SOSHERITAGE

Web App: Risk Assessment of Cultural heritage
D4.1

2023

Web App: Risk Assessment for Cultural Heritage

SOS HERITAGE

DELIVERABLE D4.1

June 2023

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Abbreviations

SOS-H	SOS Heritage
MLAB (IT)	Mazzini Lab S.r.l. Benefit
TTRUST (RO)	Fundația Transilvania Trust
NMK (SRB)	Народни музеј Крушевац
UWK (AT)	Universität für Weiterbildung Krems
ADSI (IT)	Associazione Dimore Storiche Italiane

Countries: Austria, Romania, Serbia, Italy.

Table of contents

Co-funded by
the European Union

Grant Agreement-101055573

Link to SOS-H web app

The SOS Heritage web app can be accessed from the following link: **app.sos-heritage.eu**

Scan here to access the login page:

To request the creation of an account to register for the app, fill out the form found at this link: https://www.sos-heritage.eu/web-app/

MAZZINILAB   DONAU UNIVERSITÄT KREMS   **ADSI** Associazione Dimore Storiche Italiane   TRANSYLVANIA TRUST

Objectives of WP4 and tasks description

SOS Heritage's Work Package number 4 was designed to guarantee an innovative and digital aspect to the project, continuing the analysis begun in WP3 around the importance of new digital tools for better management of cultural heritage.

Risk management for cultural heritage is a discipline that is still not very standardized and lacks common and universally recognized and applied practices. It is, therefore, necessary to design tools that can somehow help and support professionals in the cultural sector to find the best practices to safeguard their collection from the risks emerging from climate change. Furthermore, in the sector, there is a lack of tools which, by exploiting the potential of digital, can simplify some procedures and automate some mechanisms. For this reason, the SOS Heritage consortium has been working in recent months to create a digital tool that can serve this purpose.

The WP's main objective is to develop and test a web app to help cultural heritage professionals, such as collectors, museum operators and historical houses managers, to handle their risk assessment procedures and to perform conservation strategies to preserve their collections. The platform will also support professionals in producing risk management plans for cultural heritage in an immediate and digital way. The lead partner, Mazzini Lab, coordinates this Work Package.

The project consortium intends to apply to this output a user-centred design, involving test users in the process of improvement of the platform itself.

Below are the different tasks that allowed the delivery of the web app:

- As a prerequisite for developing the platform, we have identified a responsive web application generation framework that allowed us to simplify a lot the development process.

- Once the framework has been delivered by the contractor, MLAB has presented the other partners with a detailed plan on how the PR production would have been handled, with a detailed roadmap with roles and responsibilities, tools and templates adopted for input and output of data.

- MLAB has then designed and developed the backend of the web app, in order to organise data collection processes about classifying, estimating and managing risks to collections.

- MLAB has then designed the front end of the web app to be used by tangible cultural heritage owners/managers/operators, with a group of alpha testers who have been involved during the Transnational Training Course in Krems, Austria. This process insured constant feedback and a user-centred approach.

- After this first alpha testing phase, the web app is "open to the public" for the beta testing phase. Project partners and stakeholders will provide MLAB for beta testers to the web app. During this phase, all the problems related to a high number of accesses and database management will be solved, in order to deliver a final product.

Web app description

SOS Heritage web app is a digital tool specifically built to support cultural sector professionals in carrying out risk assessment projects on the collections they manage. In fact, it is not easy for those who do not have specific training in risk management for cultural heritage to understand what are the elements that can influence the levels of risk threatening the collection and the best procedures to defend against these threats. SOS-H web app is therefore conceived as a sort of interactive checklist to be used during an inspection in an institution that preserves cultural heritage: the different sections, multiple selections and various questions allow you to follow a logical order in identifying the threats looming over the analysed collection. Proceeding from one section to another, a cultural professional can gain awareness of the specific characteristics of their building and their collection and can understand which are the major vulnerabilities that characterize their situation. The different sections will be described in detail below.

