

# European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

## WGs and MC Meeting at ISTANBUL, 3-5 December 2014

Action Start date: 01/07/2012 - Action End date: 30/06/2016

Year 3: 1 July 2014 - 30 June 2015 (*Ongoing Action*)

## CASE STUDY OF THE SPIN-OFF RED SRL: DEVICES FOR INDOOR ENVIRONMENTS CONTROL



Luc Pockelé

R.E.D. srl - Research & Environmental Devices

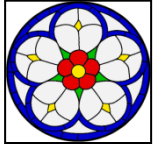
Viale dell'Industria 58B, Padova (Italy)

[www.red-srl.com](http://www.red-srl.com)

 **cost**  
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



# How R.E.D. srl is born?



**VIDRIO**



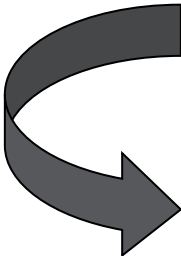
**LASCAUX CAVES  
FRANCE**

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

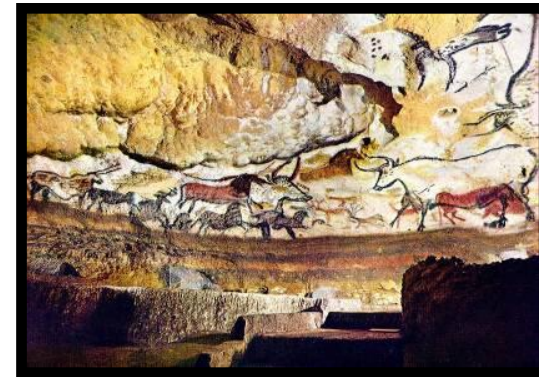
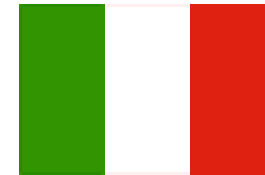
(contract n° EVK4-CT-2001-00045)



**PATENT**



**Ministry of Instruction,  
University & Research**



**Ministry of Instruction,  
University & Research**



**National  
Research  
Council**



**Adriana Bernardi**



**26 JANUARY 2006**

**Research &  
Environmental Devices**



**Luc Pockelé – Shareholder and Managing Director**

# (A) MICROCLIMATIC MONITORING

## SYSTEMS

### (1) CABLED SENSORS

#### ➤ OWN CONSTRUCTION:

- Tair	}	High precision
- Tcontact		
- Dew sensor	}	European patent
- Psycrometer		
	}	>98% RH Higt precision

#### ➤ INTEGRATED COMMERCIAL SENSORS:

Air velocity low-high speed

Tair + RH

Fissurometer ....

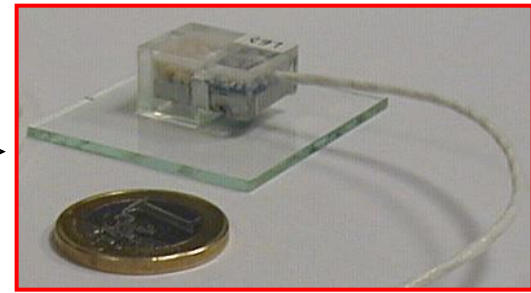
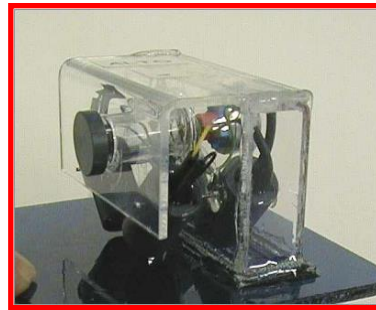
### (2) WIRELESS SENSORS

