



# Increasing Europe's competitiveness through cultural heritage research

Bruxelles, March 24<sup>th</sup> 2011

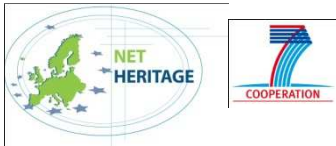
## Technologies to protect cultural heritage – a critical evaluation



***Adriana Bernardi***

CNR-ISAC – Padova (Italy)

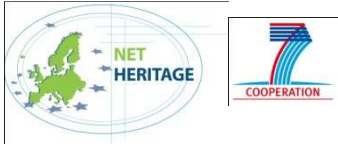




The last FP's of the Commission emphasised the importance of the technology in the European projects

In particular this emphasis increased from FP5 to FP7

During these last FP's a lot of work was done to identify the key technologies and to built new technologies in CH research



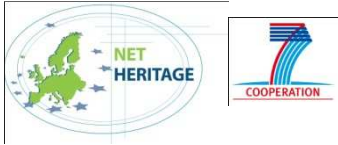
A **lot of advanced technologies** exist today when considering all fields of application...

**but...**for Cultural Heritage protection

- they often need to be **adapted** or ...
- they are **not suitable** for different reasons (barriers, low accuracy...)

**so...** in many cases

- **new solutions, products, tools, methodologies** need to be set up

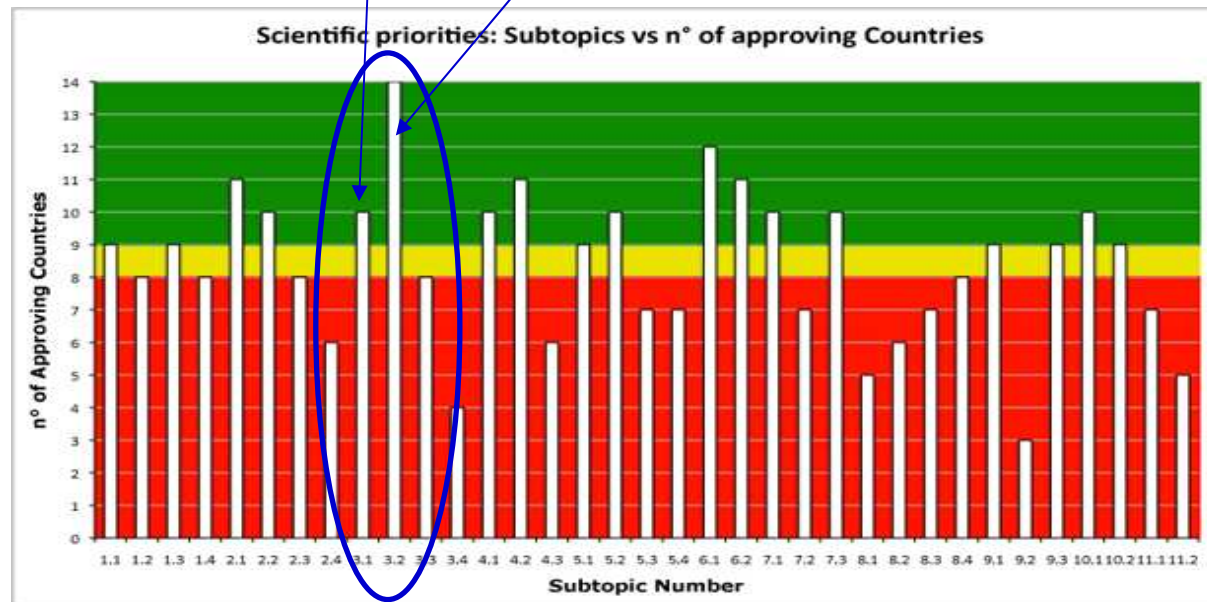


## Open questions ?

- What **level of technology** did we reach in CH?
- Did the actual technology **satisfy our needs**?
- Are all the **fields of application sufficiently developed**?
- What are **the most lacking fields**?
- Which are the **actors behind the most developed fields**?

