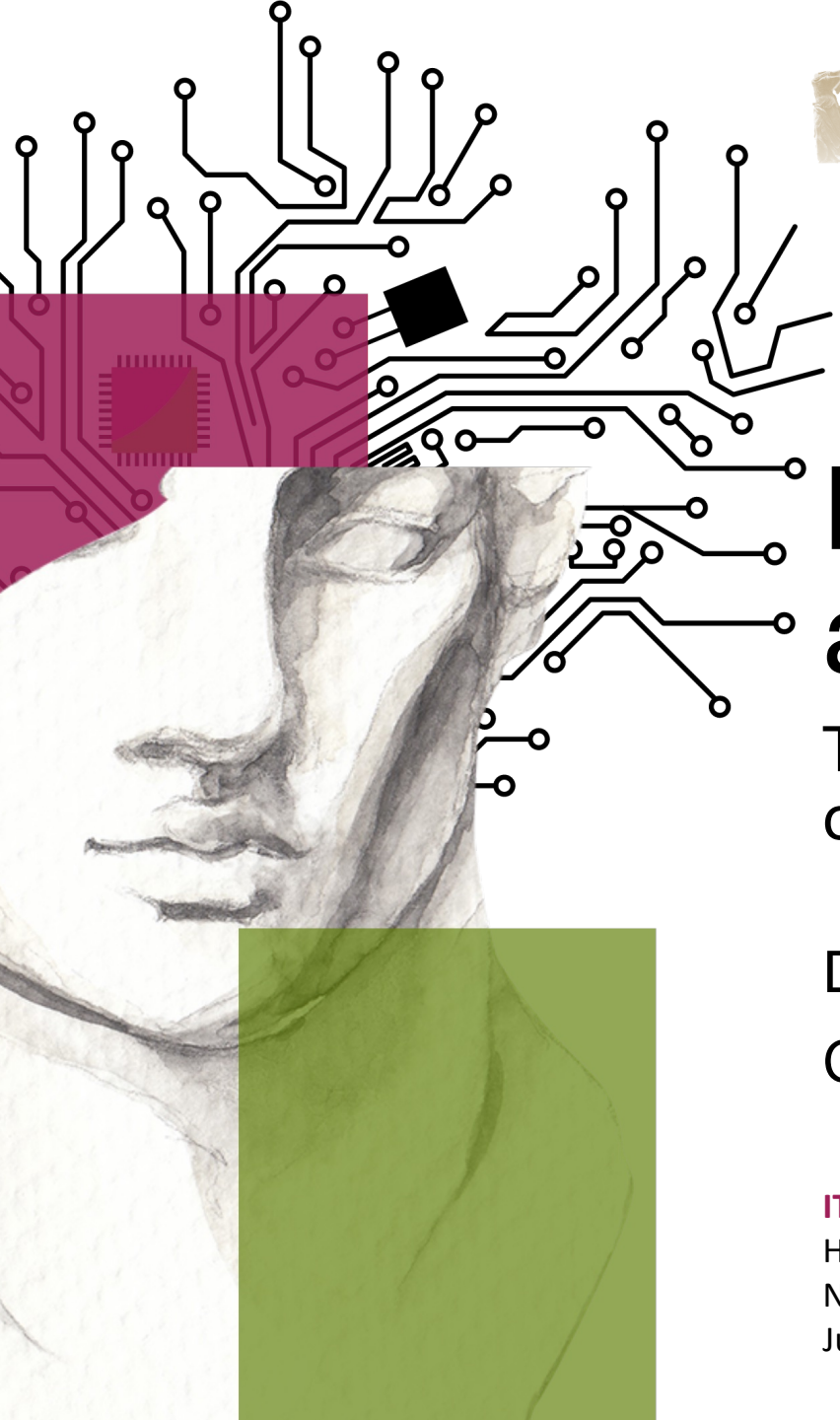


# Between ecological and digital transition:

## Towards a new multidimensional approach to conservation based on the EPICO method

Danilo Forleo

Château de Versailles

**IT-FR cooperation in heritage science - Vth edition**
Human-centered approach for cultural heritage in digital transition: disciplines talking to each other
Naples, Suor Orsola Benincasa University
June 28th, 2023

