

ENVIART

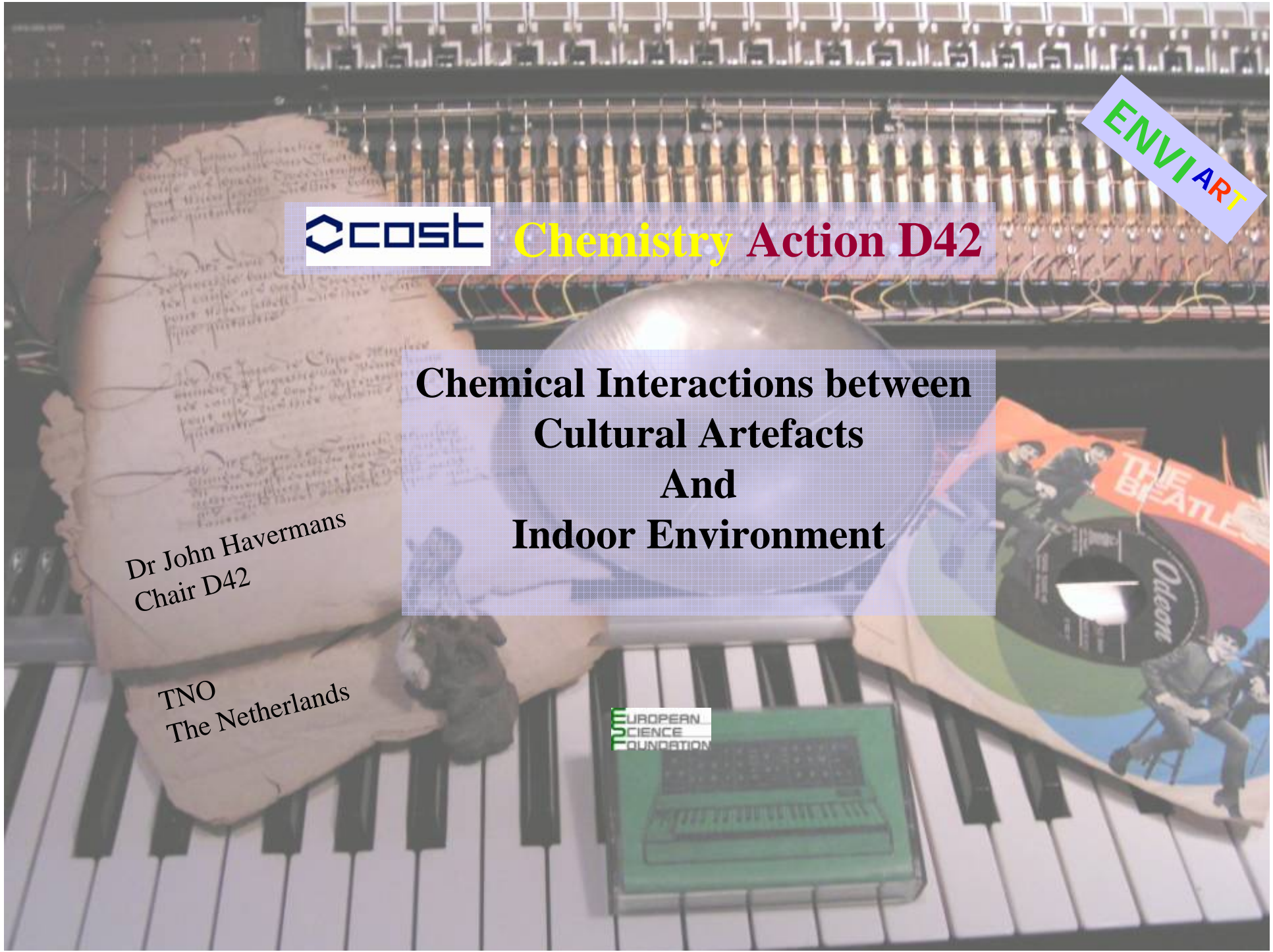
 **Chemistry Action D42**

**Chemical Interactions between  
Cultural Artefacts  
And  
Indoor Environment**

Dr John Havermans  
Chair D42

TNO  
The Netherlands

EUROPEAN  
SCIENCE  
FOUNDATION



# Who is who?



- John Havermans
  - M.Sc. Analytical Chem.
  - Ph.D. Organic Chem.
- TNO Built Environment & Geosciences
  - Dept. Indoor environment & health
  - Role as senior scientist and deputy head of the department
- COST
  - European **CO**operation in the field of **Scientific** and **Technical** Research
  - International Network
  - Special attention to young researchers
  - Previously funded via European Commission for Research
  - Now funded by European Science Foundation

