athens without seeing one of the jewels for which the city is most famous?

Earlier today I had the privilege of a guided tour of the Acropolis museum. There I saw a wonderful demonstration of research infrastructure in action. High-power laser technology is being used to preserve ancient works of art.

This is a great example of state-of-the-art technology meeting ancient craftsmanship. It shows perfectly how research infrastructures cannot just support cutting edge research, but can also preserve and showcase our cultural heritage – something that is so important for Greece and for Europe.

Europe's genius for innovation and invention can be traced all the way back to ancient Greece. But coming back to the present, the innovation challenges that our continent faces are so great that they demand action on a Europe-wide scale.


E-RIHS
EUROPEAN RESEARCH INFRASTRUCTURE
FOR HERITAGE SCIENCE

E-RIHS on the ESFRI Roadmap

European Strategy Forum on Research Infrastructures

ESFRI

2 ESFRI PROJECTS

Social & Cultural Innovation

An infrastructure for heritage interpretation, preservation, documentation and management

E-RIHS

European Research Infrastructure for Heritage Science

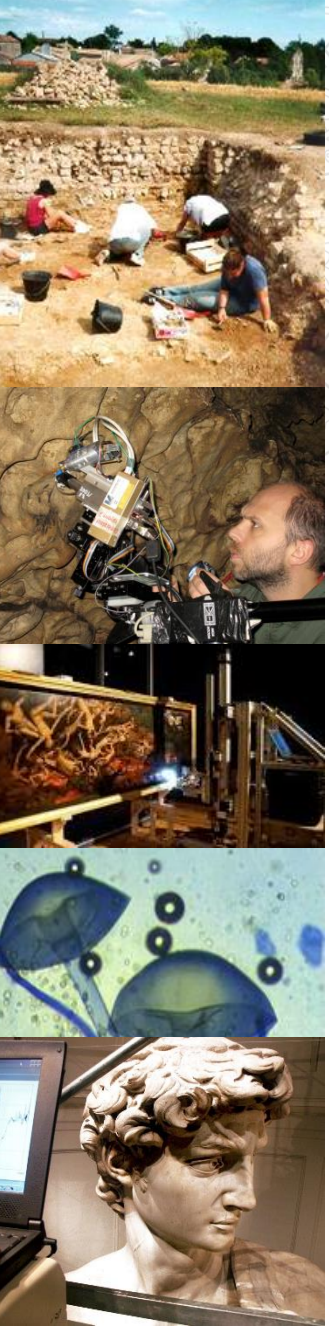
TYPE: distributed
COORDINATING COUNTRY: IT
PROSPECTIVE MEMBER COUNTRIES: BE, CZ, DE, EL, ES, FR, HU, IT, NL, PT, UK

PARTICIPANTS: BG, BR, CY, DK, IE, IL, PL, SE, SI

TIMELINE
- ESFRI Roadmap entry: 2016
- Preparation phase: 2016-2019
- Construction phase: 2020-2021
- Operation start: 2022

Description

The European Research Infrastructure for Heritage Science (E-RIHS) will support research on heritage interpretation, preservation, documentation and management. It will comprise: E-RIHS Headquarters and National Hubs, fixed and mobile national infrastructures of recognized excellence, physically accessible collections/archives and virtually accessible heritage data. Both cultural and natural heritage are addressed: collections, buildings, archaeological sites, digital and intangible heritage. E-RIHS will provide state-of-the-art tools and services to cross-disciplinary research communities advancing understanding and preservation of global heritage. It will provide access to a wide range of cutting-edge scientific infrastructures, methodologies, data and tools, training in the use of these tools, public engagement, access to repositories for national and EU measures, requires a joint and resolved effort. This has been fully recognized by the European Union with the continuous and reiterated support of initiatives aimed at integrating existing Heritage Science infrastructures, as well as, with a focus on Member States' national research programs, the JPI on Cultural Heritage, coordinating efforts of 17 EU national funding bodies supporting heritage science. The enthusiastic reviews of these initiatives testify the success of their action to advance knowledge and to establish a research community, acknowledged as "advanced" in official EU documents concerning conservation, or quickly growing in the field of archaeology as shown by the performance indicators of the relevant project ARIADNE.
This demonstrates beyond any doubt both the scientific and the socio-economic importance connected with Heritage Science: it is a sector and a research



E-RIHS : What is it?