# DEW SENSOR

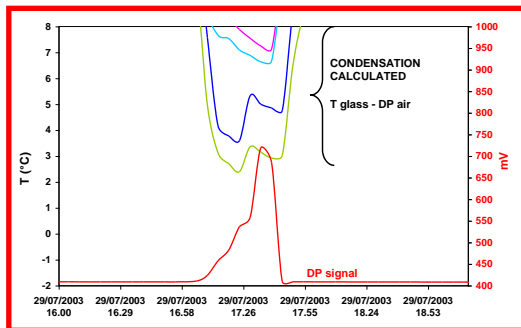
**DIRECT MEASUREMENTS OF CONDENSATION**



**MORE ACCURATE**

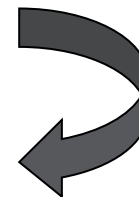


**PRINCIPLE: 2 DETECTOR COUPLES**



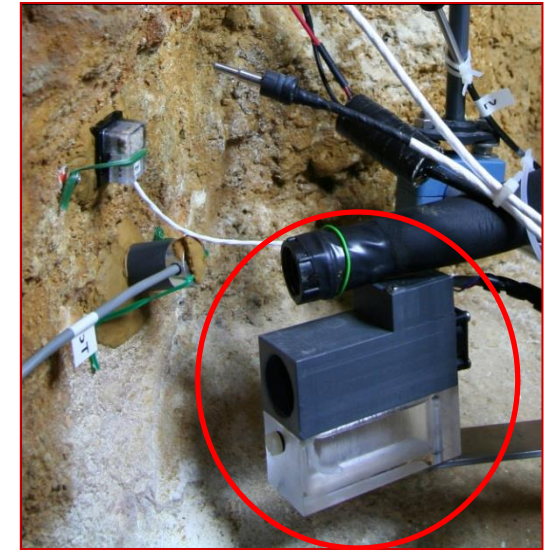
- 1st CLOSED
- 2nd OPEN

**DIFFERENTIAL SIGNAL**



# ACURATE PSYCROMETER

**ACCURACY : 0.3%**



## PRINCIPLE

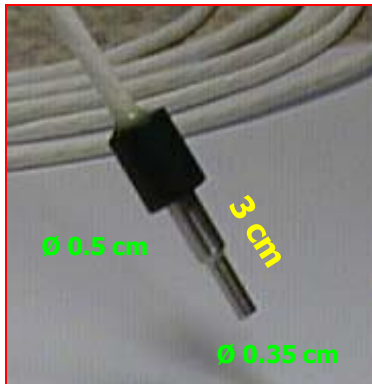
- **HIGH ACCURACY OF TEMPERATURE SENSORS (0,01°C)**
- **PRECISE DETERMINATION OF THE PSYCHROMETRIC CONSTANT**

**In development: a portable version**

# ACURATE TEMPERATURE SENSORS

## - AIR AND DEEP INSIDE MATERIALS MEASUREMENTS

- Pt100 TYPE
- ACCURACY in AIR & MATERIALS: 0.01-0.02 °C
- SMALL CONTACT AREA
- LOW THERMAL MASS



## - CONTACT TEMPERATURE



# MONITORING SYSTEMS

Cabled sensors

DEW SENSOR



SENSORS....

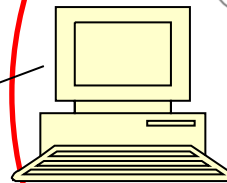
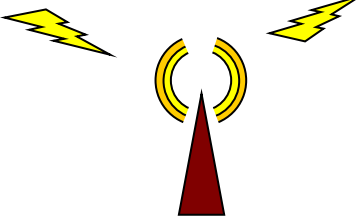
own software