# Introduction



Outside



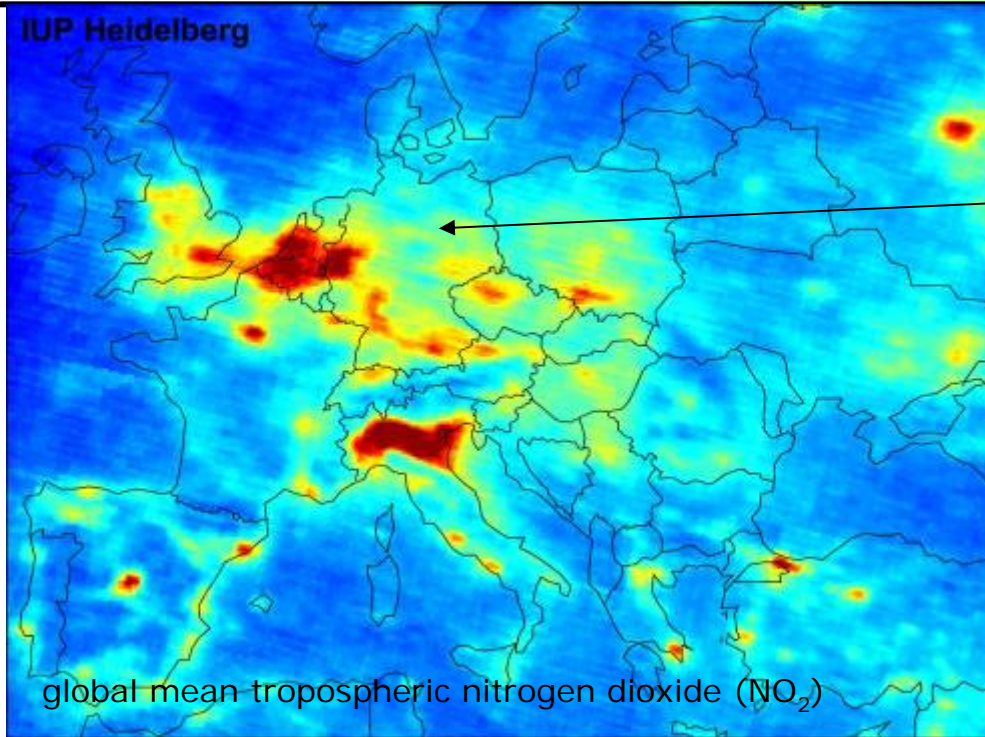
Inside



But what about objects...

Photographs from the EU COLLAPSE project

# Introduction

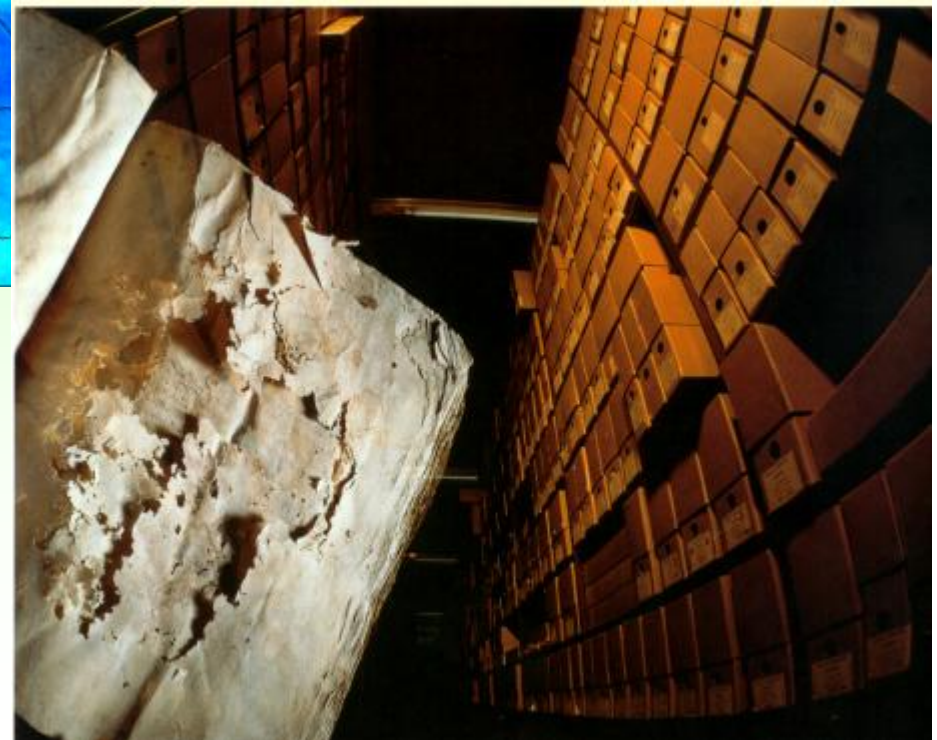


We are here!