General information

In this section, the first that opens automatically in the area dedicated to the inspection, the basic information of the institution is requested: the name of the institution, the name of the individual property, the person in charge of the institution, the current use of the building and the existence or otherwise of emergency teams set up for the evacuation of personnel and artworks.

This section has been designed mainly for two specific reasons:

- For institutes whose collection is spread over several buildings: in this case, it is possible to request the back office to create different files linked to the same institute.

- To already define the roles of the personnel who work within the institute, trying to stimulate awareness of the importance of defining specific emergency teams for the rescue of cultural heritage and of identifying a person responsible for safety.
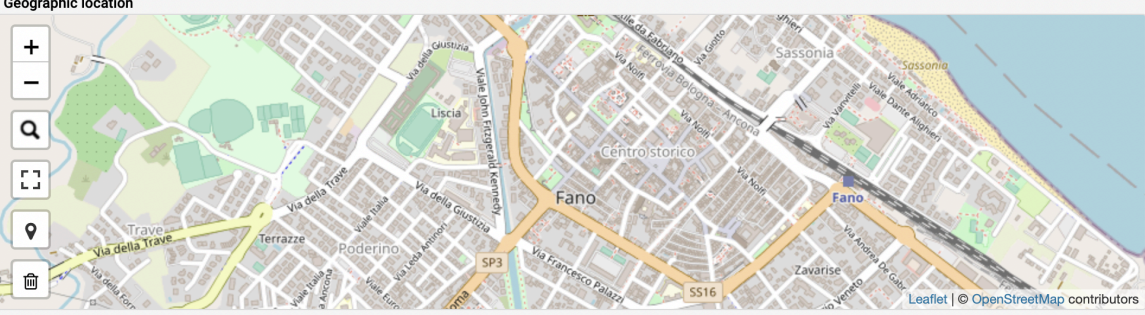
Environmental context

Detection card management
Environmental context

Venue

Region
...

District
...

Municipality
...

Location
...

Address
...

Map

Geographic location

In the tab dedicated to the *Environmental context*, the user will find questions dedicated to the analysis of the area surrounding the building where the collection is kept. These questions are aimed at identifying possible threats that may come from the environment. The questions investigate aspects such as the geographical location of the building, the surrounding urban and natural elements, the known risks of the area, the disastrous events that have occurred in that area in recent years and the accessibility of the roads leading to the building, a fundamental element for understanding the ability to reach the site in an emergency.

In this area, the risks that are emerging from climate change are of specific importance: elements such as seismic risk, extreme climatic events, such as hailstorms, cyclones and heavy rains, climate-induced risks, such as forest fires and drought, and hydrogeological risk, largely influenced by the recent environmental transformations of the last century. To analyze these variables, the user should use maps and data provided by local research agencies.

Building features

Detection card management
Building Features

Building features

Total number of floors

3

☑ Archaeological constraint   ☐ Environmental constraint

☑ UNESCO site

Year of construction

1654

Year of last restoration

2000

Description of the interventions carried out

...

Energy rating

5) Class E

Type of construction

4) Historic building

Other type

...

Other elements to report

...

The *Building features* section has been specifically designed to identify all the elements and characteristics of the building that can in some way influence the levels of risk on the collection. Based on the construction materials, the internal structures and the safety systems installed, the risk to which the collection is subjected can vary greatly. It is important that a cultural sector professional is able to identify these elements in the building in which he works.

Some of the elements that are investigated are possible constraints to which the building is subjected, the type of construction, the energy rating, the description of the storage rooms in which the collection is kept, a specific focus on the major risks, in particular fire, anthropic, microclimatic, biological risk, the existence or otherwise of an insurance policy dedicated to cultural heritage and the adequacy of emergency exits.

