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# **WP21**

## **Corrosion of historical and archaeological artefacts**

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Business meeting  
Chair Delphine Neff, CEA, France  
Vice-chair David Watkinson, U. Cardiff, UK  
Secretary Sabrina Grassini, Politecnico Torino, Italy

# History of WP21

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- Founded in 2008 by Philippe Dillmann in Nice
  - Special issue in CEST in 2008
- Joint session with atmospheric corrosion in 2009
  - Corrosion of historical statues and monuments

Since 2013



Chair: Delphine Neff  
Research scientist at CEA



Vice-chair: David Watkinson  
Conservation scientist at  
Cardiff university



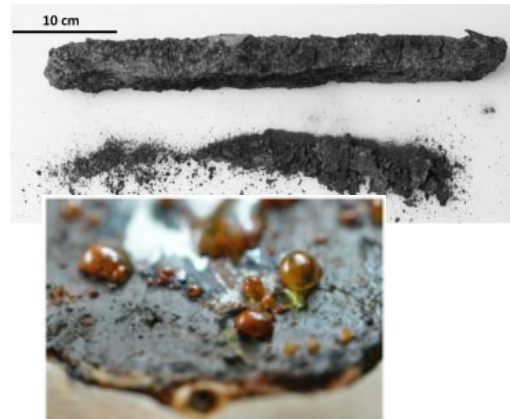
Secretary: Sabrina Grassini  
Assistant professor at  
Politecnico di Torino

# Concerns: protection of cultural heritage

- UNESCO convention of the 16<sup>th</sup> nov 1972
  - Museum objects
  - Statuary and transport
  - Reinforced buildings



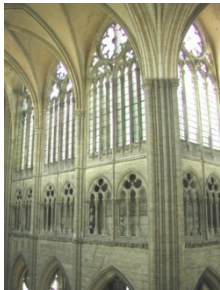
Brunel's ss Great Britain launched 1843 Bristol UK



Roman ingot, 1st century, NIMBE/LAPA ©



Lions Gate, Louvre, Paris, 19th c.  
NIMBE/LAPA ©



Amiens' cathedral, 15<sup>ème</sup> siècle, NIMBE/LAPA ©



ONERA wind tunnel, 1930 and 1950, NIMBE/LAPA ©

# Goals

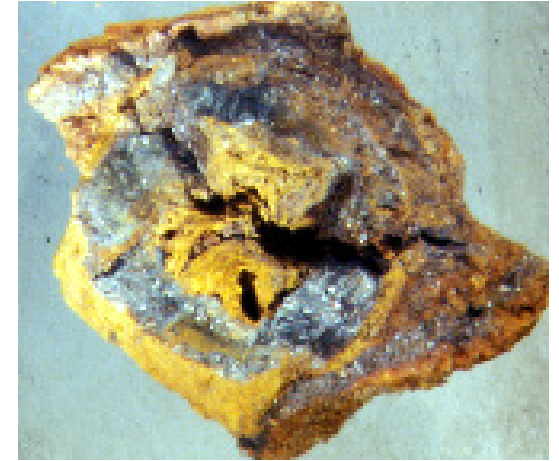
- **To control the corrosion of cultural heritage metals**
  - A wide range of metals and alloys in differing contexts
    - Fe, Cu, Pb, Al, Zn, Ag, etc
    - Archaeological to present day
    - Composite objects
      - Paint
      - Glass
      - Plastic
      - Textiles



Figures 1, 2. A restored Douglas SBD-3 Dauntless which crashed into Lake Michigan during carrier qualification training in October, 1943. Photographs by P. Fix.

# Scientific and technical

- **Understanding longterm corrosion mechanisms**
- Historic metals
- Archaeological metals
  - Post-excavation corrosion phenomenon
  - Physico-chemical transformation during treatment
  - Interaction between organic compounds, metal and corrosion layers



Roman nail totally mineralised cross section

# Treatment design and evaluation

- **Cleaning**

- Chemical (EDTA, phosphoric acid)
- Mechanical



Figure 8. A pigeon camera before treatment

Metal 2010 conference proceedings, ICOM-CC

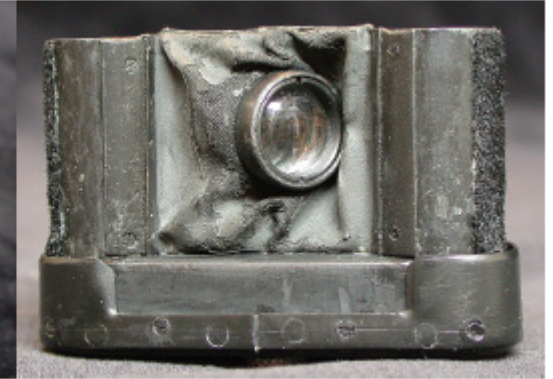
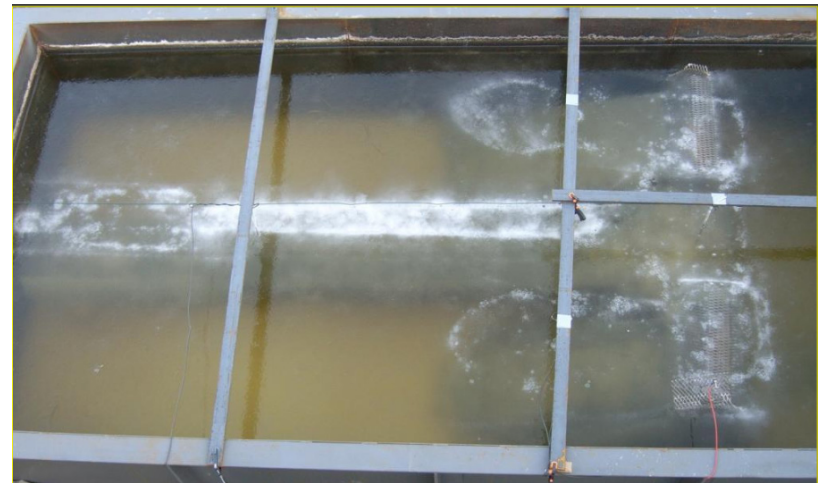


Figure 9. A pigeon camera after treatment

- **Stabilisation**

- Removal of chlorides



Anchor in polarized alkaline bath, A-Corros®

# Protection design and evaluation

- **Coatings**

- Microcrystalline wax
- BTA for bronze
- Polyacrylic resin

- **Criteria**

- No change of the aspect of the object
- Removable/reversible
- Non toxicity for restorers and conservators (green chemistry)
- Resistance to long time alteration (eg RH, UV)



Historic coating  
Holyrood Palace  
Edinburgh

# WP21

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- Reinforce connections between conservation practitioners, conservation scientists and corrosion scientists

- Connections with ICOM-CC:

- International Council of Museum – Committee for Conservation

- triennial meeting of the ICOM-CC Metals Working Group in 2016, New Delhi, India

- Collaboration on national / European projects

- **JPI- Joint Heritage European Programme**
- **H2020** special call for cultural heritage





# Members: interdisciplinary

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- About 70 members from 19 countries
  - Average of 12 oral presentation each year
    - Partly one day registration
  - 27 presentations last year in Italy
- Conservation field: restorers, curators and conservators
- Physico-chemistry: academic and private companies

# Publications

- EFC Green books 2007 (48) and 2013 (65)
- Special issue 2016 in Materials and Corrosion