**Clean collection?**

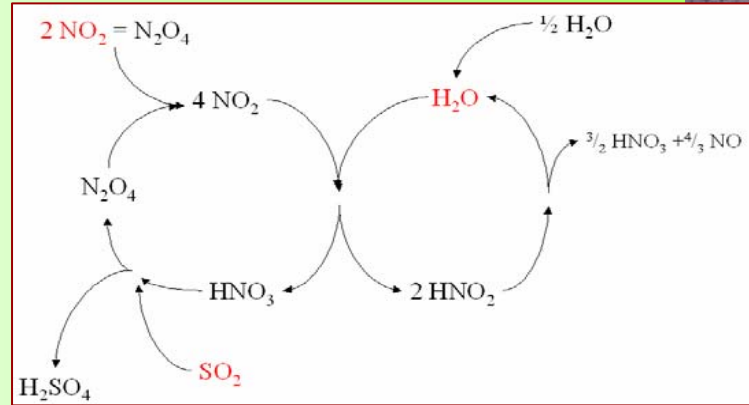
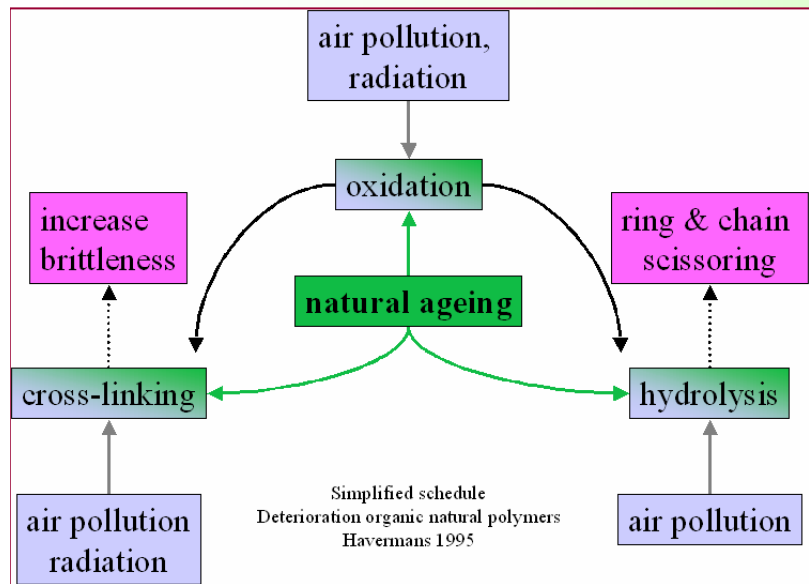
**Clean outdoor Air?**

Sometimes you don't even see what is wrong.....