ROOT  
NODE

INTERNET

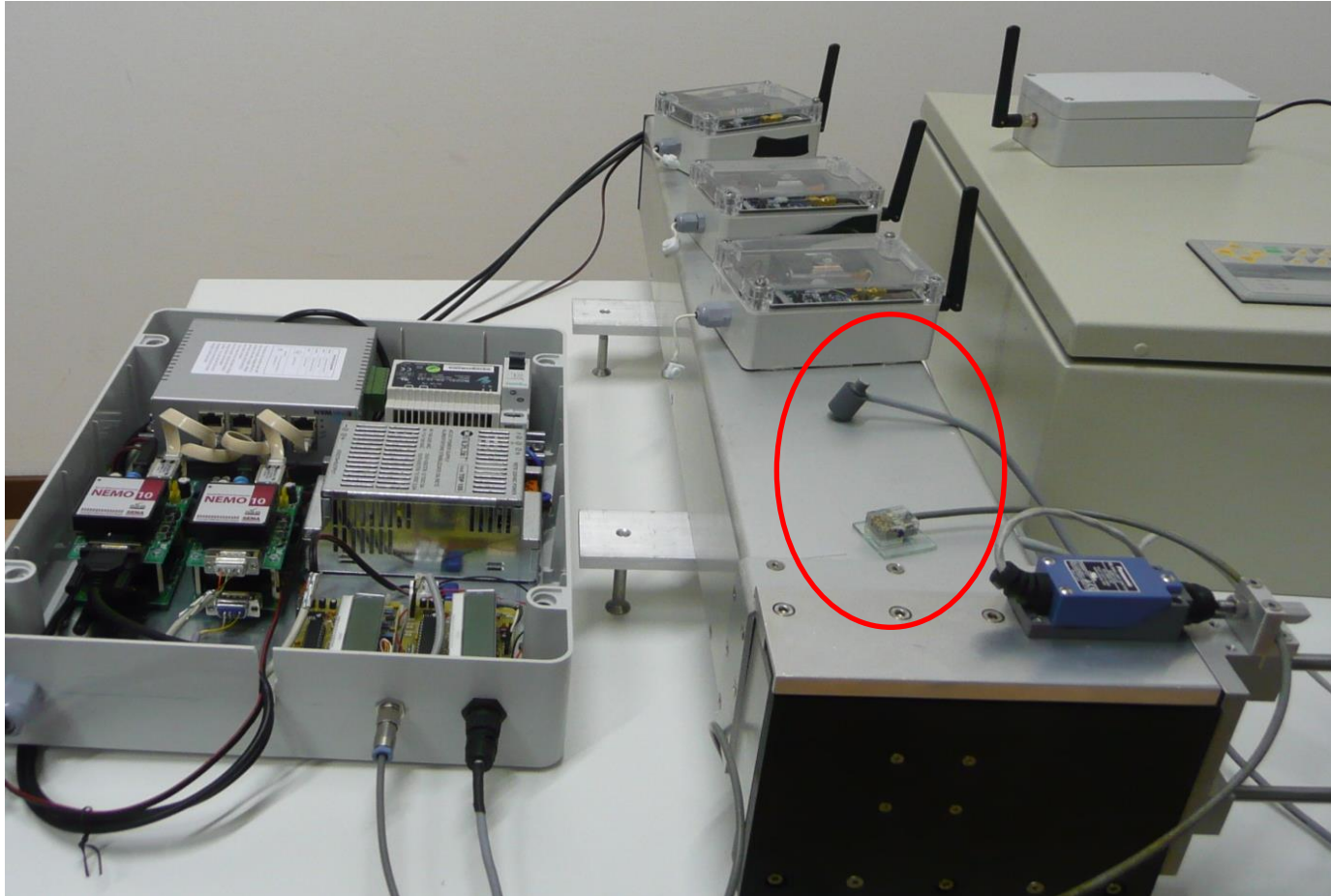
REPEATER

Wireless sensors



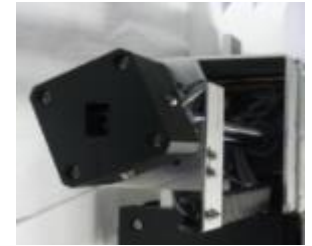


# MONITORING SYSTEMS: EU Project TeACH (1/3)



# MONITORING SYSTEMS: EU Project TeACH (2/3)

- ✓ **Colorimeter TAOS** with 2 white LED's



- ✓ **Electronic interface** up to the gateway of the kit