In Net-Heritage **WP3** the strengths, needs and priorities were investigated in all the participant countries.

The results show that the priority **3.2** “Non invasive instruments and methodologies for diagnosis and monitoring “ & also **3.1** “Portable instruments for in situ measurements” are the most important ones



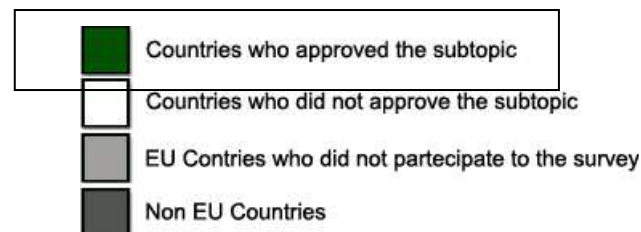
So, the technological aspects, new devices and methodologies are a **high priority for the majority of the participant countries**

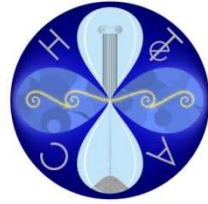


priority 3.2



priority 3.1





TeACH



# “Technologies and tools to prioritize assessment and diagnosis of air pollution impact on immovable and movable Cultural Heritage “

(contratto n°212458)

Coordinator: **CNR-ISAC**

<http://www.teach-project.eu>

## Objectives:

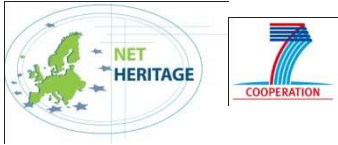
The pollutants responsible for the weathering of cultural heritage are changing.  
So it is necessary to identify the pollutants that will play the most important role in the future and to monitor their effects by means of new and appropriate devices and tools.



Poland: The National Museum, Cracow,



Norway: Oslo National Gallery



**WP4** of TeACH: “Study of identified existing devices and their evaluation for integration in the kit”

In particular the **D4.1** “Analysis of some identified existing technologies and devices available on the market”

The conclusions were:

“With respect to the products on the market, there are not many existing fit for such specific applications in Cultural Heritage...”





# CNR expertise

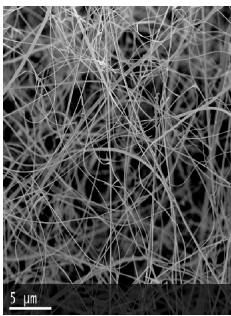


PAEDeS to monitor in real time the passive acoustic emissions



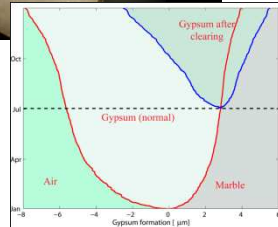
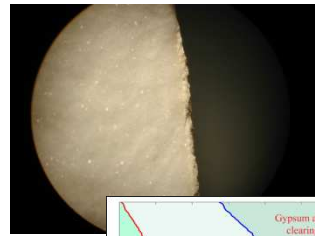
claudio.rafanelli@idasc.cnr.it

metal oxide nanowires to detect the toxic compounds in security applications



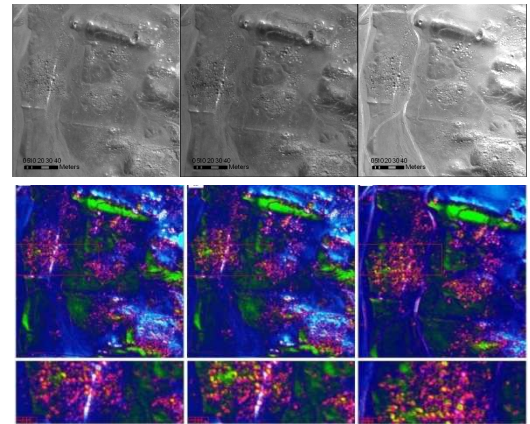
sbervegl@ing.unibs.it

software to predict monument damage

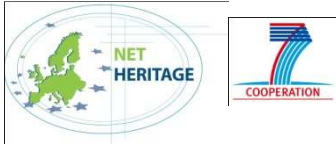


Roberto.natalini@cnr.it

facing archaeological looting by means of spatial autocorrelation applied to high resolution satellite imagery



n.masini@ibam.cnr.it



# SME's involvements

Which are the most interesting technologies/  
RTD applications for SME's???

