



MILESTONE MS1

Report on Stakeholders' Needs with respect to a Decision Maker Tool (DMT)

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1 Introduction

The main aim of this document (Milestone MS1 “*Repost on stakeholders’ needs with respect to a decision maker tool*”), is to provide information about particular needs of the different stakeholders groups responsive with the use of the innovative materials and tools developed within the frame of the project APACHE. In particular, the input of the stakeholders’ needs assessment will significantly provide critical guidance for the Work Package 5 (WP5 – Modelling-based decision-making to support the choice between conservation measures. A decision-making tool composed by a modular set of decision trees for guiding the choice between preventive and remedial conservation).

To this end we decided to prepare and run a survey with the purpose to better identify individuals, organisations and institutions that have some form of stake and/or interest in the research outcomes and assessing their particular needs.

2 How we surveyed

APACHE project posted the survey on its website at the beginning of May 2019, then the survey was posted on the websites of a large number of associations and professional organizations related to the preservation of cultural heritage (among others UNESCO, ICOM CC, AIC, IIC, IGIIC, AICRAB, FFCR, AICCM...). In addition to this, about 1000 direct messages were sent to professionals who play a role in the conservation and care of heritage collections. Respondents were encouraged to share the link with other liaisons, and social media.

The survey is organized in four sections:

1. Institution and Collection
2. Environment and Enclosures
3. Storage and Exhibition conditions
4. Challenges and Needs

Survey is composed of 21 questions, only two of them require a mandatory response:

- Question 1 (Q1) about the choose of the language;
- And Question 13 (Q13) about the measurement of some parameters in storage and exhibition area, those who answered negatively to the question: *Do you regularly measure some parameters in the storage and exhibition areas?* skipped five questions (Q14, Q15, Q16, Q17, Q18) on measurements and collection of microclimatic data and are directed to Question 19.

The survey data, feeding this document, was collected on September 23, respondents were 756. We originally planned to close the survey for September 30, 2019 but, given the great success and large participation we decided to leave it open until December 30, 2021 with the prospect to receive an even greater number of respondents and to be able to extract statistics with a higher level of confidence and a lower margin of error.





3 Language

Question 1(Q1) is about the language. The survey is available in eleven languages, all those spoken among the project participants plus Spanish, Catalan and Japanese, unfortunately no answer has yet been received in Japanese.



4 Section 1: Institution and Collections

Six questions (Q2 to Q7) in this section asked for basic information about geographic area, collection size, status of the collection and collection materials.

4.1 Geographic area

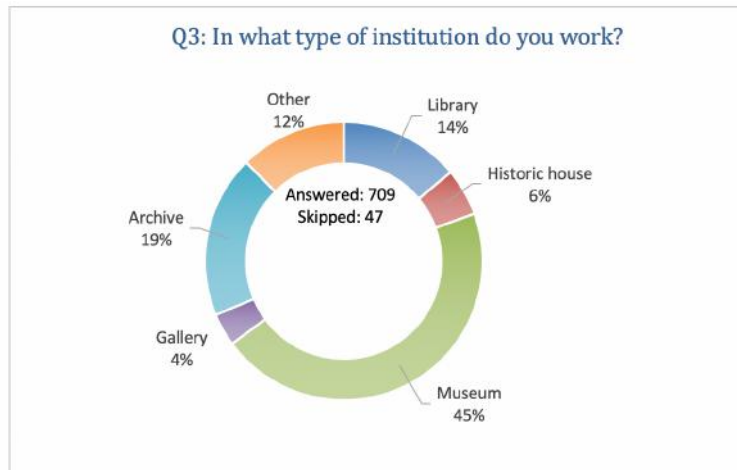
72 countries were represented with more than 100 respondents from Hungary, Italy, Spain and Brazil. Further analysis and interpretation will be published during the next two years on national and international basis.





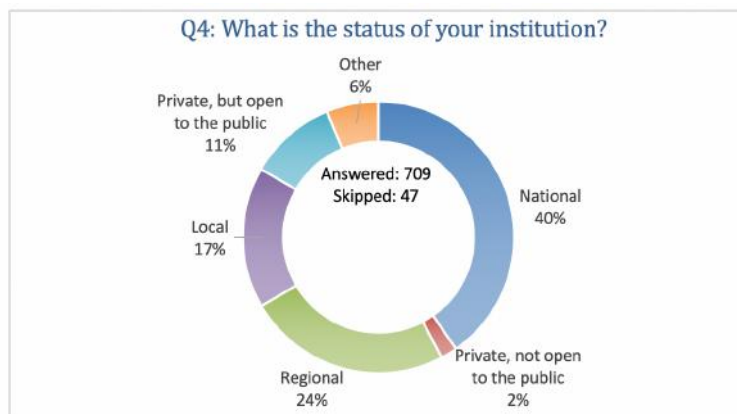
4.2 Type of institution

The 709 respondents provided answers showing that museums (45%) are the most represented type of institution, followed by archives (19%) and libraries (14%). With regard to the option *Other*, it should be pointed out that responses contain a very wide range of institutions, including: private centre, university, conservation centre, national heritage agency, scientific institution, collection storage, repository, etc.