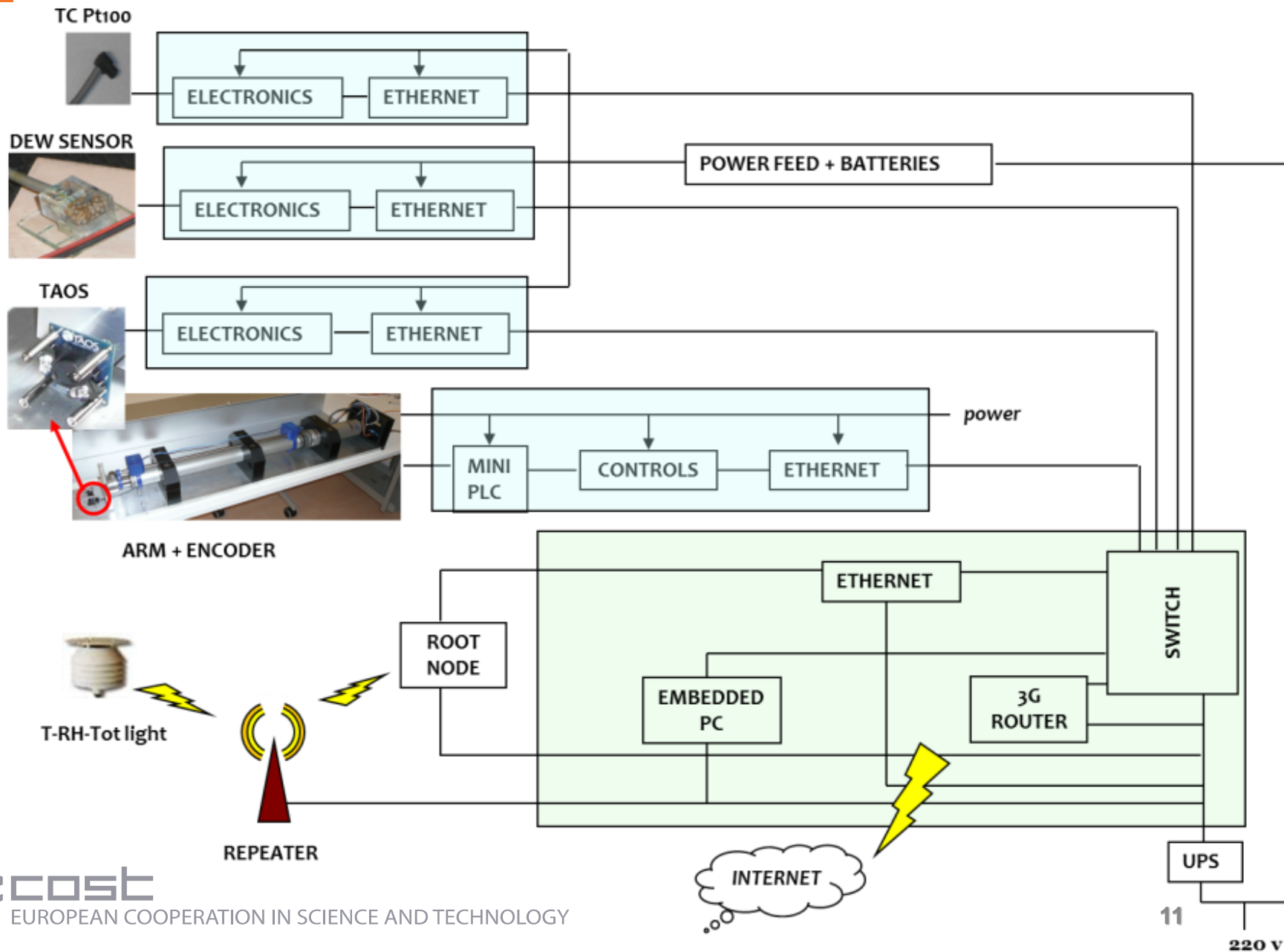
- ✓ **Mechanical arm** with housing



- ✓ **Slide gate and white calibration patch**



# MONITORING SYSTEMS: EU Project TeACH (3/3)





# REFERENCES (1/2) (mostly UNESCO sites)



EU project VIDRIO



**Cologne Cathedral  
(Germany)**



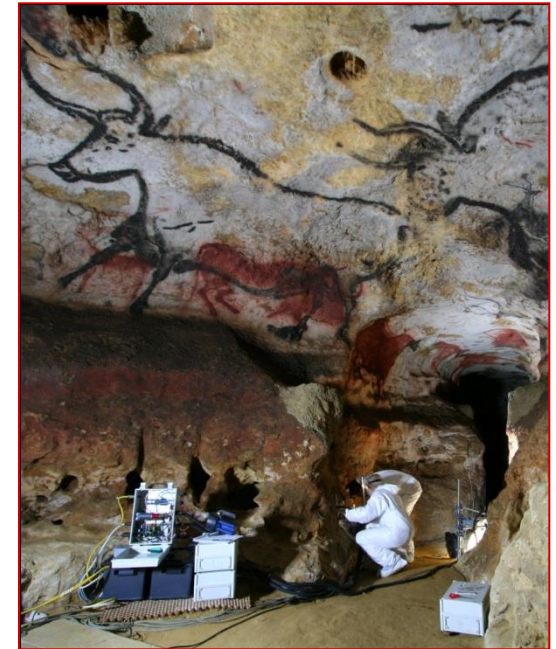
EU project VIDRIO