# OUTLIINE

1. Ecological and Digital transition in Cultural Heritage

2. A new Multidimensional approach to Preventive Conservation

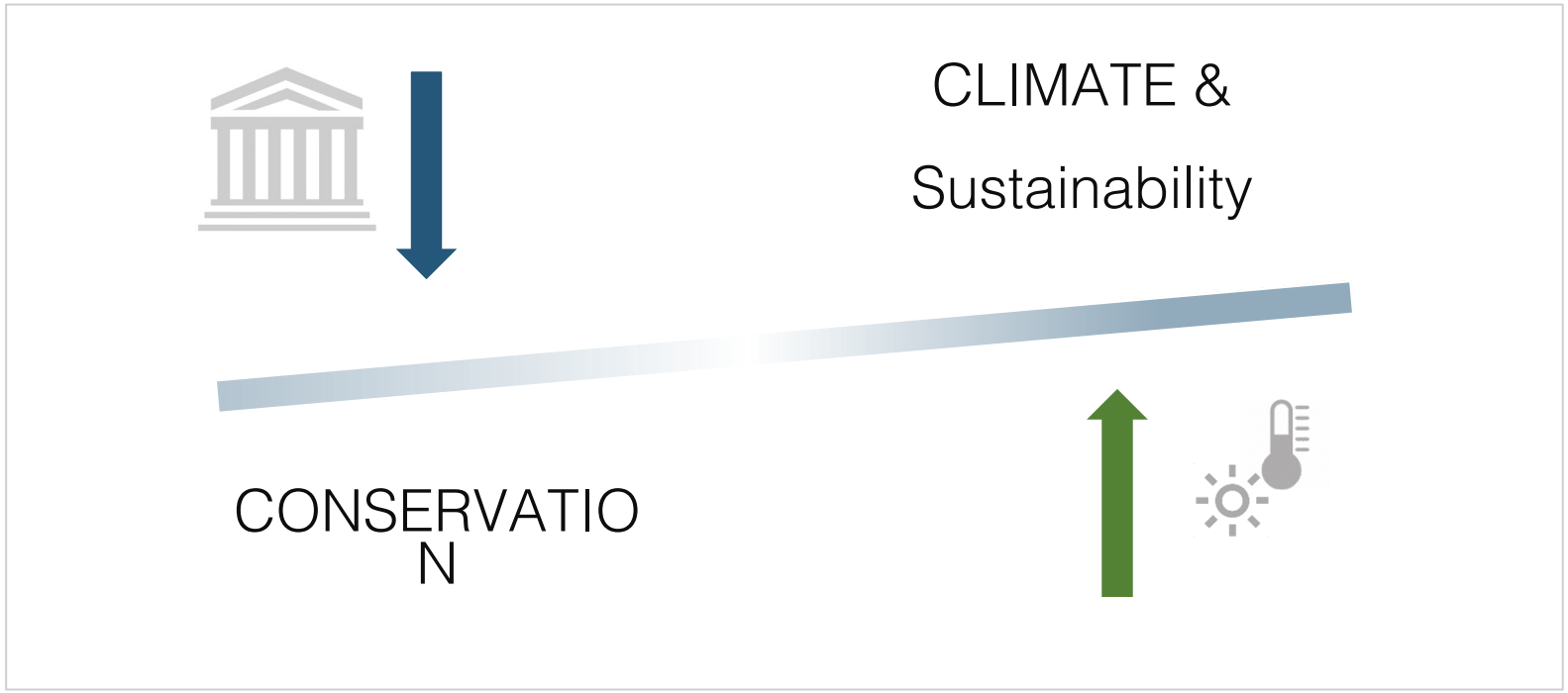
3. Integrating Instrumentation and Digital models

   - *Climate Graphing Software* - Multiscale analysis and AI
   - *HypErPICO* - Hyperspectral imaging and 3D modelling

# CHANGING MENTALITIES:

## Overcoming the dichotomic approach…

Blackening of the stone due to pollution, before and after restoration, Germany
© Danilo Forleo/ Château de Versailles