4.3 Status of the institution

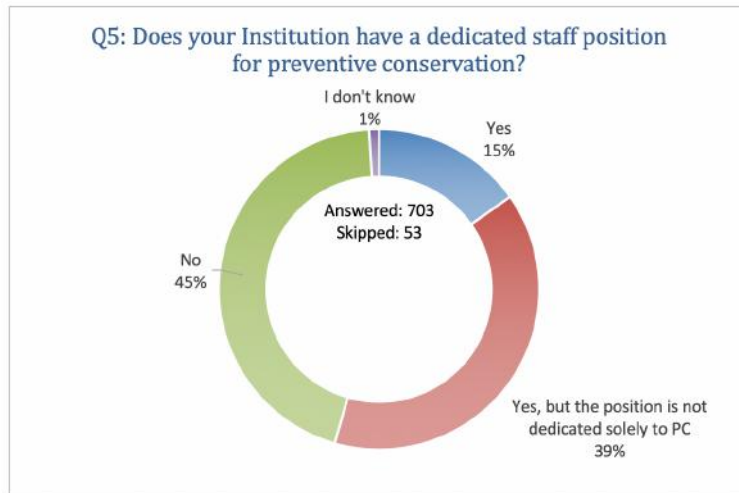
On the 709 responses 666 (94%) were able to identify the status of their collection with one of the five options offered, only 43 (6%) of the *Other* responses are without scheme of categorization.





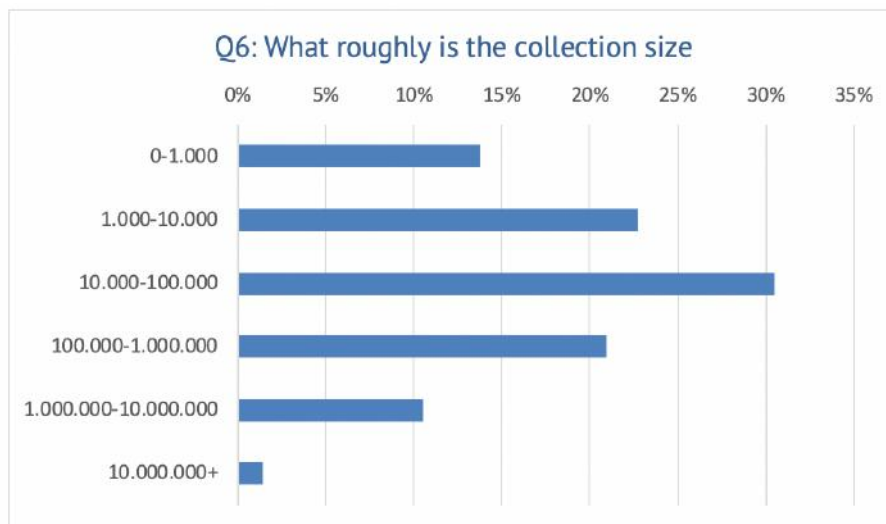
4.4 Dedicated position for preventive conservation

Approximately one out of seven institutions have a dedicated staff position for preventive conservation. The large number of professionals (39%) that have a more varied profile, most probably conservator and/or conservation scientist and/or collection manager and/or preventive conservation appraiser, shows that preventive conservation professionals don't have a real title and the role they play within the institution is cross-disciplinary. The title does exist in France but not in Italy for example.



4.5 Number of objects

The size of the collections varies enormously, from a few objects to several millions. A large number of respondents (31%) indicated total institution collection size between 10.000 and 100.000, two other sizes stand out, in particular 1.000 to 10.000 and 100.000 to 1.000.000 with more than 20% each.



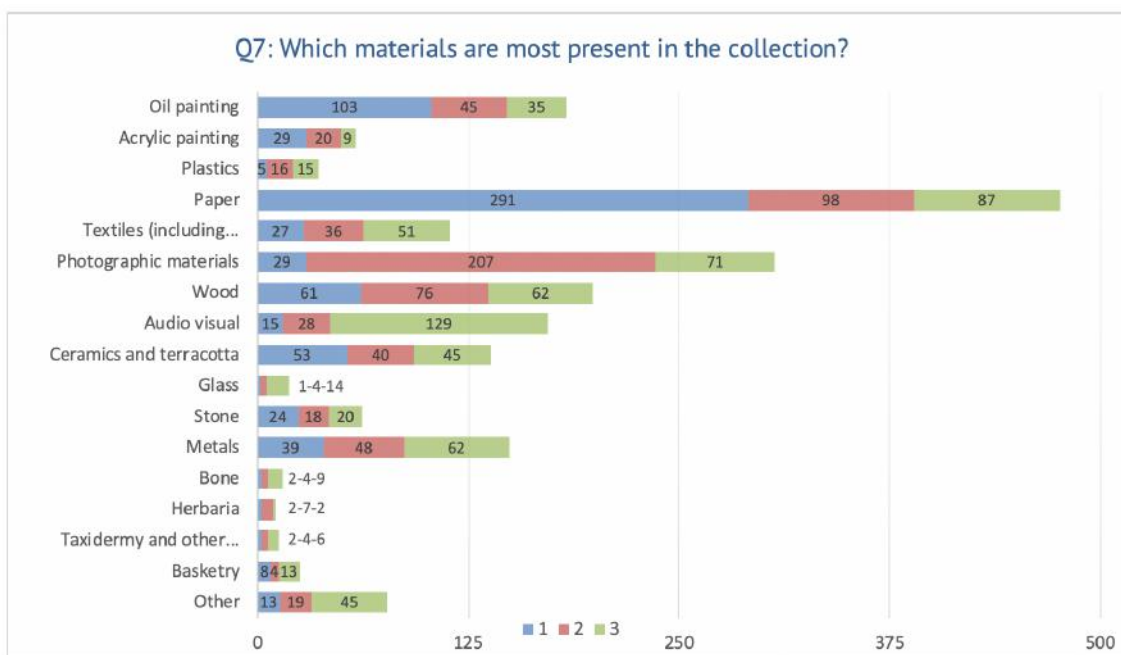


4.6 Materials of the collection

Paper and Photographic materials are certainly the most representative materials in the institutions that participated to the survey. This is probably also due to the presence of a large number of responses from Libraries and Archives.