Cultural heritage

Detection card management
Cultural heritage

The last investigative section of the web app is dedicated to the collection: the main objective of this part is in fact to obtain a general overview of the type of collection conserved in the building in question and the methods of conservation of the same. The SOS-H app does not claim to catalogue the entire collection managed by the user but rather provides the major vulnerabilities starting from the materials that make up the stored artworks.

The section begins with the identification of the historical period of the collection. Subsequently, the largest part is occupied by the question dedicated to the type of assets conserved. The assets are divided according to their museum typology: architectural, archival, audiovisual, digital, historic-artistic, archaeological and demo-ethno-anthropological. For each museum typology, the user can select the most represented materials in the collection. In this way, a summary picture will be obtained that will allow the user to get a general idea of the major vulnerabilities that characterize the preserved artworks.

Other elements investigated in the section are the presence or absence of a complete and updated catalogue, the presence of listed heritage, the type of supports used for the conservation of the artworks, the presence of a priority list for saving the collection, the identification or less of a safe deposit for the conservation of the collection in case of emergency and the presence of a digital catalogue.

Alerts

At the end of the assessment, thanks to a specific function that automatically calculates some answers assigning them to specific risk categories, the user has the possibility to view a summary graph that describes his own vulnerabilities by dividing them into different categories.

The risk categories that are activated with the answers to the questions are:

- **Emergency management**. This specific item refers to the capacity of an institution to react to an emergency on the basis of the identified characteristics. Although this element is actually extraneous to the real risk categories, the consortium considered it essential to include this item to stimulate awareness of

the importance of providing effective systems and structures for a timely response to emergencies.

- **Environmental conditions**. This item counts all the elements that can directly or indirectly influence the internal microclimate of the building and the atmosphere in which the collection is kept.

- **Anthropic**. This item counts all the questions that can influence human risk levels, specifically taking into consideration theft, vandalism, terrorism and armed conflict.

- **Fire**. Here the building's specific vulnerabilities for fire risk are identified. In addition, specific questions relating to protective devices against this risk and automatic and manual reaction systems to fire are also counted.

- **Hydrogeological**. This item brings together different aspects of hydrogeological risk, also identifying vulnerability to seismic risk.

Print function

The SOS-H app is also equipped with a print functionality located in the lower right corner of the screen. This function allows you to print a pdf file with a summary of all the answers entered in the checklist. The app automatically generates a summary report that allows the user to use as a basis for developing a risk management plan. The app does not directly and automatically generate a risk management plan as we believe that this is an activity that must necessarily be mediated by a professional who is able to assess the overall situation and develop a tailor-made plan for the institution.

In the printed report there are some questions marked with one or more red asterisks: these are the questions that have generated an alert and which have therefore been

counted in the risk graph. This feature allows the user to become aware of the vulnerabilities of the structure and get a more precise idea of which are the elements on which it is a priority to improve.

Below is an example of a section of a printed report:

Venue	
Region: Austria	District:
Municipality: Krems an der Donau	Location:
Address: Körnermarkt 14,	
Location	
Location: 2) Connected to other buildings	
Nearby anthropic environment	
Manufacturing industry: |No|	Industria Chimica: |No|
Manufacturing industry: |No|	Nuclear power plant: |No|
Military installations: |No|	Incinerators: |No|
Sport facilities: |No|	Hydroelectric reservoir: |No|
* Government buildings: |Yes|	* Commercial facilities: |Yes|
* Airports / Ports: |Yes|	Mining plants: |No|
Gas / Power lines: |No|	Gas / fuel storage: |No|
Nearby natural environment	
Lake: |No|	Sea: |No|
* Stream: |Yes|	* River: |Yes|
Woods: |No|	
Inactive volcanoes: |No|	Active volcanoes: |No|
Risks of the surrounding environment	
* Seismic risk: 3) Zone 3	
*** Extreme weather events: 2) Heavy rain / water bombs|3) Lightning	
* Climate-induced risk: 2) Drought	
** Hydrogeological risk: 1) Floods|3) Landslides	
In the last 5 years, within 5 km, have occurred:	
Explosions: |No|	Did the event(s) cause any damage?: |No|
Vandalism: |No|	Did the event(s) cause any damage?: |No|
Riots: |No|	Did the event(s) cause any damage?: |No|
Conflicts: |No|	Did the event(s) cause any damage?: |No|
Fires: |No|	Did the event(s) cause any damage?: |No|
* Floods: |Yes|	Did the event(s) cause any damage?: |No|
* Earthquakes: |Yes|	Did the event(s) cause any damage?: |No|
* Storms: |Yes|	Did the event(s) cause any damage?: |No|
Landslides: |No|	Did the event(s) cause any damage?: |No|
Eruptions: |No|	Did the event(s) cause any damage?: |No|
Accessibility	
Railway line: |No|	* Bridges: |Yes|
Underpasses: |No|	Limitations: |No|