- a distributed research infrastructure for heritage interpretation, preservation, documentation and management
- a cross-disciplinary collection of advanced tools and services for advancing understanding and preservation of global cultural and natural heritage
- serving a cross-disciplinary community of researchers in heritage science
- fostering alignment of diagnostic methodologies and practices
- establishing a common data infrastructure for scientific digital heritage

The four ACCESS platforms of **E-RIHS**

MOLAB

FIXLAB

ARCHLAB

DIGILAB

MOLAB

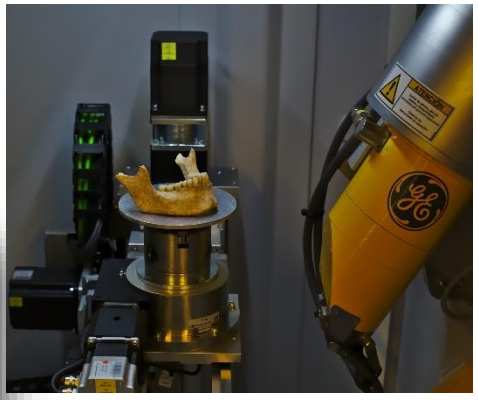
E-RIHS

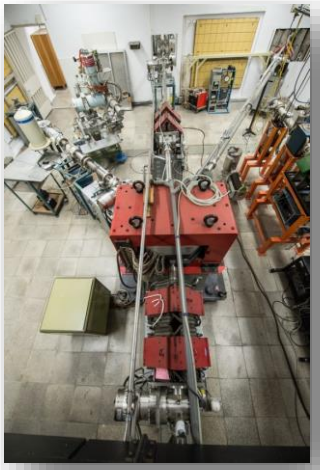
mobile laboratory for *in-situ* diagnostics