# AN EMBLEMATIC CASE:

## The air conditioning project of the Palace of Versailles

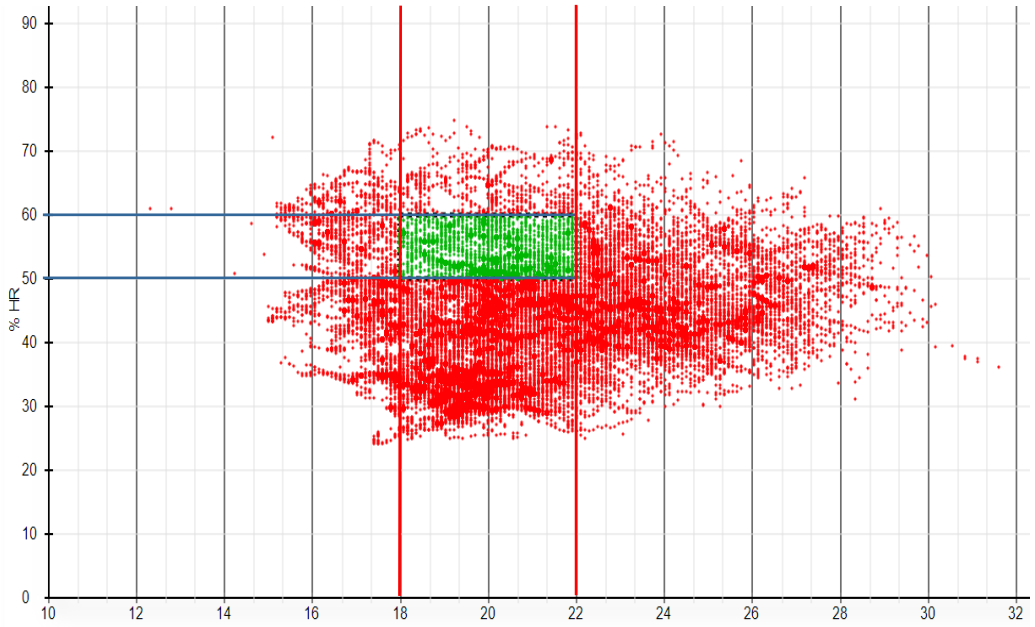
Queen's Chamber, records from 2014

### CONDITION SURVEY
*good state of conservation*

© Christophe Fouin/ Château de Versailles

VS

### RISK ASSESSMENT
*not in accordance with museum standards*

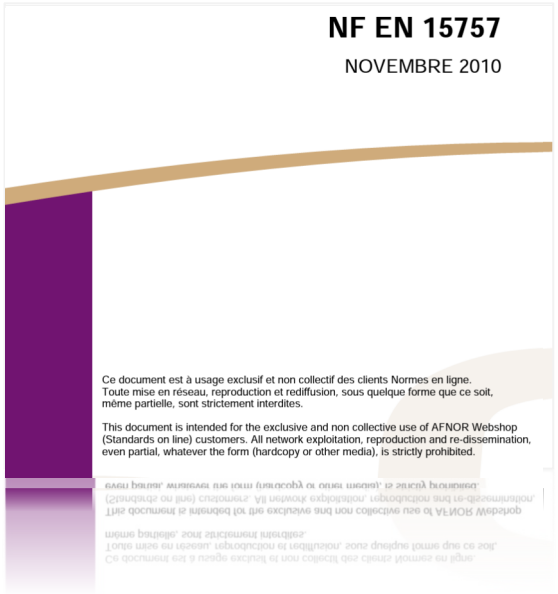



© CONSERVATION CONFORMITY RATE: 50%; Climate graphing software, records from 2014, before refurbishment of the heating system

# THE NEED FOR NEW CLIMATE CONSERVATION STANDARDS

## Based on the cause and effect relationship of alterations

### Priority of historical climate




*European Standard: NF EN 15757*
*Conservation of cultural property - Specifications for temperature and relative humidity to limit climate-induced mechanical damage in organic hygroscopic materials*

### Extending tolerance thresholds

Level 1 alarm: when the comfort values of the collections are exceeded

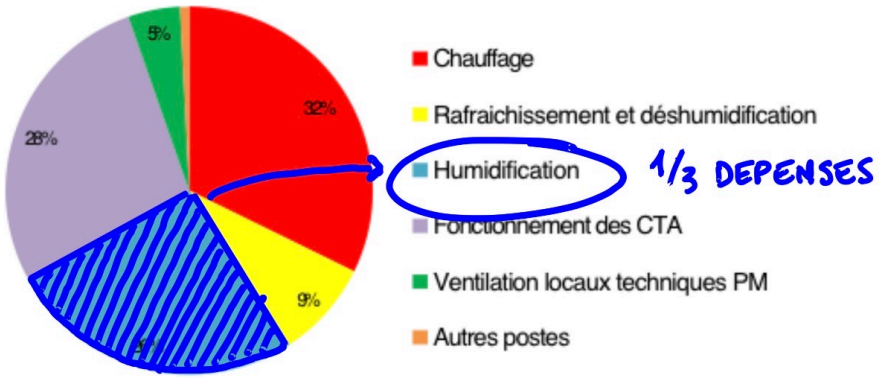
Tolerance range, relative humidity:
40 – 70%;
Tolerance range, temperature: 17 – 25°C
*Email/text alert timing: 24 hours*

Level 2 alarm: for extreme values
Tolerance range, relative humidity:
30 – 80%;
Tolerance range, temperature: 12 – 30°C
*Email/text alert timing: 60 minutes*

Example of programming alarms for exceeding risk thresholds for the collections at the Château de Versailles. © EPV/ Danilo Forleo