The framework

The web application takes the form of a management system accessible via the Internet, after granting access credentials, and after registration in the system database as a user with a well-defined role and therefore with profiled permissions for viewing and possibly disposition. The management system keeps track, for each investigation, of the progress of the risk assessment process, and memorizes all the information that historically

accumulates, as well as memorizes the documentary evidence that allows the passage from one state to another of the investigation, until the drafting of the final report.

The web application provides the user with pages with simple and intuitive graphic elements for all and only the functions relating to a single process phase, personal data, or other functions necessary for the operation of the system.

The application has been released, by the supplier, on a suitable web space that allows the operation of all users and administrative access to the technical staff of the Consortium.

The sizing of the service is offered by the application in order to include:
- the management of at least 100 detectors;
- the management of 10 administration users.

The software is provided as a service in SaaS mode. The service is usable via the web and provided on a cloud platform by the supplier. The web server and storage are physically located within the European Union.

The web solution is responsive and usable from any type of device (personal computer, tablet, smartphone) with the use of the most common browsers and without the need to install software or plug-ins on users' clients.

The proposed solution has administration and configuration tools that allow the introduction of any changes quickly and without the need for intervention on the source code (low coding). The changes include the insertion of new fields, the revision of the insertion masks, the consultation and modification, the addition of print reports, the addition of graphics, and the automatic sending of e-mails based on events defined.

The proposed solution is based on standard SQL databases and allows simple data extraction also on the front-end side. In terms of interoperability, the solution has functionality for exchanging data to and from the outside via web service and it has the ability to always generate interfaces in low coding mode.
The system guarantees the security of the information and prevents any type of commonly known cyber attack (CRSF, SQL injection, JS injection, etc.).

At the access management, profiling and logging levels, the software includes:
- Definition of profiling groups with the assignment of different levels of permissions;

- User profiling and association to profiling groups;
- Integration with Active Directory (LDAP);
- Management of complex passwords;
- Log of accesses made by the single user;
- Log on individual operations (insertion, modification, deletion) configurable;
- User blocking after a configurable number of incorrect login attempts;
- Blocking of users from the administration system;
- Unblocking of users from the administration system.

Access is possible for two types of users:

- Detectors;
- Administrator.

The Detector user

The Detector user is able to manage and view only the data entered by himself/herself, while the Administrator user is able to view the data entered by multiple Detector users.

Once logged in, the Detector user is able to change their password. The user is able to consult the survey forms already entered by viewing both the entered data and any attached files. Each user is able to view and modify only the previously inserted cards. He/she is not able to view data entered by others.
The software allows the search for any element (textual or numerical) in any field it is found or more targeted searches on the values of single fields, even combined with each other.

The Administrator user

The Administrator user is able to consult the survey forms entered by the Detector users assigned to his own area. He/she is able to filter the cards therefore also by Detector.
The general functions are the same as for the Detector user, except for the ability to print reports and extract data from the cards in standard CSV format.