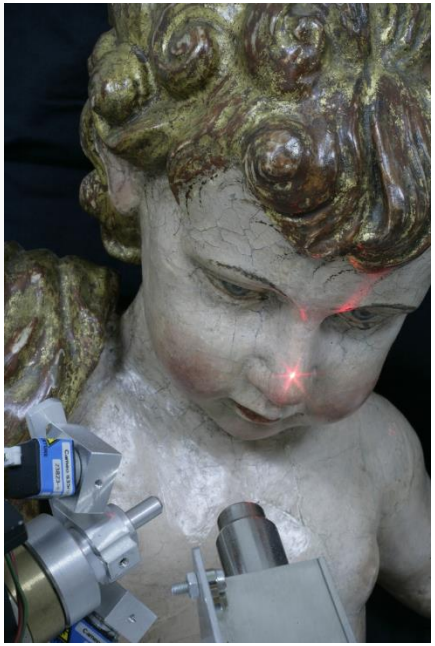
FIXLAB

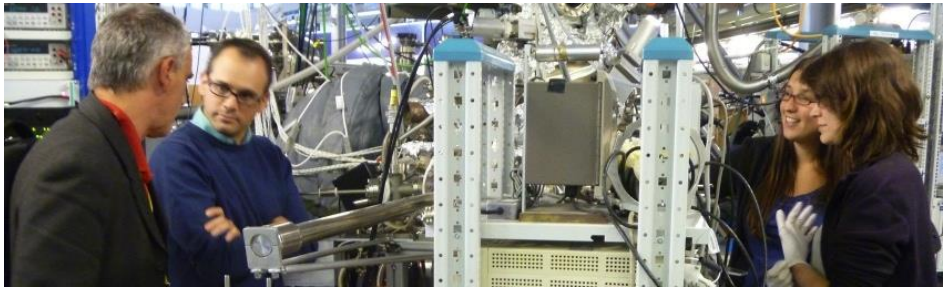
E-RIHS

access to large laboratory facilities









ARCHLAB

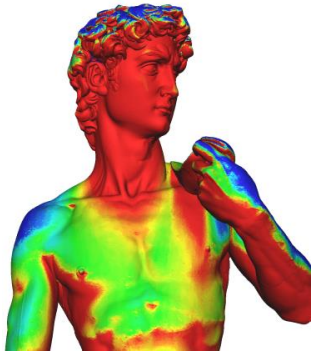
E-RIHS

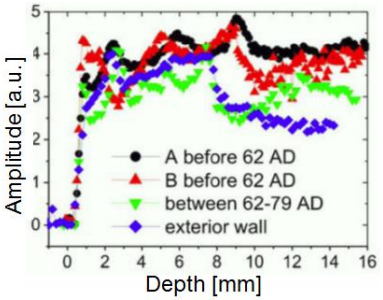
scientific archives for heritage

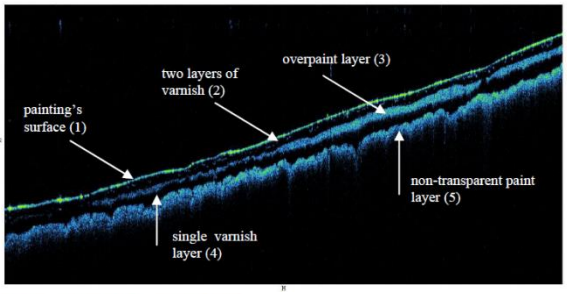
DIGILAB

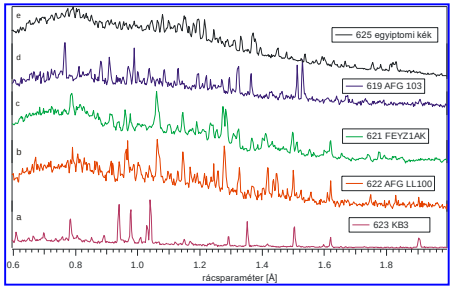
E-RIHS

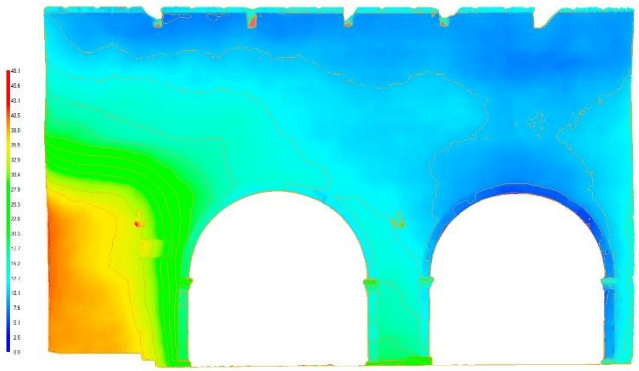
digital datasets for heritage science

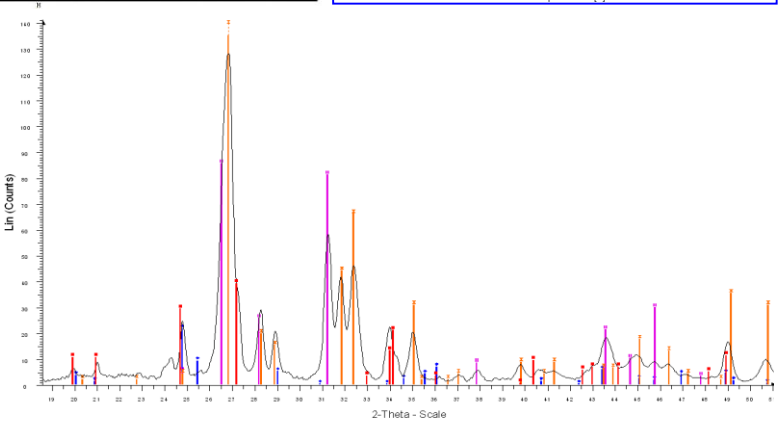












E-RIHS timeline

2017-2019

- preparatory phase (E-RIHS-P2)