This question opens the possibility to select up to three materials and put them in order of prevalence. The blue part of the bar in the graph represents the first choice, the red the second and the green the third. We can see that oil painting is the second most represented material if we consider only the first choice but, it must be stated, that very often collections of movable cultural heritage include several typology of materials and exploring only the first choice would be reductive and not reflecting the real situation.

As multiple responses were possible the number of responses exceeded the number of respondents. We will come back to these multiple answer questions over the next year with a more in-depth analysis and interpretation but also with a more appropriate and exhaustive graphic representation.



5 Section 2: Environment and Enclosures

The five questions (Q8 to Q12) in this section asked for some information about a description of storage and display environment as well as their organisation in terms of enclosures and display cases.

As multiple responses were possible for Q8, Q9 and Q10 the number of responses exceeded the number of respondents.

We will come back to these multiple answer questions over the next year with an in-depth analysis and interpretation but also with a more appropriate and exhaustive graphic representation.

5.1 Environment of the storage

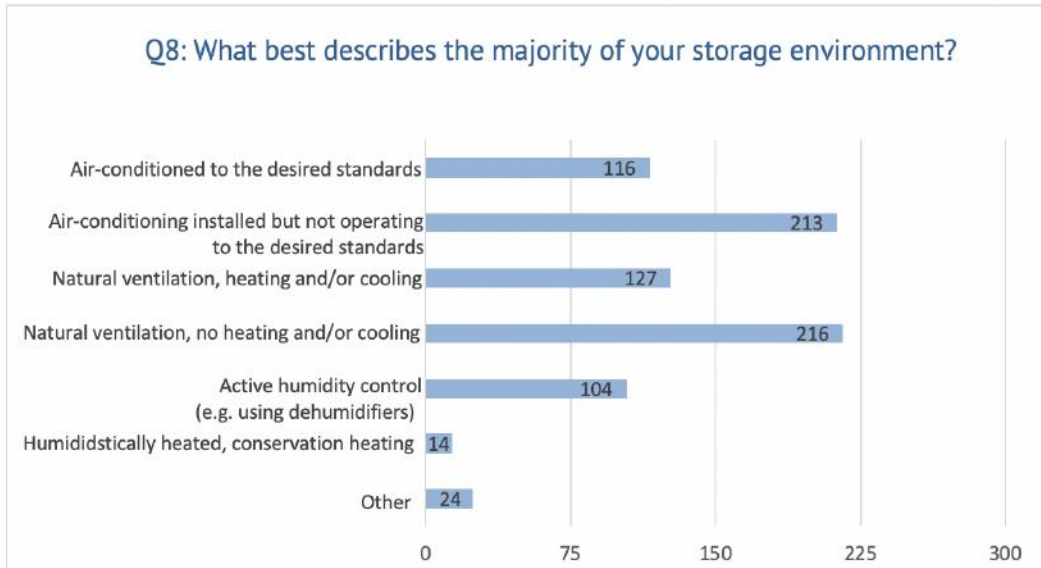
Fluctuations in temperature and relative humidity are damaging. Installation of adequate climate controls and operation of them to maintain preservation standards will retard the deterioration of materials considerably. Climate control equipment ranges in complexity from a simple room air conditioner, humidifier, and/or dehumidifier to a central, building-wide system that filters, cools, heats, humidifies, and dehumidifies the air. Today, concerns about sustainability as well as the economic downturn have stimulated a re-examination of many aspects of museum practice. Within the broader discussion of sustainable practice, the imperative to take





action has intensified. More than three-quarters of the institution have a simple or complex climate control and only a very small part (116 on 814 responses) uses a climate control adapted to the distinctive vulnerability of the collection materials.

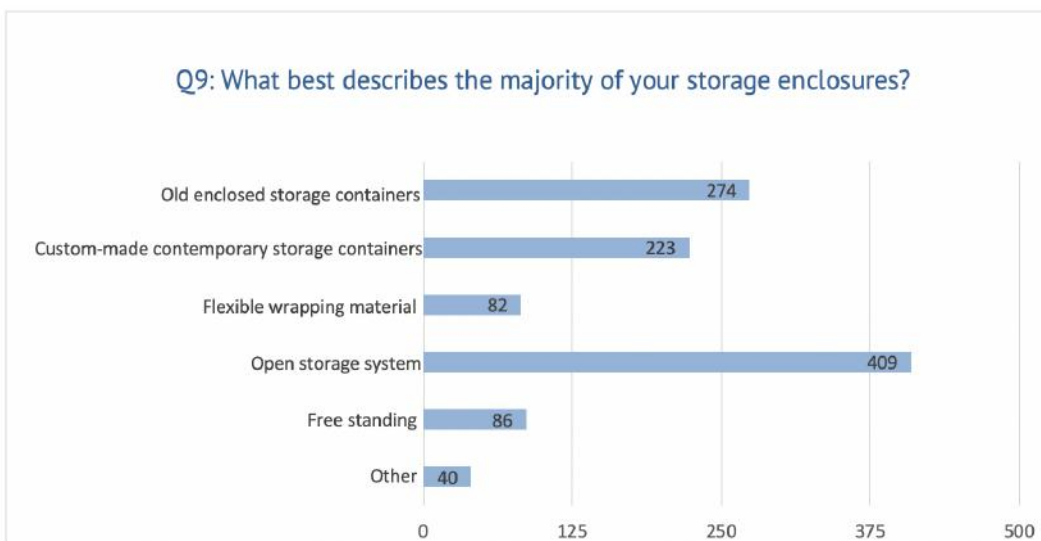
It was possible to select up to two responses.