The **involvement of SME's** increased more  
and more from FP5 to FP7



## 5FP: European Project **VIDRIO**

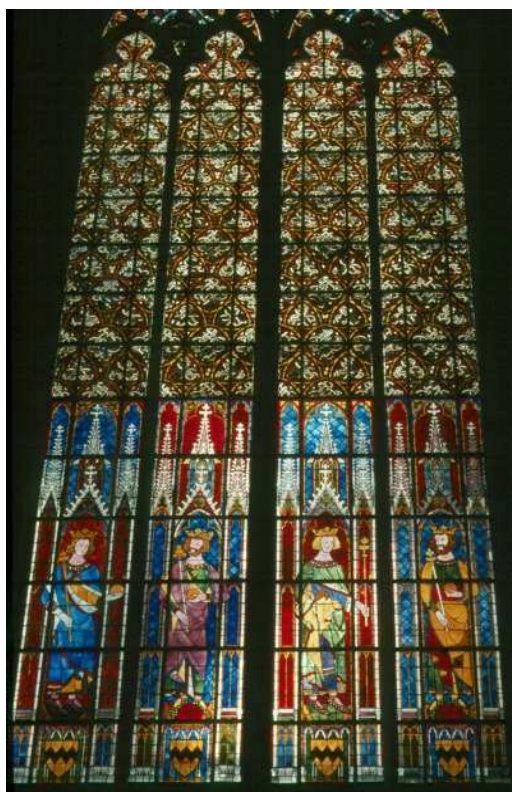


### DETERMINATION OF CONDITIONS TO PREVENT WEATHERING DUE TO CONDENSATION, PARTICLE DEPOSITION AND MICRO-ORGANISM GROWTH ON ANCIENT STAINED GLASS WINDOWS WITH PROTECTIVE GLAZING

(contratto n° EVK4-CT-2001-00045)