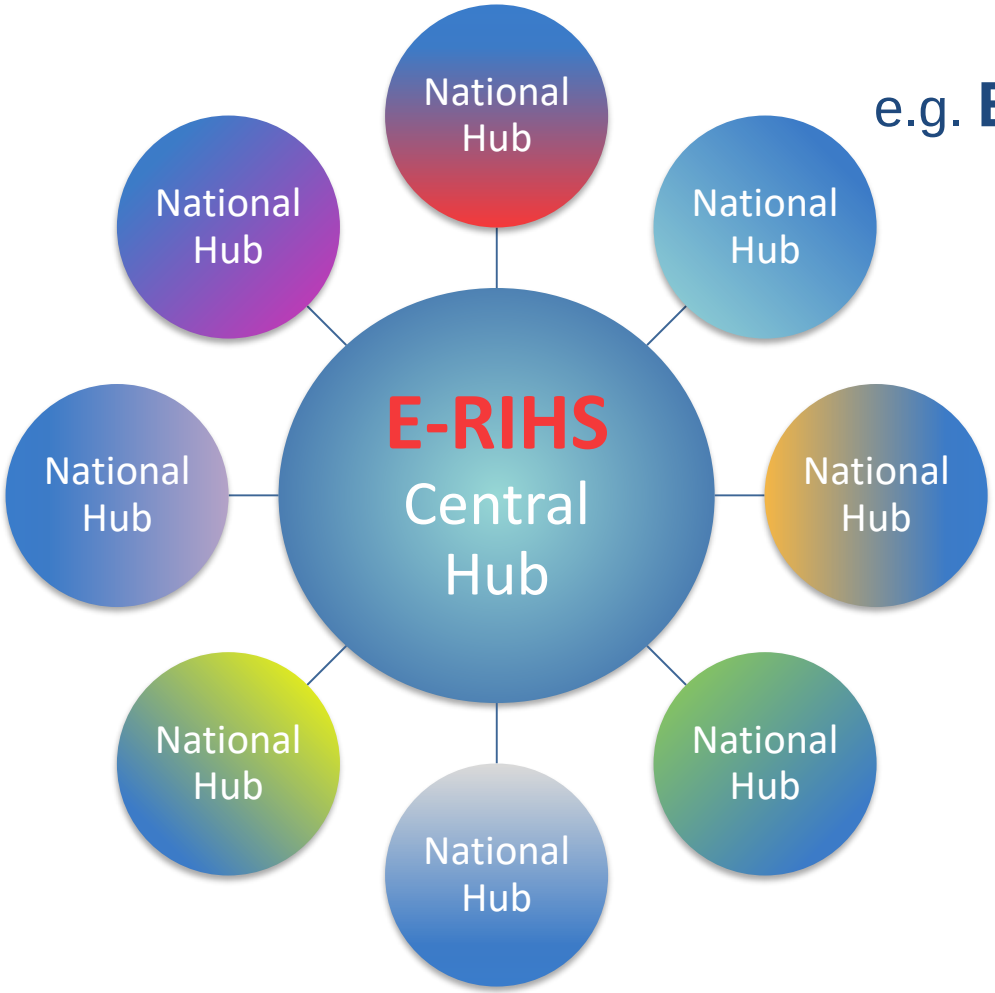
2020

- submission of proposal to establish **E-RIHS**

2021-2025

- **E-RIHS** implementation phase

E-RIHS star structure



e.g. **E-RIHS.gr**

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