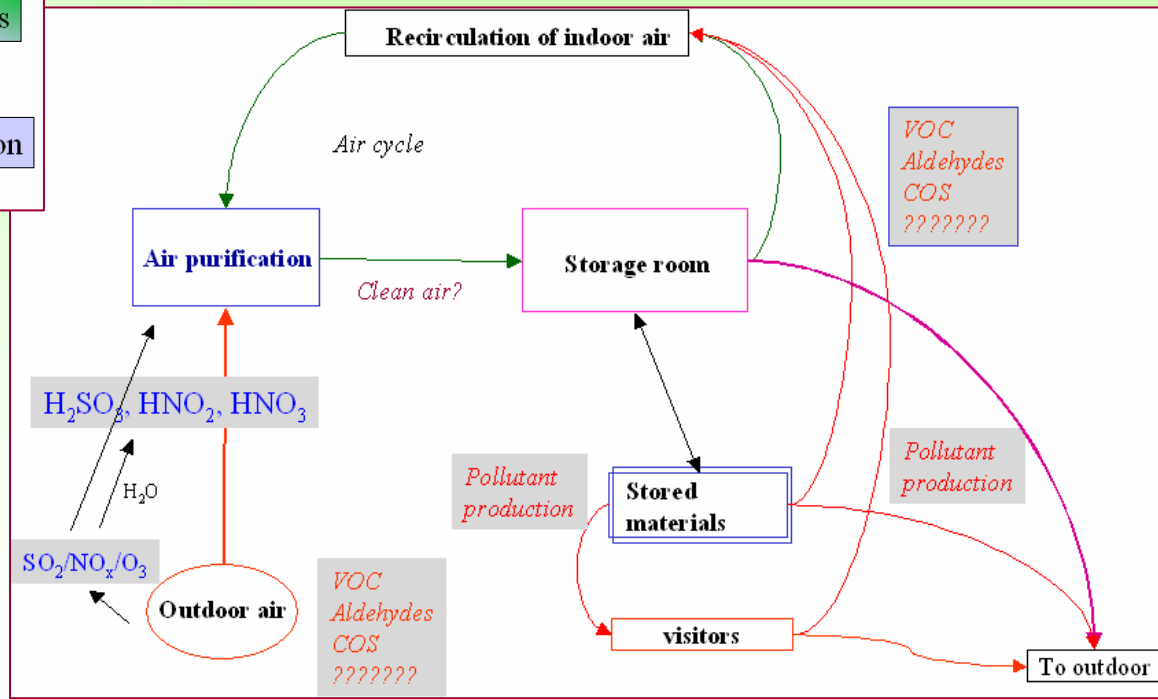




# Introduction : challenges



Beautiful chemistry behind the cultural artefacts and their interaction with the environment resulting in loss!





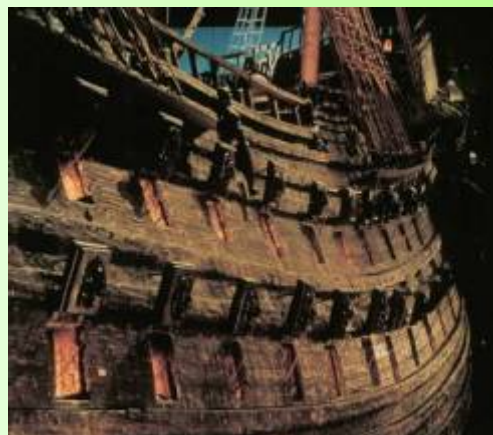
# Introduction: challenges



© TNO/NA

Paper deterioration

**Cause:** acidic pollutants initiated hydrolyses



© Wasa museum

Historical Ship & bronze canon deterioration

**Cause:** 800.000 moisty visitors initiated salt formation  
Folowed by acid formation and fenton-type reactions



No ©

Photographic collections  
And natural ageing

Historical film collections (vinegar syndrome)