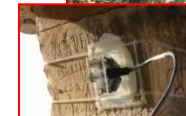
**Sainte Chapel  
(France)**



**Santiago de  
Compostela  
(Spain)**



**Lascaux  
Caves  
(France)**



**Hagar Him Temple (Malte)**

# REFERENCES (2/2) (mostly UNESCO sites)



**Diamanti Palace  
(Ferrara, Italy)**

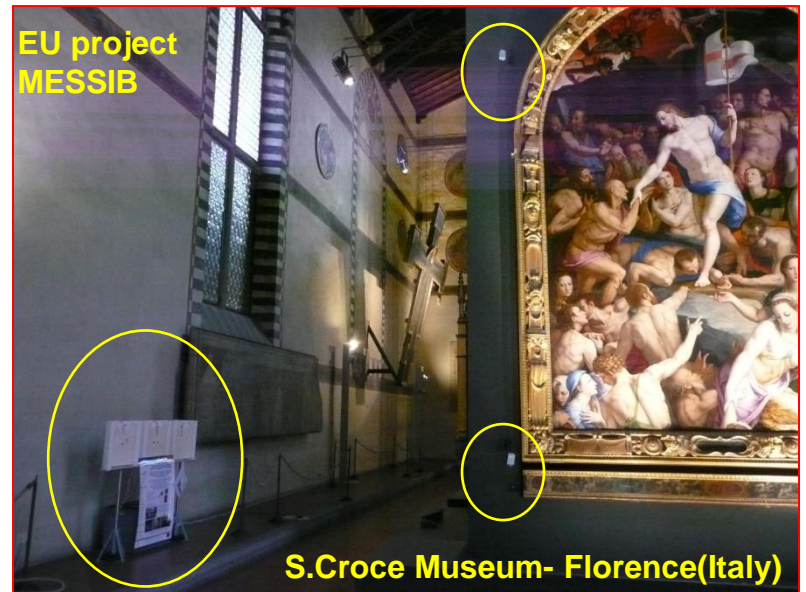
**Longobard Temple  
(Cividale del Friuli – Italy)**