5.2 Storage enclosures

More than 50% (579 on 1114 responses) of the objects are wrapped or enclosed in storage containers. A variety of approaches to controlling the environment within display and storage cases has been developed during the last decades. The establishment of any microclimate becomes a two-edged sword, its benefits usually obvious, and its dangers often less apparent such as emitting construction materials, unsuitable confined environment due to pollutant components of the artwork itself, artwork is not visible for inspection, etc.

It was possible to select up to two responses.

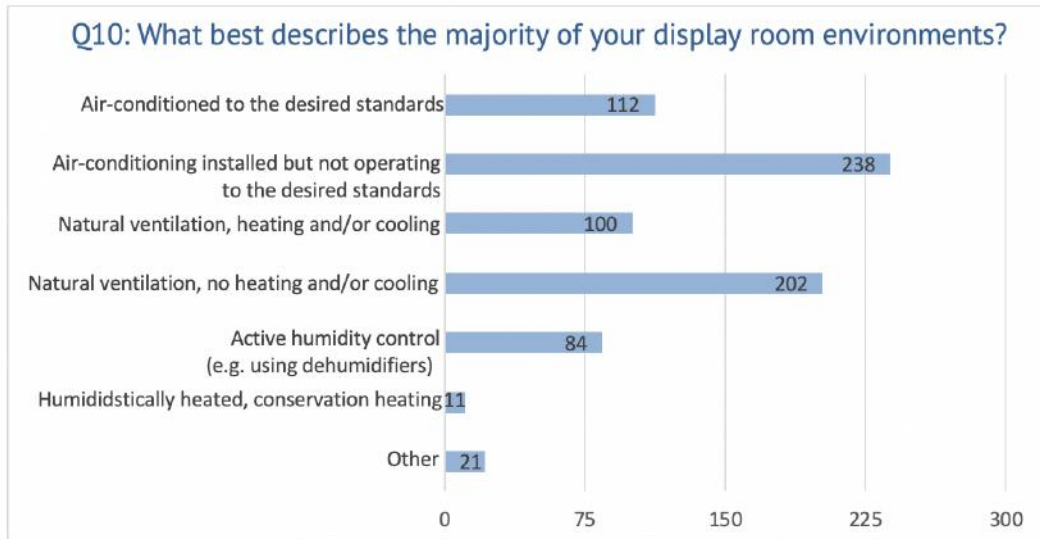




5.3 Environments of display areas

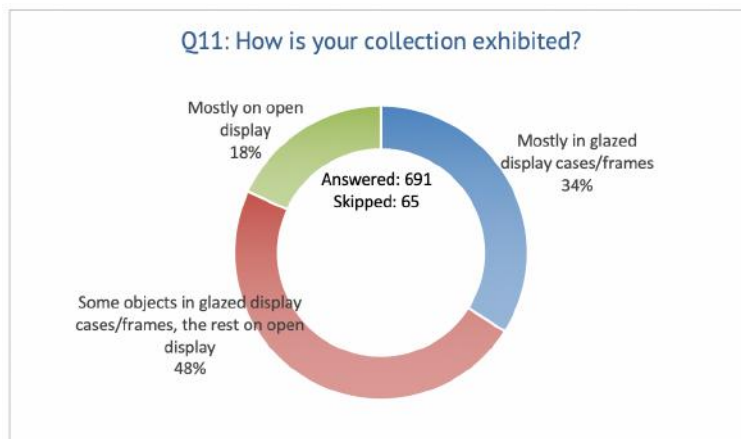
There is no contradiction with a previous paragraph about the environment of the storage, however in display areas we have to consider also other parameters such as Light, UV and IR, we need light to see collections exhibited!

It was possible to select up to two responses.



5.4 How is the collection exhibited

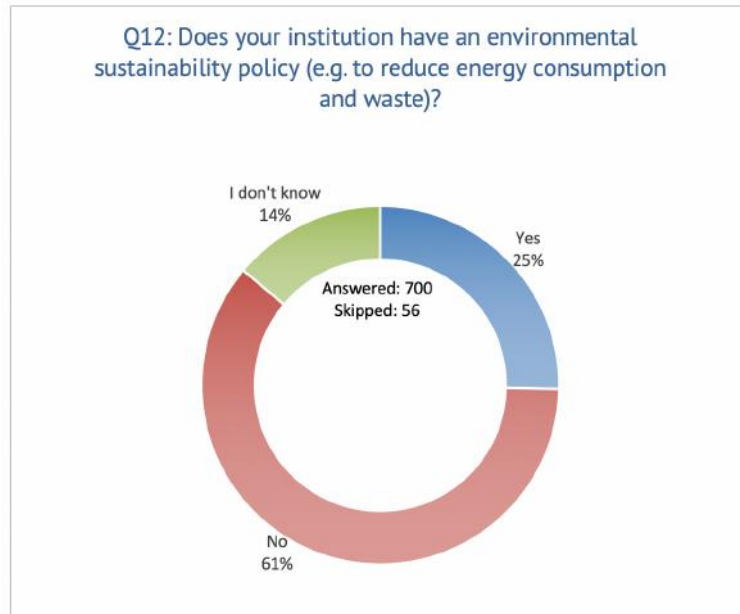
At least 34% of the objects are exhibited in glazed display cases or frames. As for storage enclosures microclimate in the display case becomes a two-edged sword where benefits and dangers have to be evaluated according to specific type of material and its vulnerability.