**Cause:** acetic acid from the carrier initiates hydrolyses including objects nearby

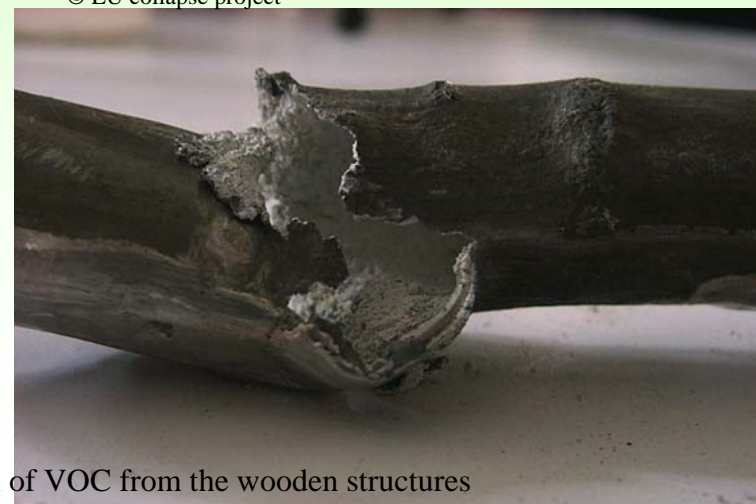


© a nony mouse

Organ Pipes

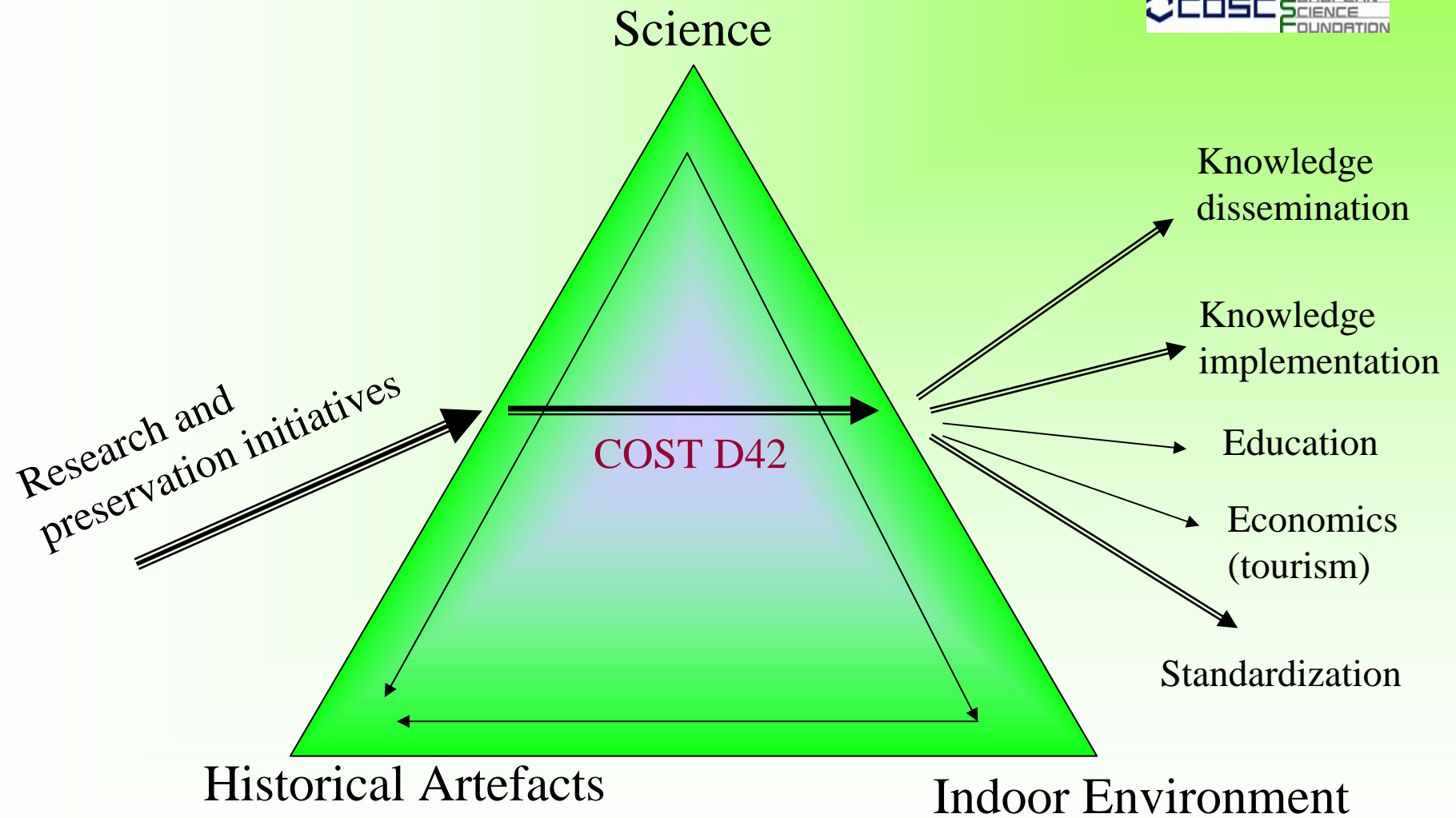
**Cause:** Formation of lead acetate

The deterioration of a pipes by the emission of VOC from the wooden structures



© EU collapse project

# The challenge



# Objectives



- *Explore chemical interactions between cultural artefacts and typical indoor environmental conditions*
  - Field studies, laboratory experiments
  - Knowledge transfer (preventive conservation practice)