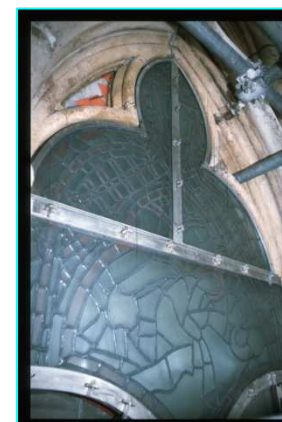
Coordinator: **CNR-ISAC**

<http://www.isac.cnr.it/~vidrio>

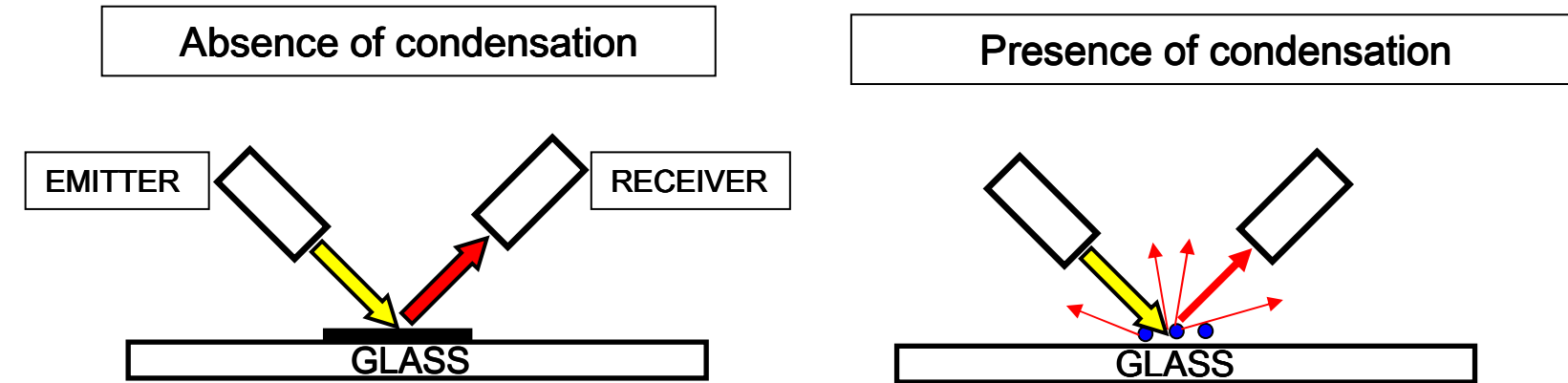


Multidisciplinary research aimed :

- ❖ to study the effects of the environment on the ancient glass and on the grisaille
- ❖ to evaluate the efficiency of the **PROTECTIVE GLAZINGS** and their impact on the microclimatic conditions



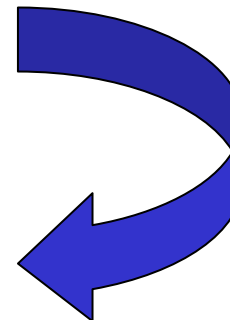
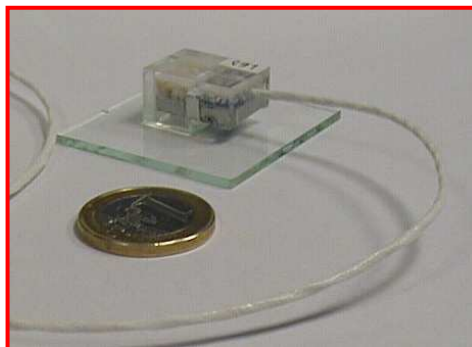
The **dew sensor** is based on the diffusion of the IR radiation a layer of water forms on a surface



