PROJECT ACRONYM AND TITLE: APACHE - Active & intelligent P Ackaging materials and display cases as a tool for preventive conservation of Cultural Heritage

FUNDING PROGRAMME: H2020 NMPB

CALL: NMBP-33-2018 - Innovative and affordable solutions for the preventive conservation of cultural heritage

SCIENTIFIC FIELDS: Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology

HOST DEPARTMENT: DAIS – Department of Environmental Sciences, Informatics and Statistics

SCIENTIFIC RESPONSIBLE: Antonio Marcomini

FINANCIAL DATA:

<table>
<thead>
<tr>
<th>Project total costs</th>
<th>Overall funding assigned to UNIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>€ 7,913,811,25</td>
<td>€ 349,875,00</td>
</tr>
</tbody>
</table>

ABSTRACT:
Most Cultural Heritage objects housed by museums are often stored under unsuitable climate conditions. APACHE will develop a cutting edge technology to control and prevent the degradation of such patrimony. The novel approach is based on three pillars: 1) advanced sensing and absorbing materials to control the artifacts’ environment; 2) modeling to define the threshold of artifacts’ degradation and to discriminate between the need for preventive or remedial conservation; 3) remote control of the works of art stressors. The unique combination of these pillars will reduce to the lowest possible level the costs actually required by conventional technology for art conservation. New generation of active and intelligent display cases, crates, and storage boxes, will be implemented thanks to: i) The unique APACHE partnership, comprising the most important experts in the three aforementioned pillars; ii) The development of easy-to-use sensing devices able to communicate through Wireless Sensor Networks and Radio Frequency Identification Devices thanks to Industry 4.0-5.0 ICT technologies, granting the optimal environmental conditions around the art objects. Multiscale models integrated in an open simulation environment will be used to predict the degradation of artefacts and set the properties of sensors (detection limits) and polyfunctional absorbents. APACHE includes small, medium, and large museums exhibiting representative variety of display and storage conditions. For instance, the Venice Peggy Guggenheim Collection features one of the most important collections of modern/contemporary art, which experiences highly unfavorable environmental conditions, difficult to control with conventional tools. Centre Pompidou and National Museum of Hungary possess a vast amount of artefacts stored in deposits (e.g. in crates and boxes). Moreover, a decision-making tool composed by a modular set of decision trees will be offered to end-users to guide them through the best solutions.
<table>
<thead>
<tr>
<th>Planned Start date</th>
<th>Planned End date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st January 2019</td>
<td>30th June 2022</td>
</tr>
</tbody>
</table>

**PARTNERSHIP:**

1. Consorzio interuniversitario per lo sviluppo dei sistemi a grande interfase, Italy - Coordinatore
2. Ca’ Foscari University, Italy - Partner
3. University college cork - national University of Ireland, Ireland - Partner
4. Consiglio Nazionale delle Ricerche, Italy - Partner
5. University college of London, United Kingdom - Partner
6. Foundation for research and technology Hellas, Greece - Partner
7. Chalmers tekniska hoegskola ab, Sweden - Partner
8. National technical university of Athens, Greece - Partner
9. Universidade federal do rio grande do sul, Brazil - Partner
10. Zfb zentrum fur bucherhaltung gmbh, Germany - Partner
11. Ionfly vacuum and plasma technology srl, Italy - Partner
12. Univerza v ljubljani, Slovenia - Partner
13. Max-planck-gesellschaft zur forderung Der wissenschaften ev, Germany - Partner
14. Fraunhofer gesellschaft zur foerderung Der angewandten forschung e.v., Germany - Partner
15. Bewarrant, Belgium - Partner
16. Mirabile antonio, France - Partner
17. Goppion s.p.a., Italy - Partner
18. Akzo nobel pulp and performance Chemicals ab, Sweden - Partner
19. Ericsson ab, Sweden - Partner
20. International centre for the study of The preservation and restoration of cultural property, Italy - Partner
21. Ministero per i beni e le attivita culturali, Italy - Partner
22. Centre national d’art et de culture Georges-pompidou, France - Partner
23. Narodni muzej slovenije, Slovenia - Partner
24. Magyar nemzeti muzeum, Hungary - Partner
25. Fondazione scienza e tecnica, Italy - Partner
26. Solomon r guggenheim foundation, United States of America - Partner