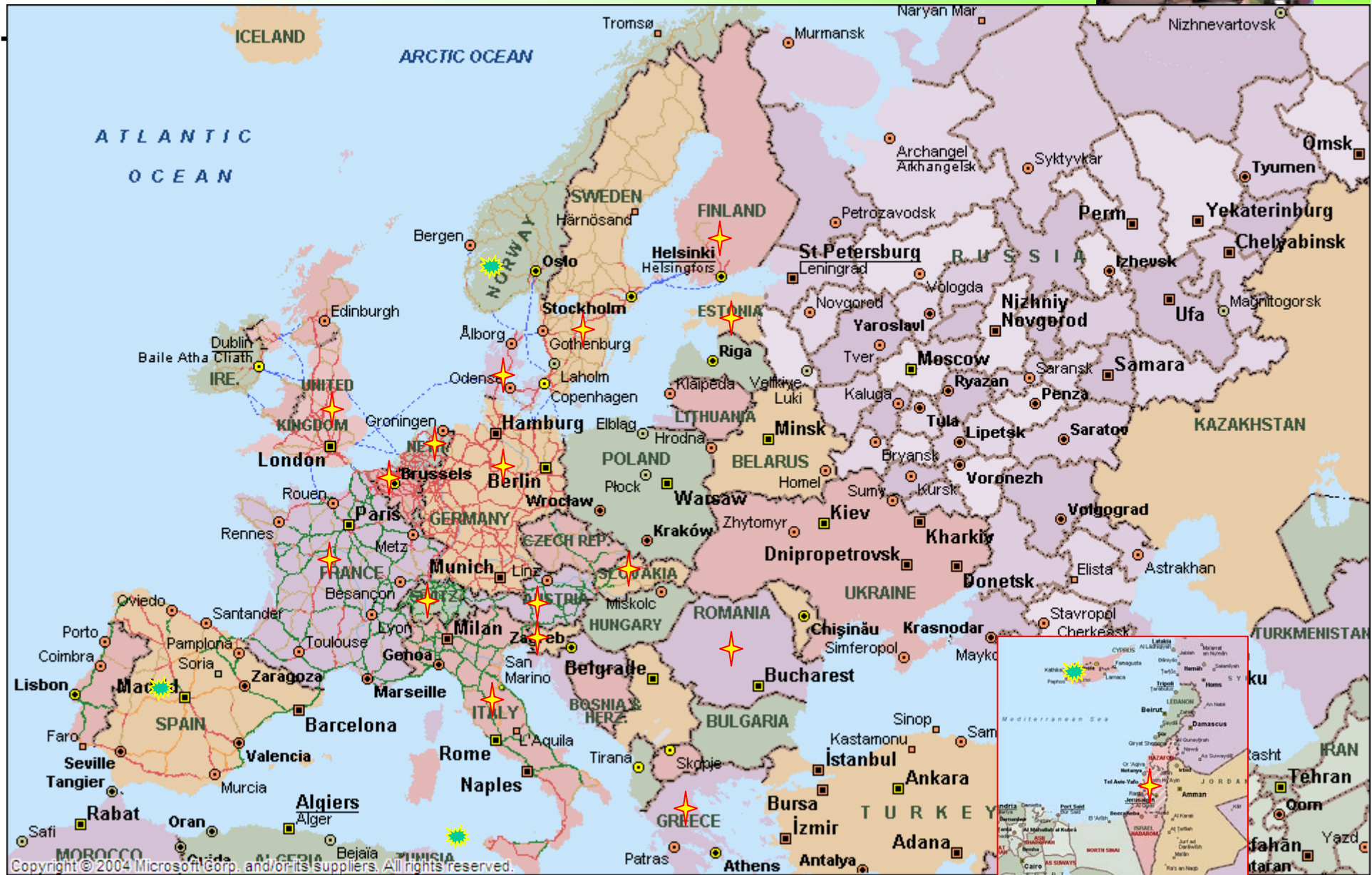
# Technical objectives



- **Understanding** natural ageing of materials in relation to indoor environment
- **Assess chemical degradation** rates connected to define environmental conditions with laboratory experiments
- Investigate **chemical interactions** of materials with typical indoor pollutants
- Provide a **platform** between (conservation) scientist, engineers, curators, etc. aiming to improve “best practice” in preventive conservation
- Contribute to **standardization** of methods in conservation and conservation research



# 16 countries signed and 4 intend to sign



# Link with EU RTD initiatives



- EU Goal
  - Reinforce the scientific basis for the establishment of measures and methodologies for the protection and rehabilitation of the EU Cultural Heritage
- To understand
  - Causes, mechanisms, effects and treatments
- To develop and validate
  - technologies & methods
- Assessment of environmental risk factors
  - Unsound use of technology
  - Mass tourism
- First EU programme started in 1986!
  - So 20 years of EU Initiated Cultural Heritage Research
  - Over 20 EU projects the indoor environment is included!