5.5 Environmental sustainability policy

Sustainability is one the newest degree subjects that attempts to bridge social science with civic engineering and environmental science with the technology of the future. But what is sustainability and how is it justified? What are we trying to sustain? Obviously, not everything that is sustainable is worth sustaining. So what makes some things worth sustaining and others not? This question would require another survey. Surprisingly, few institutions are yet thinking explicitly about sustainability.



6 Section 3: Storage and Exhibition conditions

The six questions (Q13 to Q18) of this section asked for some information about a description of storage and display environmental measurement as well as data gathering and actions taken when an unsuitable environment have been detected.

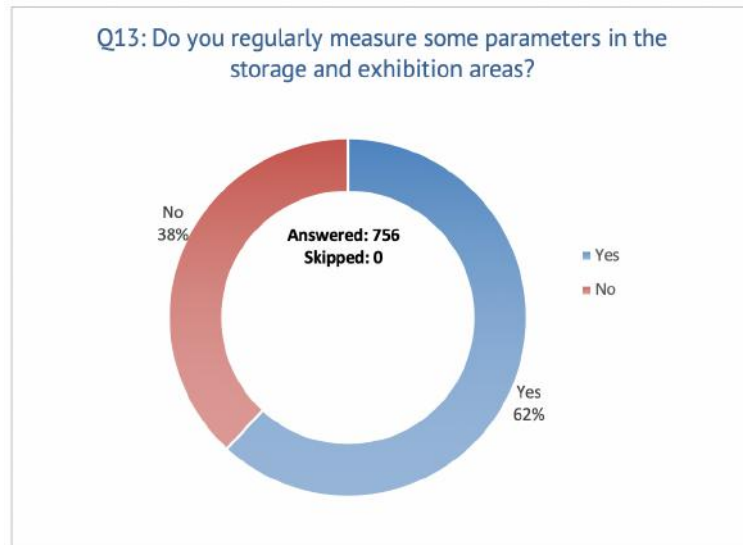
As multiple responses were possible for Q14 and Q15 the number of responses exceeded the number of respondents.

A better analysis and interpretation of this multiple choice data will be the subject of a separate publication foreseen for the end of 2020.

6.1 Measurement of parameters

Respondents that answered “No” to Q13 were directed to Q19, skipping in this way five questions about measurement and collection of environmental data. They were 288 on a total of 756.





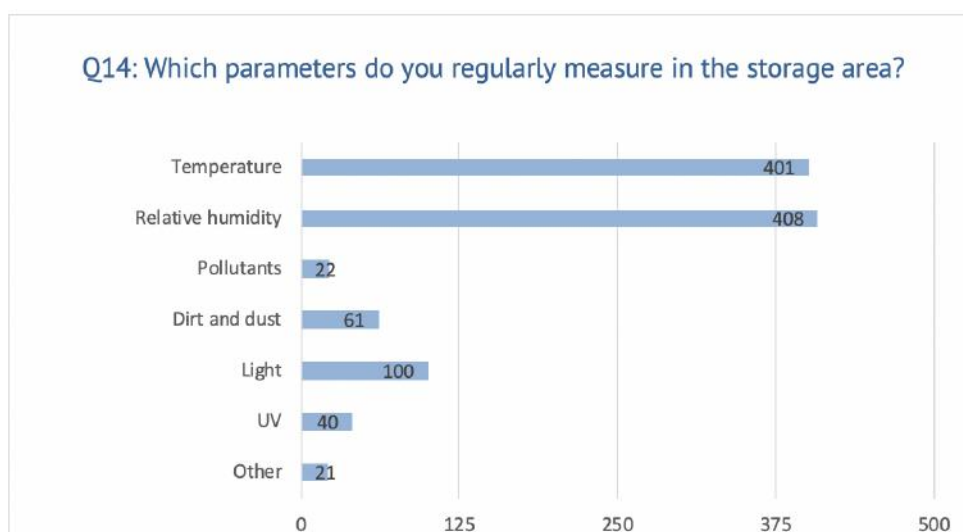
6.2 Parameters surveyed in the storage areas

Different physical and chemical factors, such as light, temperature, relative humidity, pollutants and so on, can affect works of art on display and in storages. Each factor does not act individually, but its effect can be enhanced or accelerated by the presence of other factors. Accordingly, an evaluation of the whole environment is recognized as an essential requirement for conservation purposes. With the generalization of simple measurement instruments several institutions (809 on 1053 responses) seem to measure especially temperature and relative humidity but it should be part of an overall plan of environmental diagnostics.

Very few (22 on 1053 responses) institutions measure pollutants presumably because, to date, it demands a scientific background and cultural heritage professional, except conservation scientists, do not have the necessary tool to conduct their own air quality monitoring studies.

Only 468 on 756 respondents participated to the following five questions (Q14 to Q18).

It was possible to select all that apply.