**Petrarca tomb  
1304-1374**



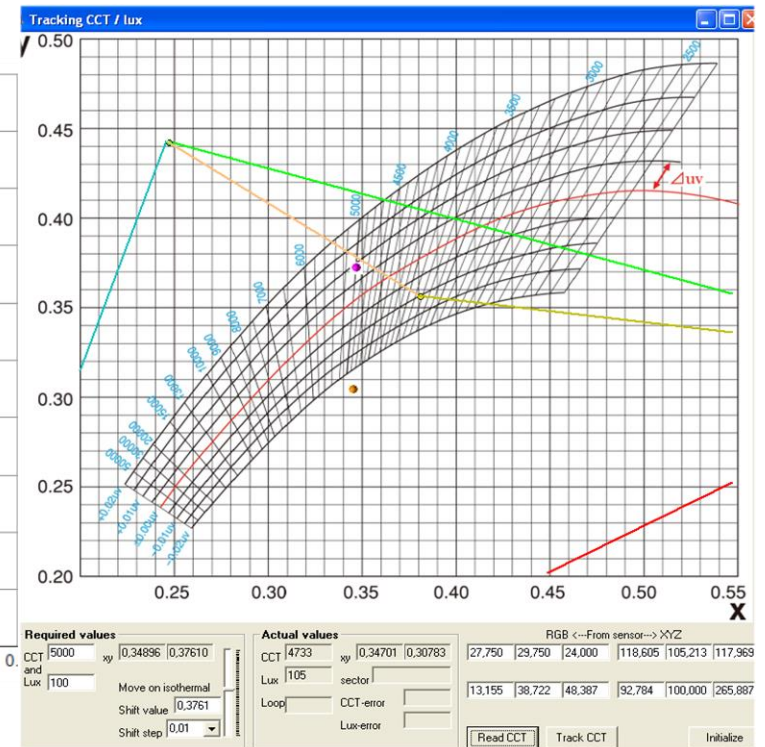
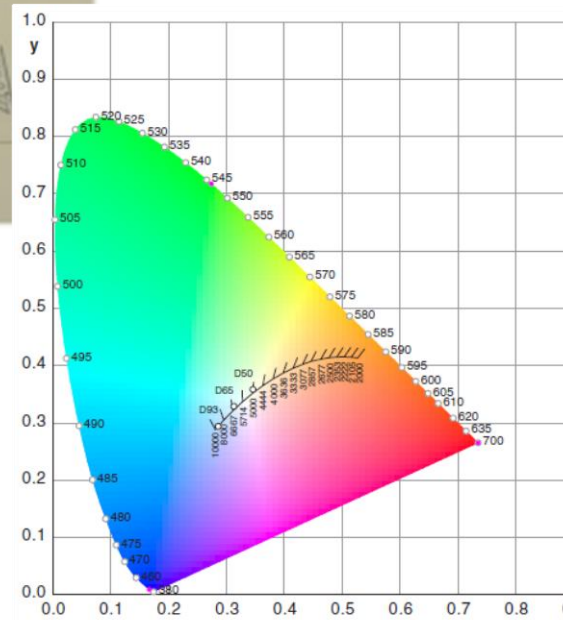
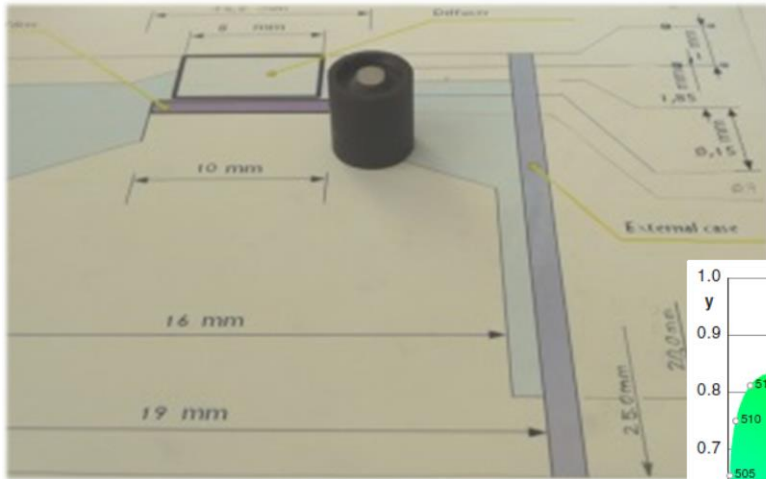
**Industrial application:  
Container Food**