### Prioritise on a low heating target

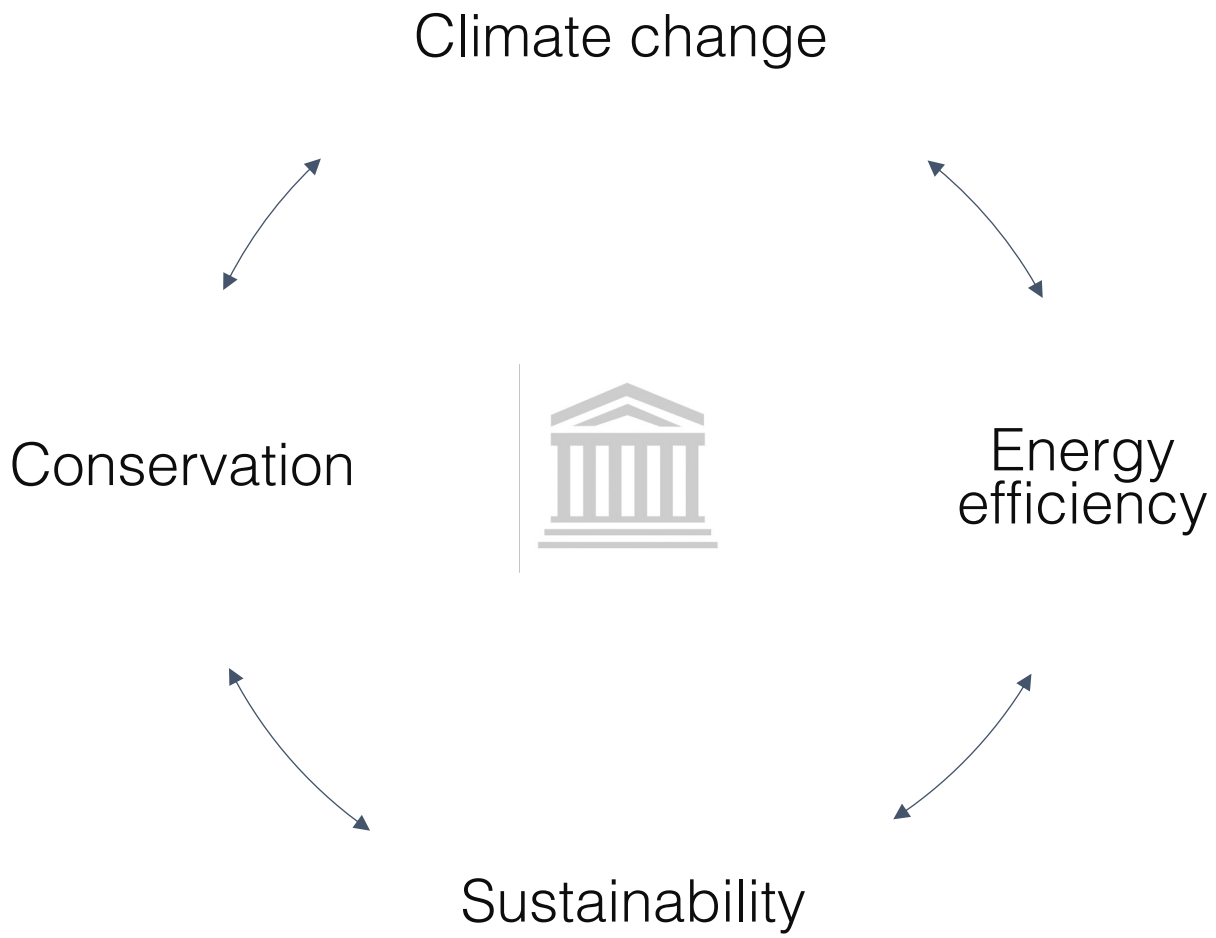
### Saving energy, protecting the collections from climatic shocks