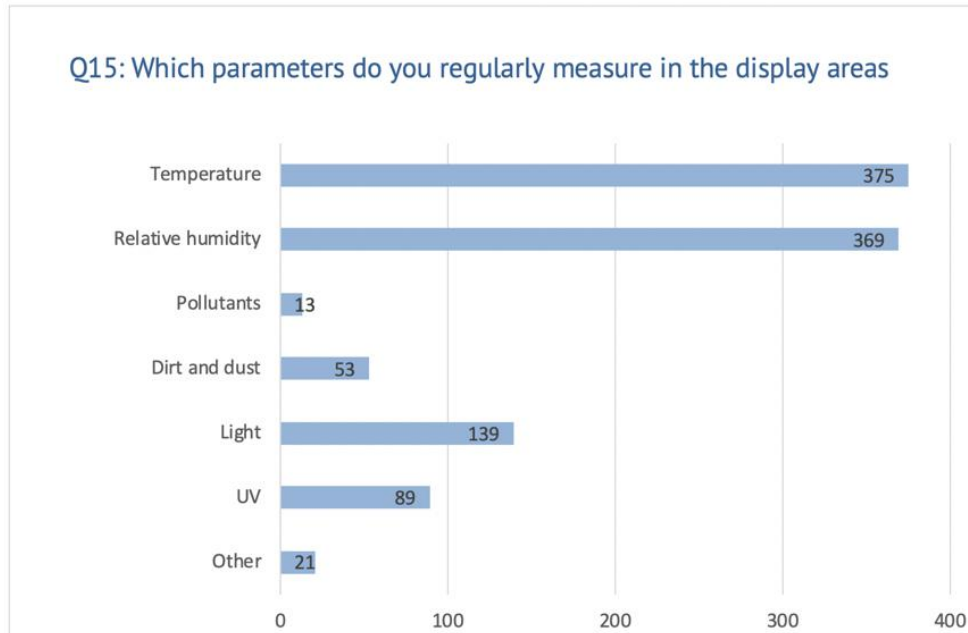




6.3 Parameters surveyed in the exhibition areas

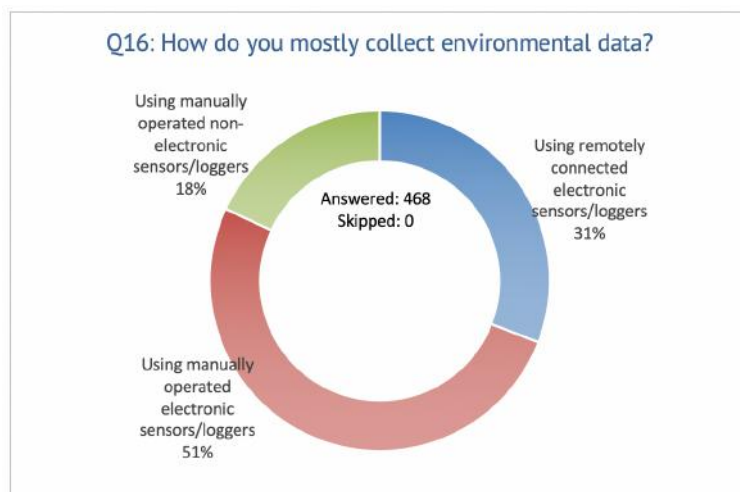
When comparing the two graphs (Q14 and Q15) measuring temperature seems to be more important in the display areas than in the storages while the opposite happens for relative humidity.

It was possible to select all that apply.



6.4 Collection of environmental data

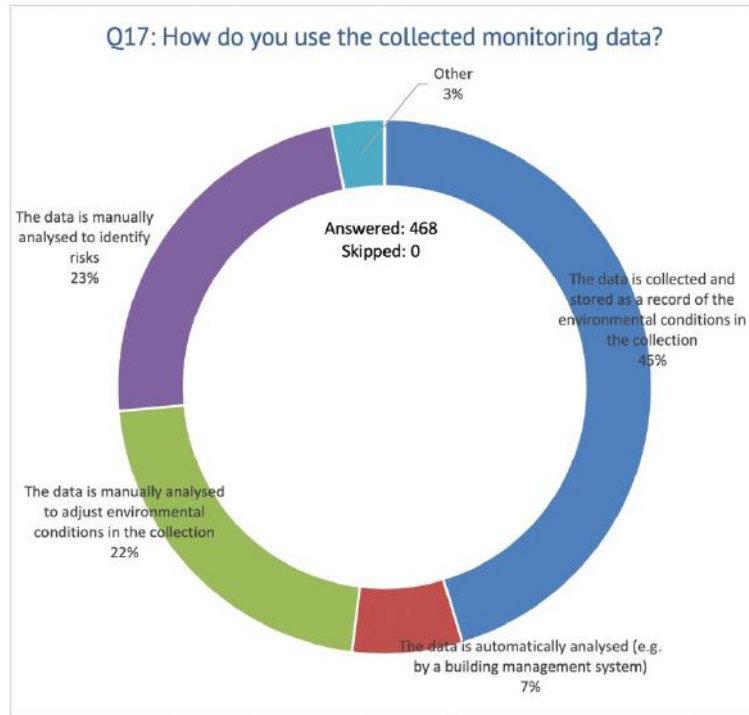
The majority of the respondents to this part of the survey prefer to use manually operated electronic sensors/loggers and almost one out of three uses remotely connected devices.