# Improvements to reach

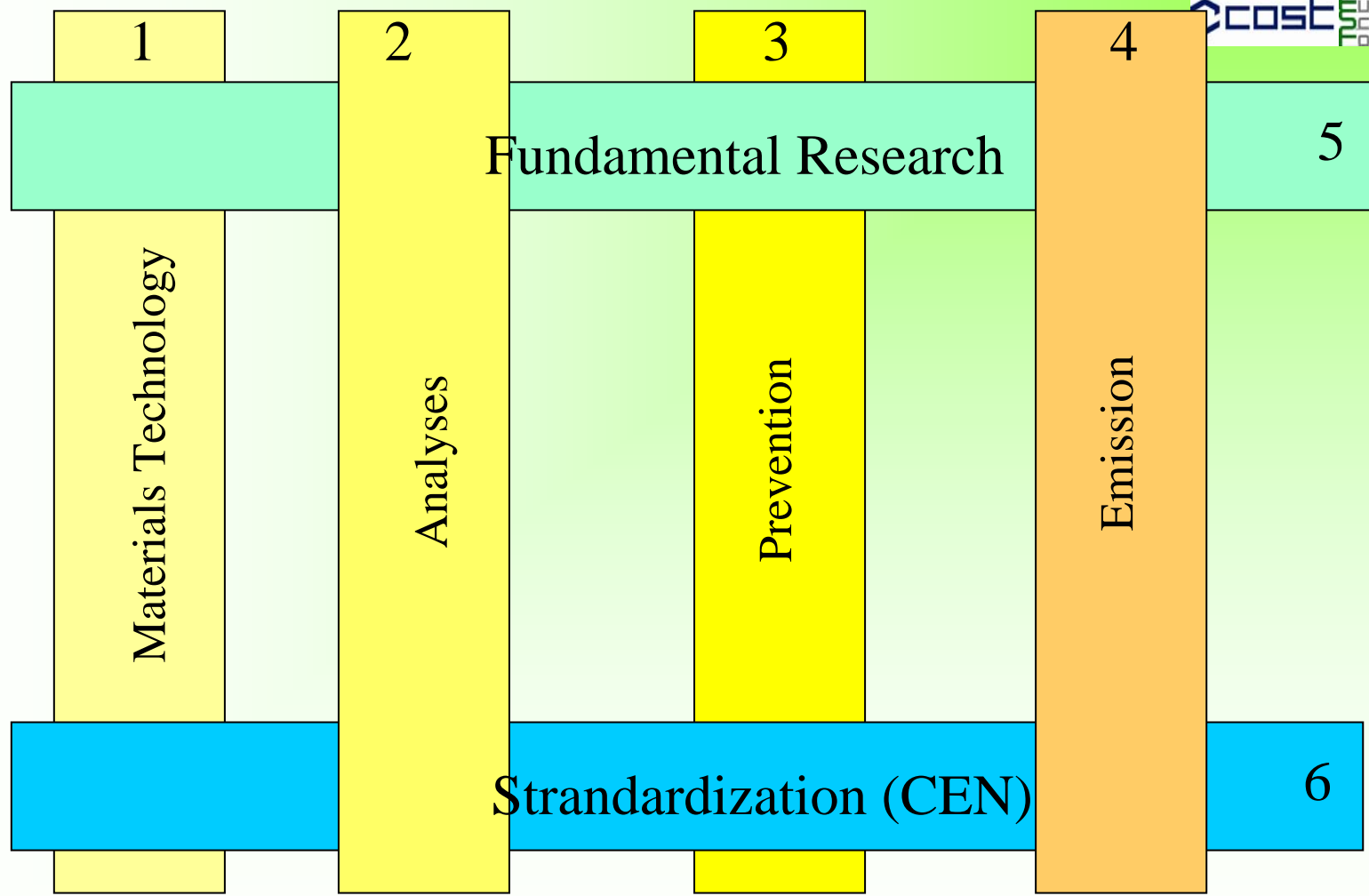
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- Multi-disciplinary collaboration between key players
- Improve preventive conservation practices
- Improve education
- International cooperation: young researchers
- Enhancing pre-normative work
- Set priorities for investments in collections
  - Contribute to risk assessment