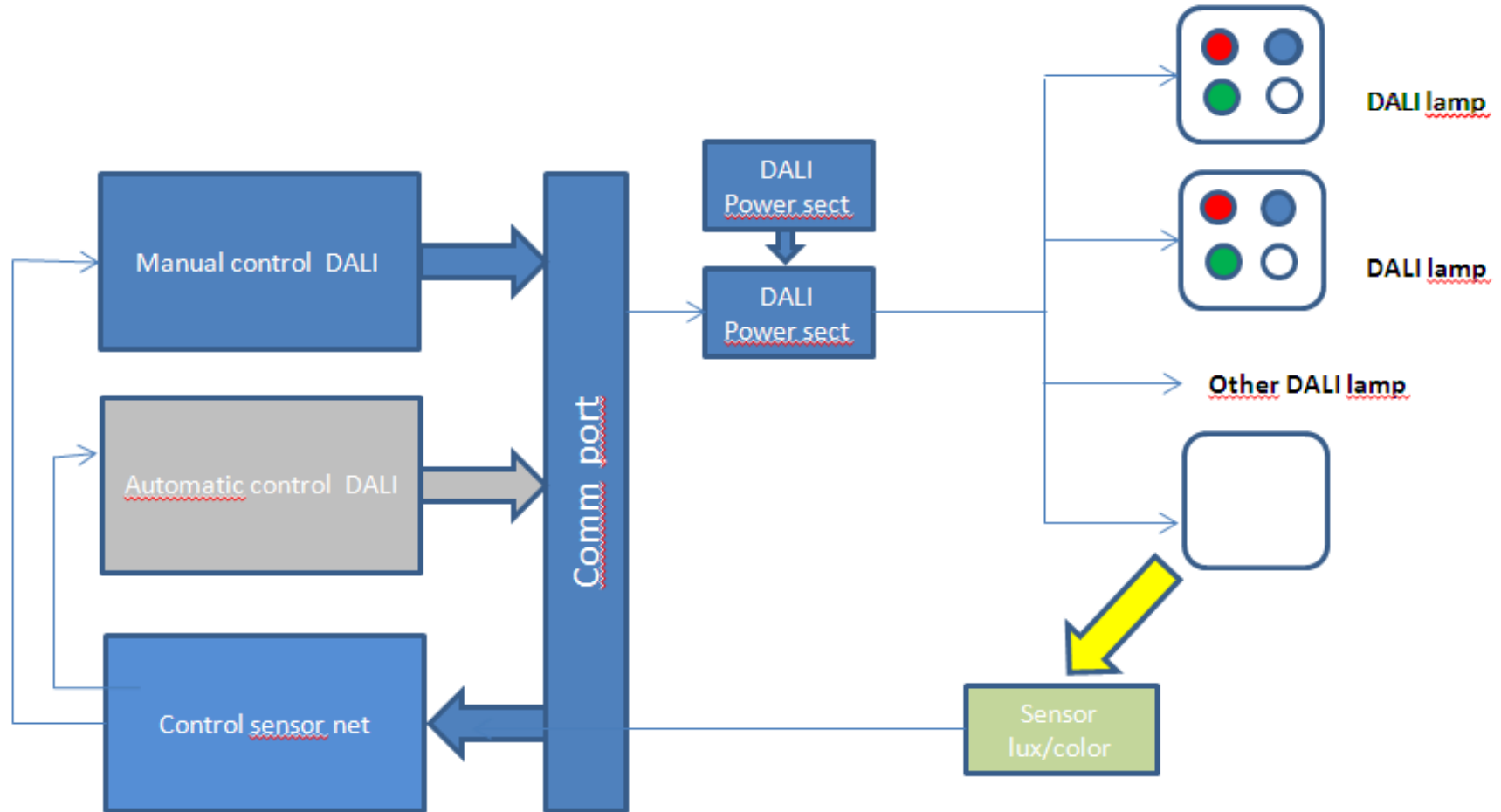
**S.Croce Museum- Florence(Italy)**



# LIGHTING TECHNOLOGIES: EU project CETIEB



# LIGHTING TECHNOLOGIES: EU project CETIEB





# **(B) RENEWABLE ENERGIES & ENERGY EFFICIENT BUILDINGS**

**VIA:**

- ***ENERGY & VENTILATION MODELS***
- ***THERMOHYGROMETRIC MONITORING INCLUDING COMFORT MEASUREMENTS***
- ***AUDITS***

**LEADING TO:**

- ***ENERGY EFFICIENCY IMPROVEMENTS***
- ***RISK AND BUILDING MANAGEMENT GUIDELINES***
- ***IMPROVED AIR QUALITY***



# GEOHERMAL ENERGY

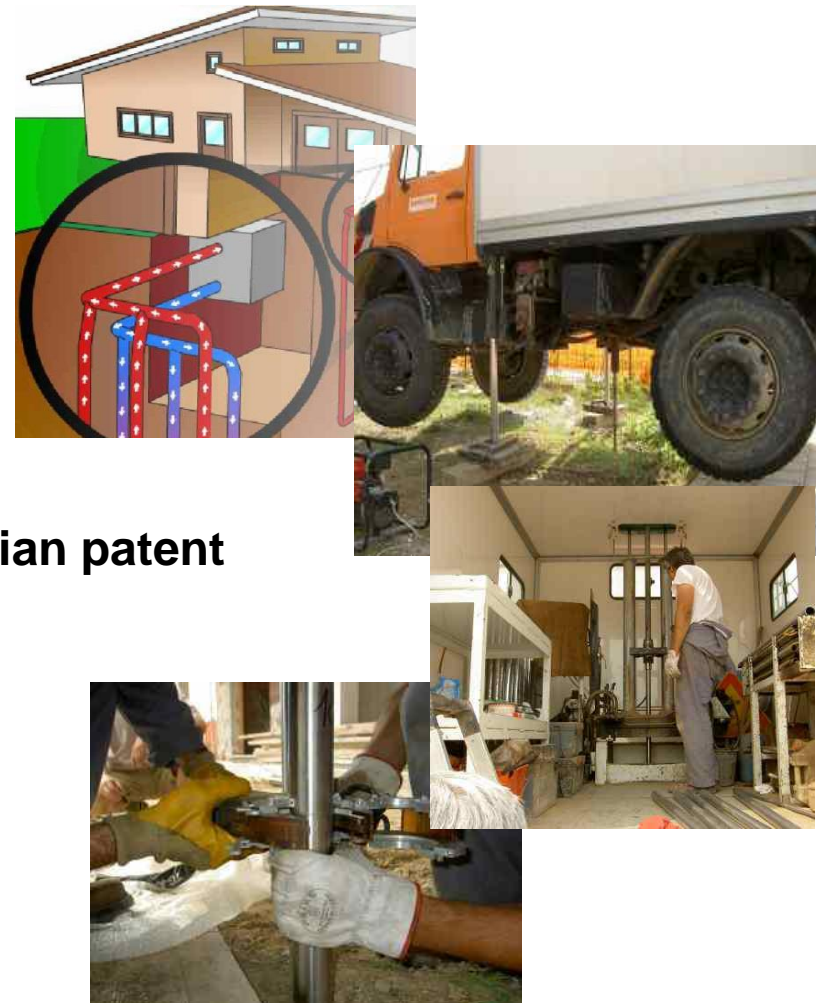
## PRODUCTS

- COAXIAL STAINLESS STEEL PROBES & INSTALLATION METHODOLOGY
- TRADITIONAL PROBES

} Italian patent

## SERVICES

- DIMENSIONING & INSTALLATION OF GEOHERMAL PLANTS



# INSTALLATIONS

- **Office in Teolo (Italy)**
- **Seminario in Padova (Italy)**
- **Private house in Villaguattera (Italy)**
- **Private house in Chioggia (Italy)**
- **Industry in Mestre (Italy)**

**Coaxial probes**



- **Private house at Lido of Venice (Italy)**

**Classical probes**

# INVOLVEMENT IN EUROPEAN PROJECTS



Funded by 7FP of EU  
under G.A. no. 212458



Funded by 7FP of EU  
under G.A. no. 283182



Multi-source Energy Storage System  
Integrated in Buildings

Funded by 7FP of EU  
under G.A. no. 211624

## ➤ Indirectly :

- TeACH (Environment)
- MESSIB (Energy storage)

## ➤ Directly :

- NANOMATCH (Environment)
- CETIEB (Lighting)
- EFFESUS (Energy and IEQ)
- EcoShopping (Energy and Lighting)
- EE-HIGHRISE (Energy and IEQ)



Funded by 7FP of EU  
under G.A. no. 314678



CETIEB

Funded by 7FP of EU  
under G.A. no. 285623



Funded by 7FP of EU  
under G.A. no. 609180



Funded by 7FP of EU  
under G.A. no. 285209

# MEMBER OF ASSOCIATIONS

Directly or through CNR-ISAC R.E.D.srl is also member of:

- **Renewable Heating & Cooling Platform (RHC)**
- **European Geothermal Energy Council (EGEC)**
- **Energy Efficient Buildings (E2B – PPP)**
- **European Platform ECTP** in particular FACH (WG4: Energy and Environment)
- **AICARR**



*Thank you for your attention*

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**web site: [www.red-srl.com](http://www.red-srl.com)**