6.5 Use of collected data

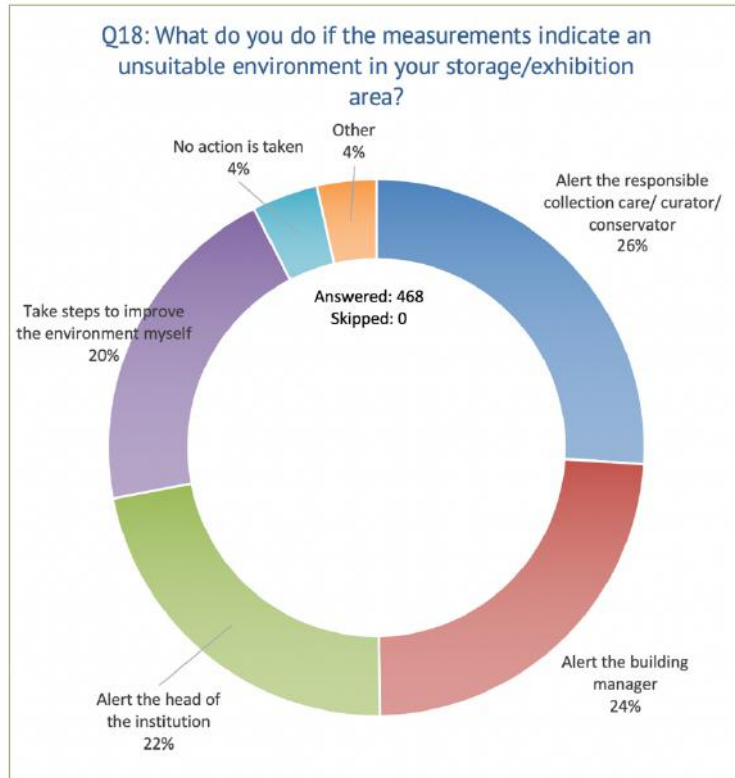
It is quite surprising to see that almost half of the institutions collect and store data as a record but they do not seem to be used to analyze, identify and eventually undertake mitigation action if the environment is unsuitable.





6.6 Actions taken with an unsuitable environment

There are a number of mitigation actions that can be undertaken in the field of cultural heritage. The data is clear the institution's staff is extremely (92%) responsive when an unstable environment is detected but only 20% take steps to ameliorate the situation.





7 Needs and Challenges

The three questions (Q19 to Q21) of this section asked for some information about the agents of deterioration that pose the greatest threat to cultural heritage collections, the challenges for implementing preventive conservation and the type of advice and information respondents would like to receive in the frame of the APACHE project

As multiple responses were possible the number of responses exceeded the number of respondents.

A better analysis and interpretation of this multiple choice data will be the subject of a separate publication foreseen for the end of 2020.

7.1 Agents of deterioration

Agents of deterioration is a term used to identify the ten major active agents that threaten cultural heritage collections. These active agents can be sudden and catastrophic or gradual over a period of time. Institutions have employed and refined different strategies over the years to help mitigate these ten agents.

This question opens the possibility to select up to five option and put them in order of prevalence. The blue part of the bar in the graph represents the first choice (most prevalent), red the second, green the third, purple the fourth and light blue the fifth (less prevalent).

If we look at the total of the five results for each agent of deterioration, incorrect relative humidity is considered the prevailing risk, it is followed by pests and incorrect temperature but if we consider only the first choice fire seems to be the most pressing risk. There are several possible explanations that will be developed at a later stage but at first reading of the responses, a majority of French and Brazilian respondents have opted for fire as first agent (probably shocked by Notre-Dame and Museu Nacional blaze) while Italian went on physical forces as first choice (high seismic activity?).



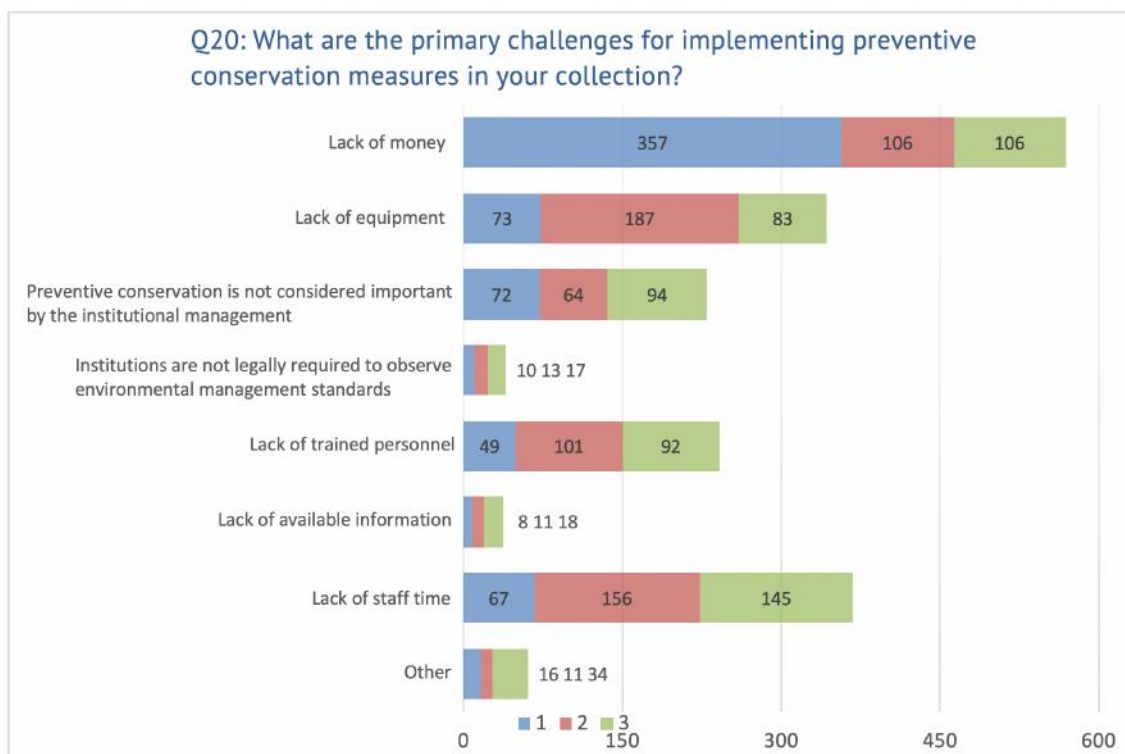


7.2 Challenges for the implementation of preventive conservation

Preventive conservation approach differentiates itself from curative conservation as it addresses deterioration causes, emphasises maintenance work and presumes a systematic assessment by means of monitoring and risk management. Risk management is the process of identifying, assessing and analysing possible damage to cultural heritage and developing mitigation strategies. Decision-makers in many fields use this approach in order to reduce losses however, Q5 indicates that 39 percent of the institutions surveyed have a multi-task professional that also implement preventive conservation, only 15 percent of the institutions have a dedicated staff position. We have to expand the impact of preventive conservation.