Energy consumption breakdown. © EPV

# CHANGING MENTALITIES:

## Overcomes the dichotomic approach towards a systemic approach




# EPICO METHOD

## European Protocole in Preventive COnservation for Historic Houses

11 EU institutions involved

1 Leader, The Château de Versailles

1 Online Platform

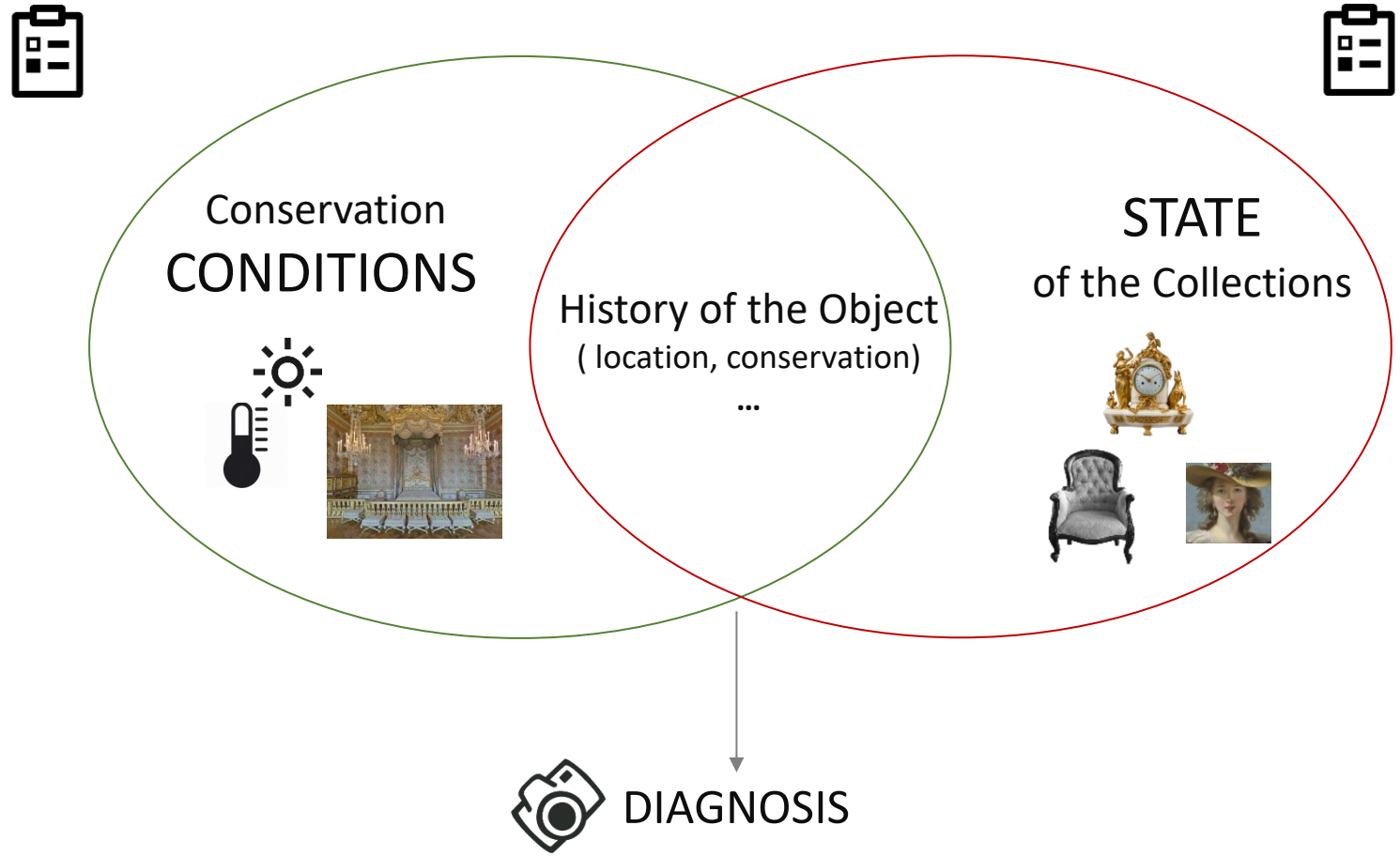
EPICO European Protocol In Preventive Conservation

5 criteria

- SPECIFIC TO HISTORIC HOUSES
- SYSTEMIC APPROACH
- CAUSE /EFFECT RELATIONSHIP
- PROVIDE COMPRHENSIVE VISION
- BE REPLICABLE/ TRANSFERABLE