*INNOVATIVE  
TECHNICAL SOLUTION*

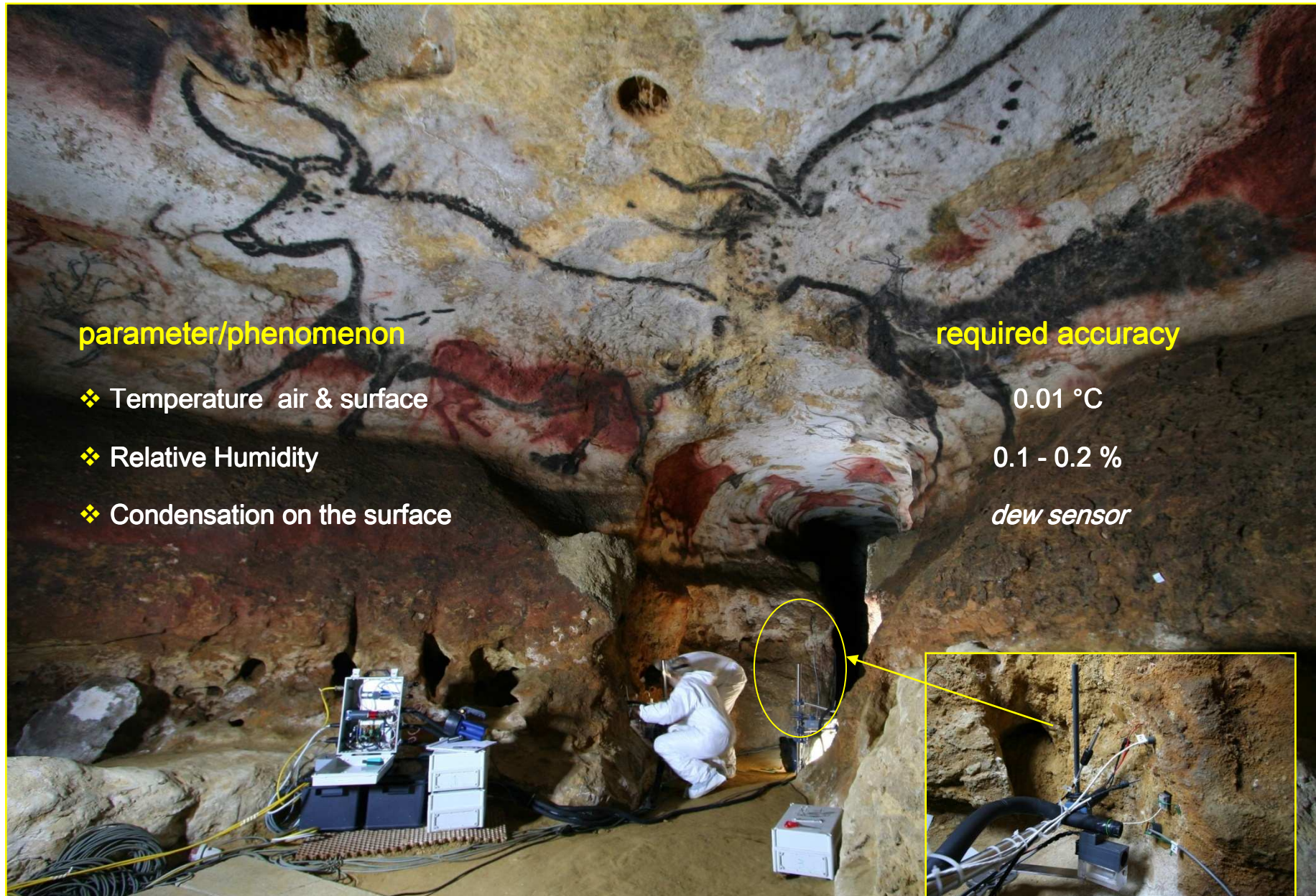


*two sets of sensors, one closed within an anhydrous environment, the other one in open air*



# Lascaux caves (France)

(Contract Ministère de la Culture Française and CNR-ISAC)



## parameter/phenomenon

- ❖ Temperature air & surface
- ❖ Relative Humidity
- ❖ Condensation on the surface

## required accuracy

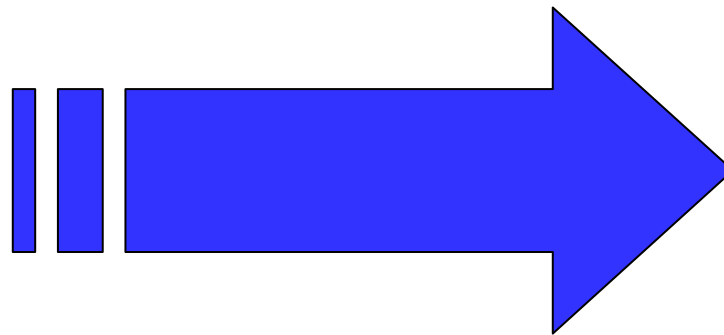
0.01 °C

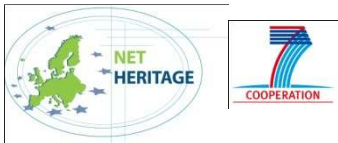
0.1 - 0.2 %

*dew sensor*



# TECHNOLOGY TRANSFER





# SPIN-OFF

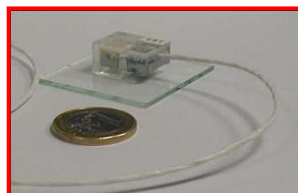
(art. 11 D.M. 593 of the Italian Ministry)

## Research project

“Development of new meteorological and microclimatic instruments to measure physical parameters in extreme environments”



Research & Environmental Devices  
www.red-srl.com



Dew Sensor



Temperature of the air  
(accuracy ~0.01 °C)



Psychrometer  
(accuracy ~ 0.2% UR)



Surface temperature  
(accuracy ~0.01 °C)



## Shareholders



**A. Bernardi (ISAC-CNR)**  
*(Scientific responsible)*

**Tecno Penta (SME)**



**CNR**





*Many thanks  
for  
your kind attention*

[a.bernardi@isac.cnr.it](mailto:a.bernardi@isac.cnr.it)