This question opens the possibility to select up to three responses and put them in order of prevalence. The blue part of the bar in the graph represents the first choice, the red the second and the green the third.

The first examination of the data shows that money, time and equipment are, in descending order, the most common challenges for the implementation of preventive conservation.



7.3 What would you appreciate receiving advice on?

This question is closely linked to the APACHE project, it is perhaps one of the most significant in the survey because it concerns the type of information that cultural heritage professionals would most like to receive, basically it gives us a list of a few structural priorities of the decision making tool. The question opens the possibility to select up to five options and put them in order of prevalence. The blue part of the bar in the graph represents the first choice (most prevalent), red the second, green the third, purple the fourth and light blue the fifth (less prevalent).

It is interesting to see how the responses meet the objectives of APACHE. As first choice we have the buffering materials on which the project is extensively involved. The findings indicate also (looking at both the first and the second choice) the two macro-functionality previously identified for the Decision Support System: 1) guide the user in choosing when and how to intervene and 2) suggest the conditions for display and storage.





8 Conclusions

The results of the survey provide some of the first empirical data about Cultural Heritage needs and challenges to design a decision-making tool composed by a modular set of decision trees for guiding the choice between preventive and remedial conservation. It is addressed particularly to enclosed (display case, crate, box, cabinet, wrapping, etc.) artworks. The findings suggest that the survey in several languages is highly successful, 756 respondents from 72 different countries is a clear evidence of this. The survey obtained information from a diverse group of cultural heritage professionals working for Museums, Libraries, Archives, Historic House, Gallery, Conservation Centres, Universities and Private Collections opened to the public.

The size of their collections varies greatly they range from a few dozen objects to more than 10 millions. Even if the collections which have between 10 and 100 thousand objects are the most represented with almost a third of the responses. It is obviously not the size that makes the importance of a collection but in whatever form, via whatever technique or practice, the activation and the preservation of the collection is the institution beating heart. A majority of those who responded to the survey have indicated that paper and photographic material are the most represented materials in their collection, followed by oil painting and wood. These four categories of materials represent more than 60 percent of the responses, they all require special environmental conditions and control strategies because they may carry intrinsic pollutants, a pollutant that is already in the object as part of its original content and can react with other compound causing accelerated degradation process to the object itself or to those in contact. Overall the survey findings suggest that there is a critical need of staff position for preventive conservation, it is clearly stated by 45 percent of the respondents.

The second section of the survey is about storage and exhibition organisation, three key areas of current activities and policies are highlighted: storage environment and enclosure, display areas and display case and environmental sustainability policy. Although the responses to the survey indicate that most institutions have a simple or more complex sets to control the climate (around 80 percent), the survey results also indicate that more than 40 percent do not control the environment or its storage is equipped with an automatic system that is not adapted to the vulnerability of each material. Many (more than 50 percent) of the respondents indicated that their collections are wrapped or enclosed in old or new protection container that protect from dust and





light and provide physical support during manipulations but can, at the same time, be made of emitting construction materials. APACHE project can bring in this specific area, studies, methods, solutions and materials for mitigation of the pollution impact on cultural heritage objects: pollution barrier films, low emitting materials, absorbing media and sensors to improve pollution effects knowledge and evaluation and control methods. A great majority of the respondents pointed out the absence of an environmental sustainability policy in the institution.

Measurement of parameters, collection of data and actions taken in presence of an unsuitable environment are the matters of the third section. The results indicate that 38 percent of the institutions do not measure regularly any parameters in storage and display areas. Most of the respondents favour the measurement of temperature and relative humidity in both areas while light and UV measurement are obviously more important in the display area (139 responses for light and 100 for UV) than in the storages. The survey points to a likely preference for manually operated electronic sensors/loggers (51 percent) and for a collection of data (45 percent) as a record of the environmental condition of the collection without any active corrective measure. The results indicate that there is a strong and rapid responsiveness (91 percent inform a responsible person for the collection, institution or building) when an inadequate environment has been recorded but only 20 percent take directly steps to improve the environment by themselves.

The fourth section provides evidence about how the respondents perceive the source of risk related to the ten agents of deterioration, the challenges for implementing preventive conservation and the actions and the advises that most of the respondents would appreciate receiving. The respondents indicated that they consider incorrect relative humidity as the agent of deterioration that represents a real risk for their collection, it is followed by pests and incorrect temperature.

The survey results also highlight that lack of money, lack of staff time and lack of equipment are the three challenges for implementing preventive conservation. We may also include lack of institutional funding for training opportunities. In their individual comments, a number of respondents stressed the difficulties in finding funded collaborative trainings.

Most of the respondents indicated that they would appreciate receiving advice on suitable active and passive buffering materials and when and how intervene to remedy environmental problems which are among the macro-functionality previously identified for the development of the Decision Support System.

Based on the survey results and its own first, but still substantially incomplete, analysis and interpretation we believe that the APACHE project can provide several solutions to the needs and challenges that came out of the last three questions. They concern the development of temperature and humidity regulators, novel sensors targeting pollutants, humidity and temperature, wireless sensing platform, decision-making tool for curators and conservators to support preventive conservation actions, publication of open access papers and the organisation of funded trainings and workshops on the correct use of the novel materials.

9 Acknowledgments

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