# EPICO METHOD

## Systemic and integrative approach

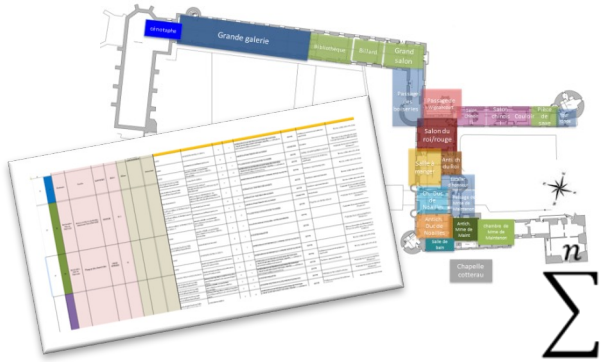


# EPICO METHOD

## Multidimensional system

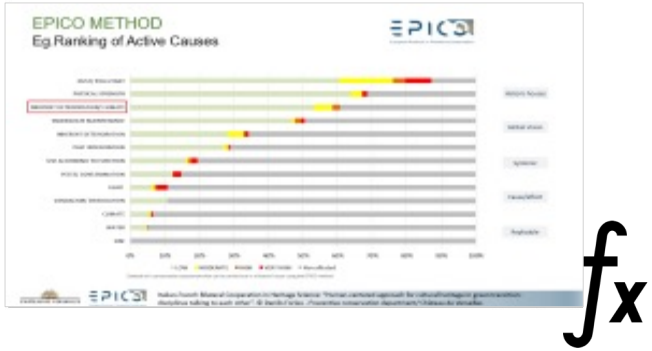
### 1 Pilot inspection


### 2 Sampling

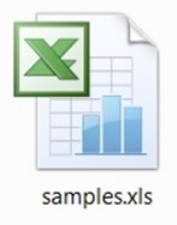



### 3 Condition survay

### 4 Data processing



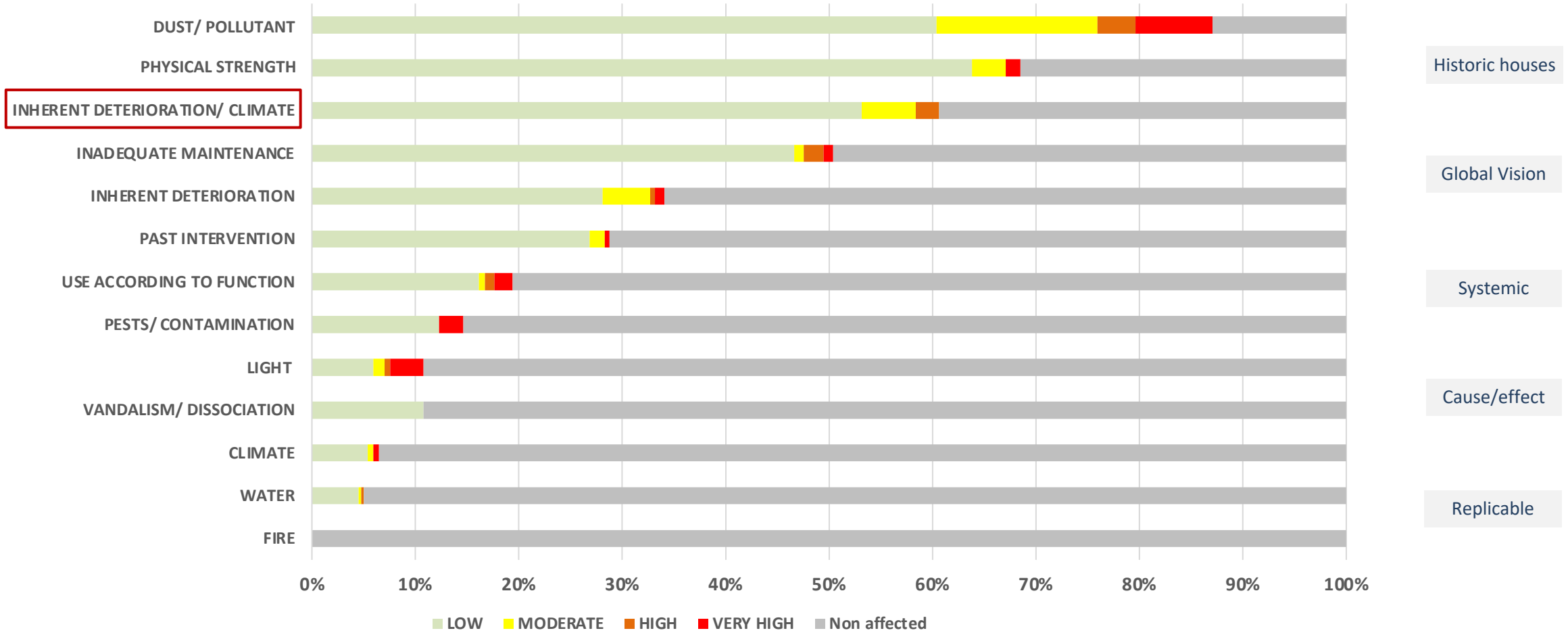