Alpha testing

The SOS-H web app was tested during the Transnational Training course carried out by the consortium between the 20th and the 24th of March 2023 at the University for Continuing Education in Krems, Austria.

An entire day of the course was dedicated to testing the web app. The participants were divided into two groups and were invited to make an inspection of two cultural institutions of Krems: the Archive of Contemporary Art and the museumkrems. In the two institutions, the participants were able to carry out a risk assessment using the app's features supported by the project's lead partner.

After the test, the participants were invited to participate in an open discussion to express their opinion on the functionality of the app and to express suggestions and suggestions to improve it. Participants were also asked to fill in a satisfaction questionnaire: the results are reported below:
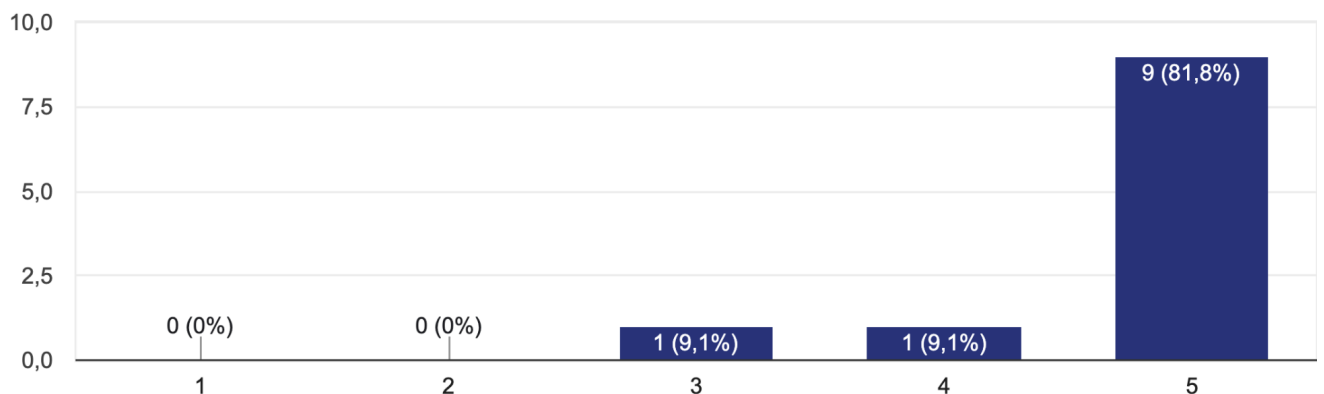
How would you rate the web app user interface?
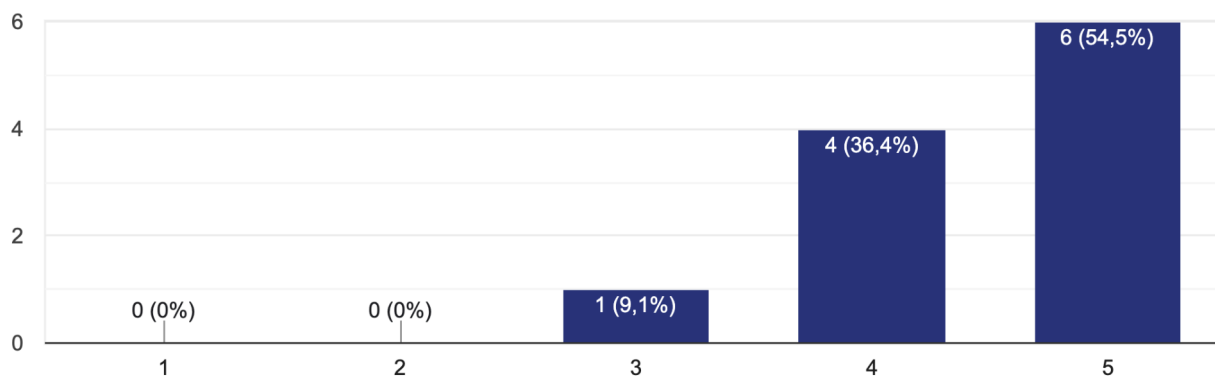
How would you evaluate the aesthetics and visual identity of the web app?
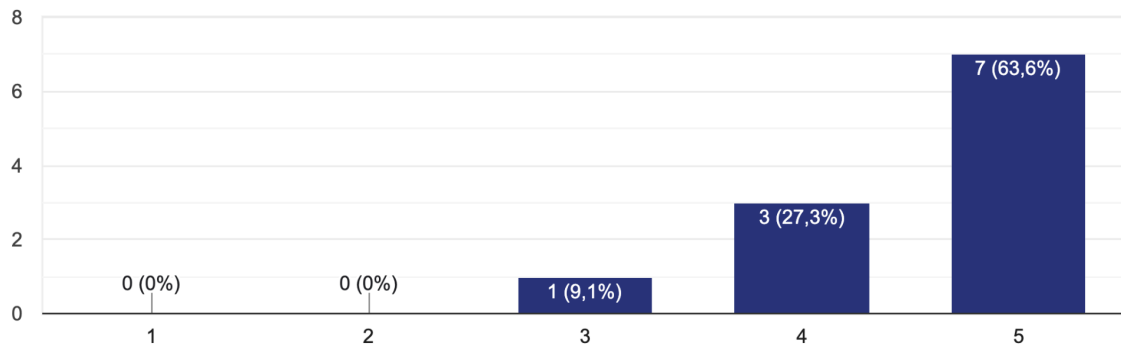
**How would you rate the ease of orientation within the tabs of the app?**