# Scientific Areas Proposed

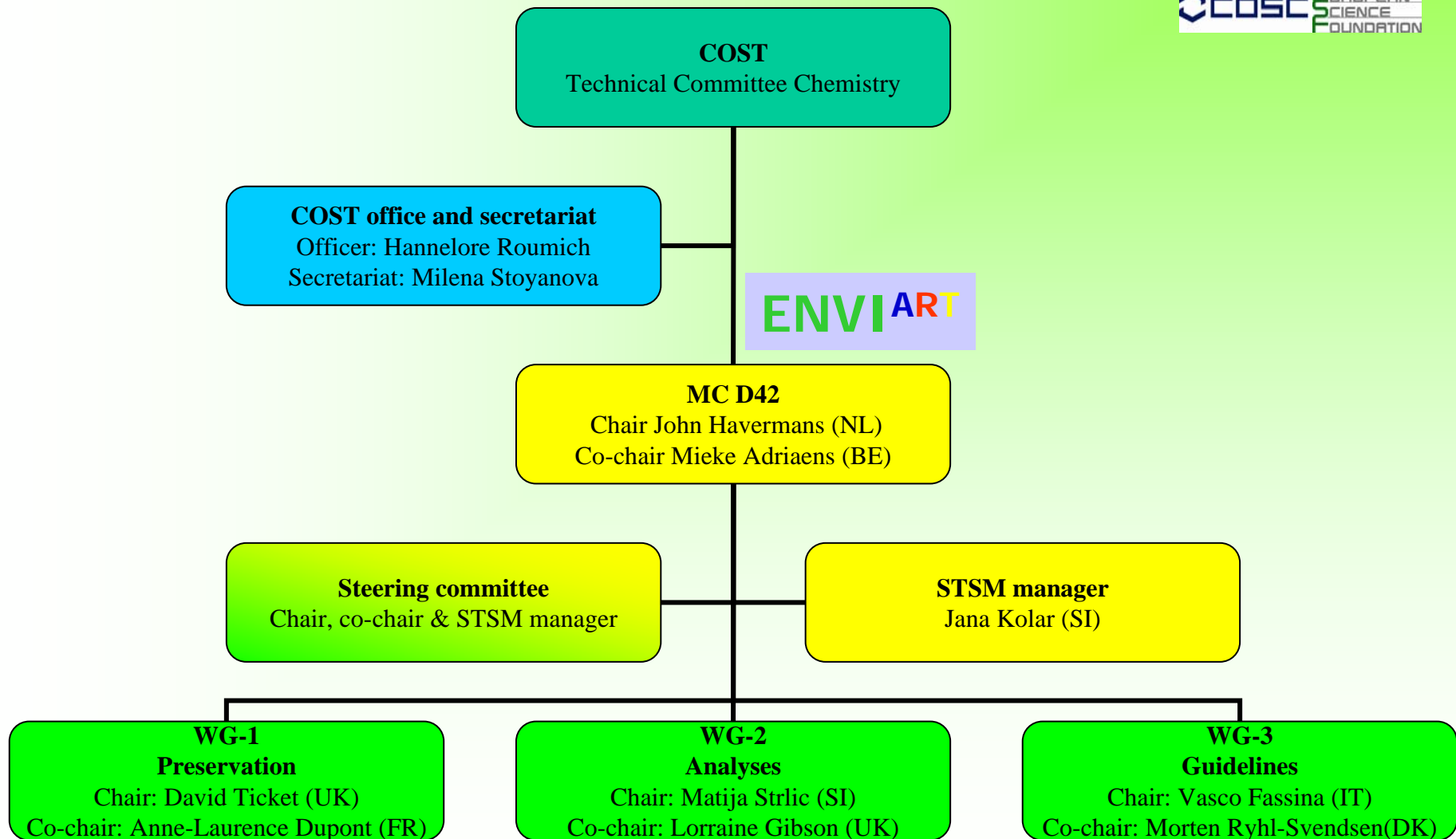




# Start with 3 working groups

| <b>Working Group - 1</b><br>Preservation  |   | <b>Working Group - 2</b><br>Analysis   |  | <b>Working Group - 3</b><br>Guidelines   |  |
|---|---|--|--|--|--|
| <b>Task Group 1</b><br>Degradation & Stabilisation  | <b>Task Group 2</b><br>Prevention   | <b>Task Group 1</b><br>Materials   | <b>Task Group 2</b><br>Environment   | <b>Task Group 1</b><br>Methods   | <b>Task Group 2</b><br>Storage & Health                                  |
| <b>Focus 1.1</b><br>Effects air pollution on degradation<br>Strategies for stabilisation<br>Field and lab studies | <b>Focus 1.2</b><br>pollutants and artefact<br>Chemical air purification<br>Development new strategies & Innovative methods | <b>Focus 2.1</b><br>Analyses object<br>Analyses environment<br>Non-destructive tools<br>Building materials | <b>Focus 2.2</b><br>Assessment VOC<br>Endogeneous and exogeneous emissions<br>Particulate matter<br>Sampling | <b>Focus 3.1</b><br>Assessment and evaluation of current methods and standards | <b>Focus 3.2</b><br>Healthy storage guidelines<br>Handling<br>Exhibition |
| <b>Common Focus</b><br>•Fundamental Research<br>•Dissemination Activities   |   |  |  |  |  |

# Structure



# Dissemination Strategy



- Level-1
  - Management meetings, web-site, joint publications (at least 2 cooperating members/labs), literature database?
- Level-2
  - Technical meetings, joint projects, exchange of researchers & pre normative actions
- Level-3
  - Seminars, Workshops, Conferences & Education/training school



# Meetings 2006



- COST D42 - 1<sup>st</sup> Workshop
  - Germany, Braunschweig, November 17, 2006
  - Joint meeting with the IAQ group.
  - Friday: Joint WG meeting
    - Introduction of COST D42 (& Members) to the field
- COST D42 – 2<sup>nd</sup> Workshop meeting
  - Belgium, Gent, December 8, 2006
  - Presentations and discussions dedicated to
  - WG-1, prevention in conservation and
  - WG-2, analysis

# STSM



- Short Term Scientific Missions
  - Students and young researchers can receive a grant for visiting another institute
  - Only from COST to COST countries
  - STSM manager: Dr. Jana Kolar (Slovenia)
  - COST D42 website will be open with STSM calls

# More Information



Filling the gaps by networking

- End 2006
  - **WWW.ENVIART.ORG**  
**WWW.COSTD42.ORG**
- At present
  - All names of COST D42 members can be found at
  - **www.cost.esf.org** and search for action D42



# Acknowledgement



- Organizers for this IAQ meeting
- COST
- EU DG Research
- TNO



*Sometimes we just have to accept the presence  
of organic indoor air pollutants*