### 5 Conservation plan



# EPICO METHOD

## Eg.Ranking of Active Causes

European Protocol In Preventive Conservation




Historic houses

Global Vision

Systemic

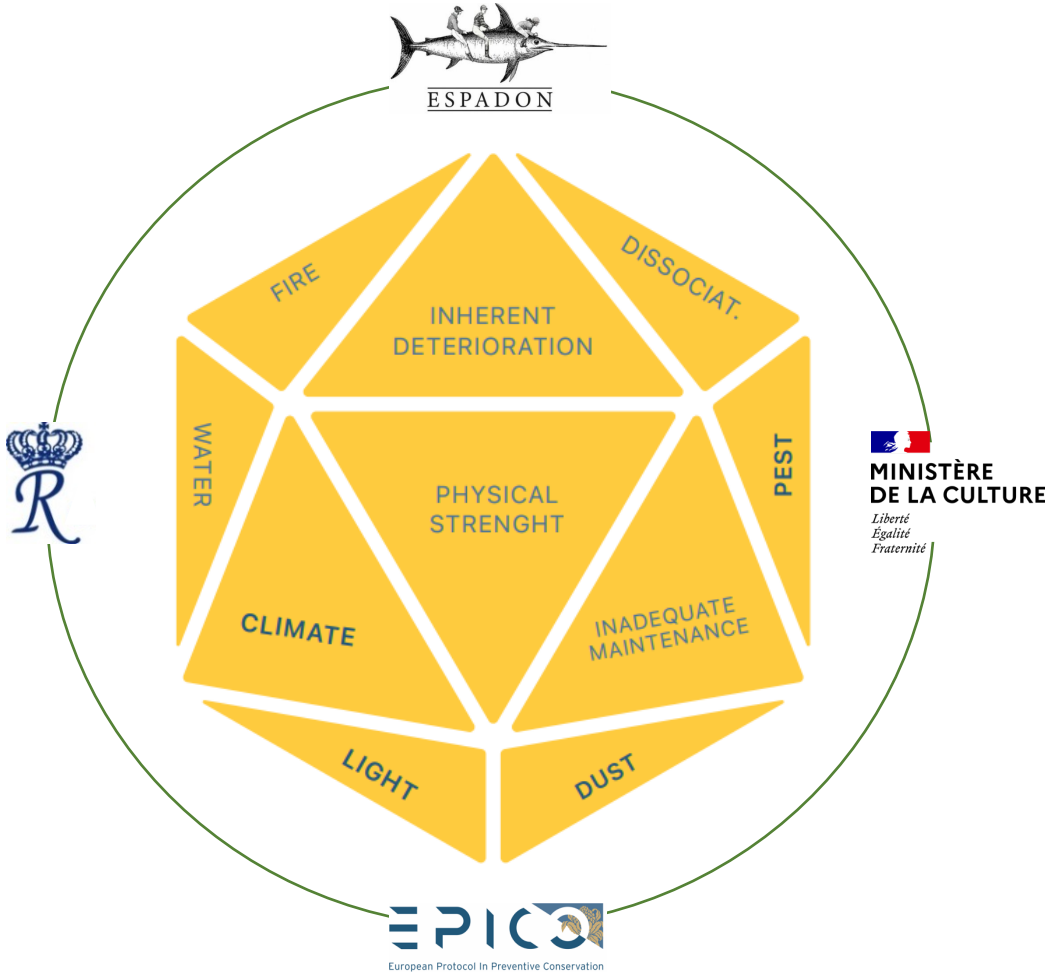
Cause/effect

Replicable

Example of a conservation assessment that can be carried out in a historic house using the EPICO method