If you deem it necessary, leave a suggestion here on how we can improve the user interface:

- The app has a nice overview.
- Design sub-partitions for entities (deposits, different buildings) within an overall institution in order to detail and differentiate them, i.e. the same museum can be responsible for different locations, and structures with different uses and quite diverse conditions and therefore risks to assess.
- As we discussed during the course the questions need to be more specific and some thresholds might be useful.

- The user interface can be improved with the help of icons/symbols.
- Data security is a major concern, particularly transmission over the internet. A dedicated VPN could be introduced. On laptops or tablets, question marks to open explanation windows giving more information on data ranges, reference scales, and further information about terms and definitions could be helpful. These should be all collected in the user's manual.
- A less sterile interface and guiding symbols and icons would be more intuitive and user-friendly.
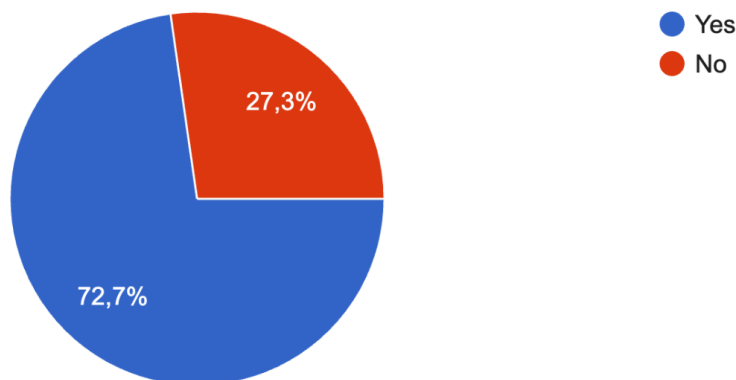
How would you evaluate the overall structure of the app?
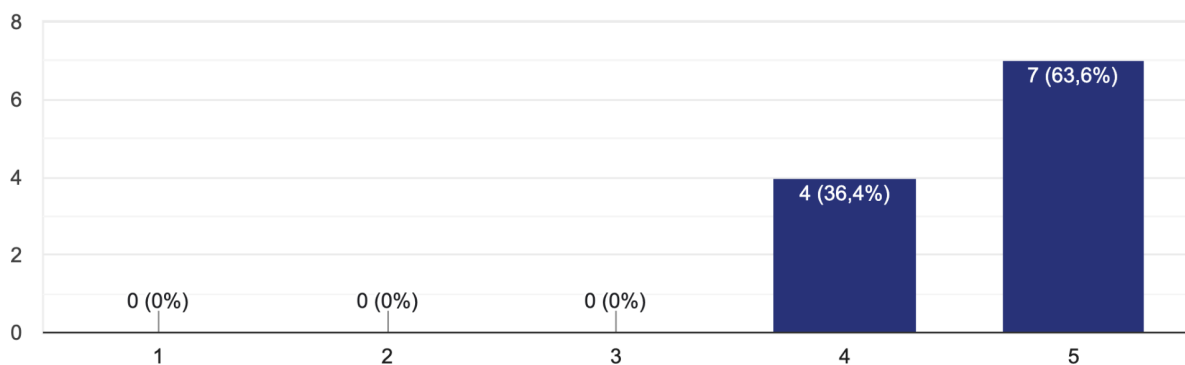
Do you think the usage flow is fit for purpose?
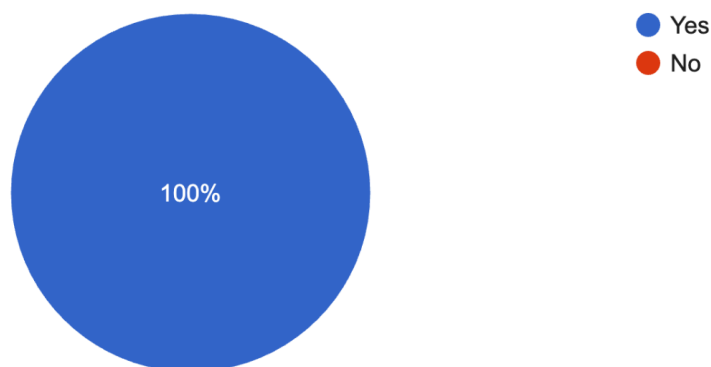
Do you find that the questions are posed in a simple and understandable way?

- Yes
- No

27,3%

72,7%

If you deem it necessary, please leave a suggestion on how we could improve the visual identity:

- Not necessary if on a laptop or tablet, for use on cellphones, a comprehensive users manual could replace pop-ups and explanation windows
- I don't think that further improvement is quite necessary.