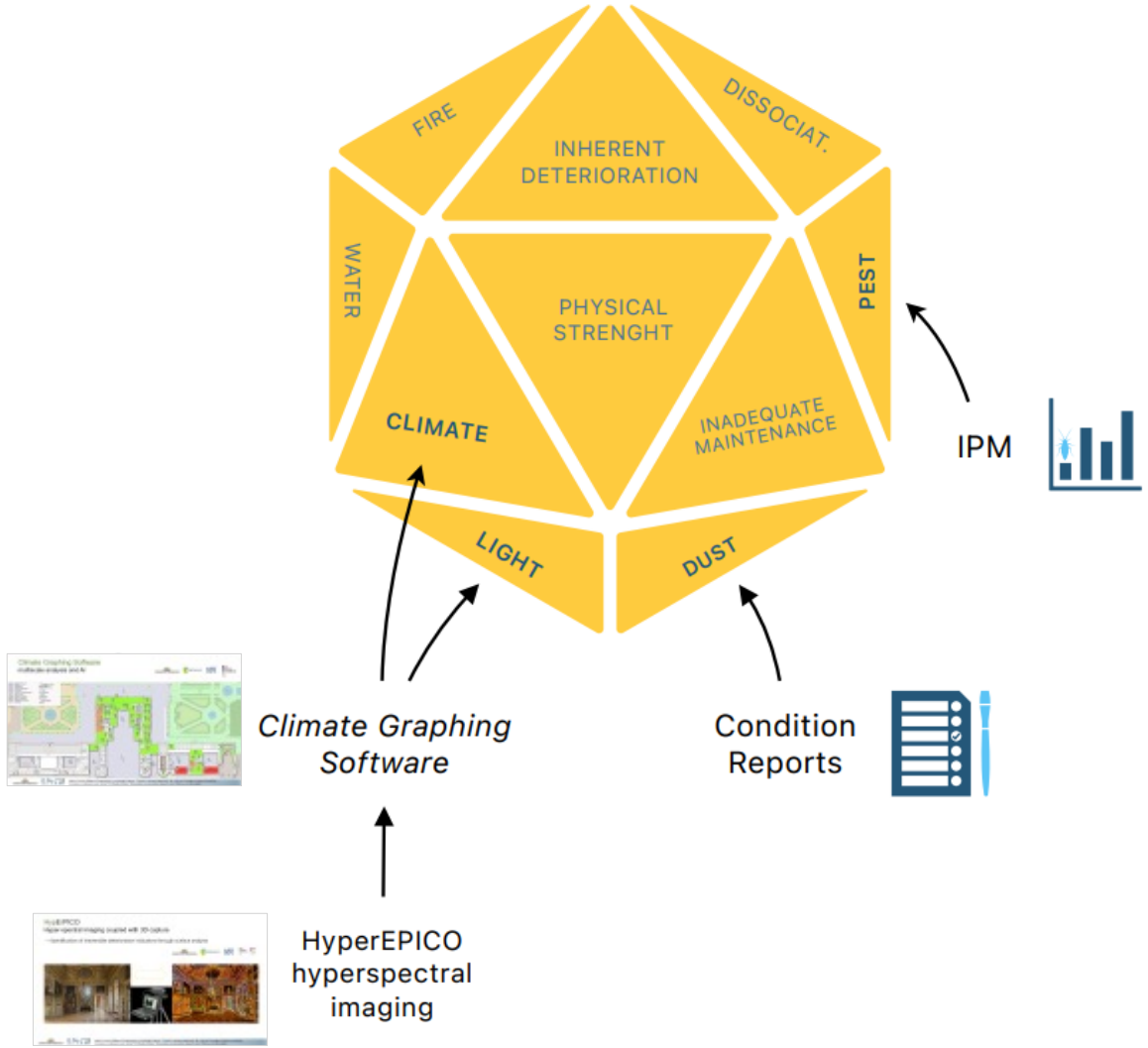
# EPICO METHOD

## A new integrative and multidimensional platform



# EPICO METHOD

## A new integrative and multidimensional platform



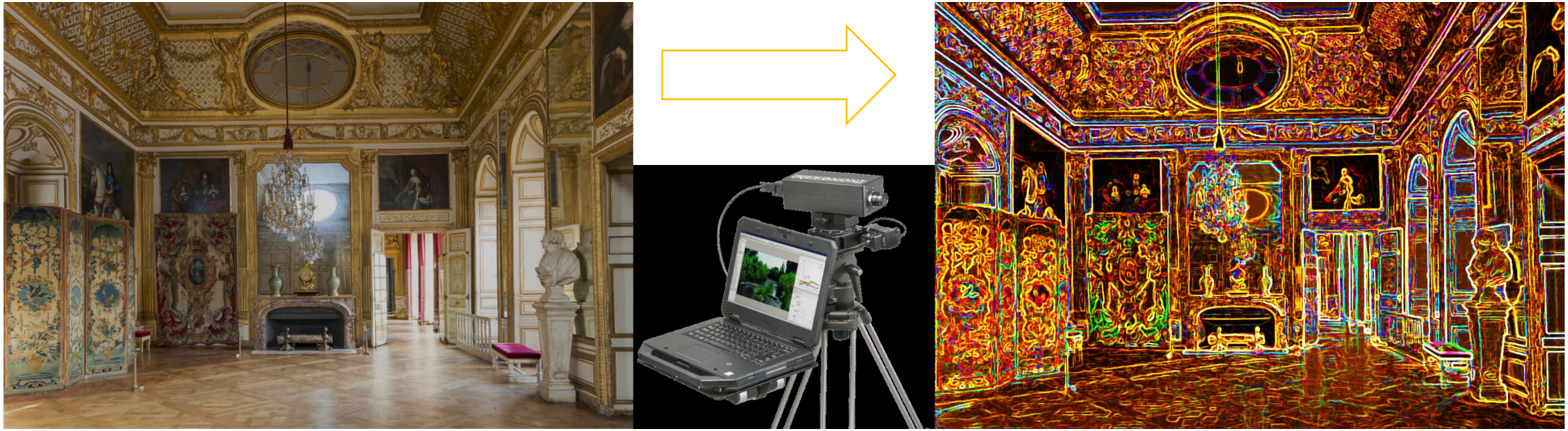
# Climate Graphing Software

## multiscale analysis and AI

# HypErPICO

## Hyper-spectral imaging coupled with 3D capture

→ Identification of irreversible deterioration indicators through surface analysis



Italian-French Bilateral Cooperation in Heritage Science: “Human-centered approach for cultural heritage in green transition: disciplines talking to each other”. © Danilo Forleo - Preventive conservation department/ Château de Versailles


# 2022 -2025 NEW EPICO PROGRAMME

New assessments

Innovative strategies

EPICO
European Protocol In Preventive Conservation

## CLIMATE CHANGE - CONSERVATION

## ENERGY EFFICIENCY

CHÂTEAU DE VERSAILLES

Résidences royales européennes

STIFTUNG PREUSSISCHE SCHLÖSSER UND GÄRTEN BERLIN-BRANDENBURG

Château de Chantilly
INSTITUT DE FRANCE

Palais Princier de Monaco

UNIVERSITÉ PARIS 1 PANTHÉON SORBONNE

CERGY PARIS UNIVERSITÉ

ESPADON

MINISTÈRE DE LA CULTURE
Liberté
Égalité
Fraternité

COUNCIL OF EUROPE
CONSEIL DE L'EUROPE

Parques de Sintra
Monte da Lua

Eure-et-Loir
LE DÉPARTEMENT

chateaudemaintenon.fr

Centre de Recherche

Muzeum Pałacu Króla Jana III w Wilanowie

CENTRO CONSERVAZIONE RESTAURO LA VENARIA REALE

# Thanks for your attention!

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http://www.europeanroyalresidences.eu/epico/