- A time-flow chart or percentage bar would be helpful so you know how much you have browsed from the questions; different "chapters" or "sections" could have different background colours. E.g., the questionnaire referring to the overall history of the building could be visually separated by the "next sheet" with specific questions relating to the storage facilities, and so on.

If you deem it necessary, please leave a suggestion on how we could improve the app structure:

- Keeping the free selection on which "pages" to work on, allows for more flexibility during a walkthrough. Ask the user to confirm when selecting exiting without update (data loss prevention).
- By structuring the questions and avoiding ambiguous or repetitive questions, those who fill in the form have no reason to hesitate or give two different answers for an

almost similar question. Weighting the input data (answers) by clearly distinguishing between quantitative and qualitative ones.

If you deem it necessary, please leave a suggestion on how we could improve the question form:

- Maybe use more precise methods for some terms (frequent stands for once a day/week/month.. or just add the option where, if something is frequent, there is a falling menu with more precise time frames, for example)
- Re-visit some English formulations to make them easier understandable ("archaeological constraint" could become "protected by law", a natural constraint could list provisions providing legal protection e.g. "protected under 1972 UNESCO Natural Heritage convention" or "NATURA 2000, etc. "usage" inquiry could allow choosing: public, private or both.
- You should introduce thresholds, and also the question marks we discussed to explain the questions, so they are more clear.
- Be very precise in your phrasing, not all the questions are understandable, in some cases different people understand certain words differently. Thus some of the questions are not too concrete. Have a glossary, explanations etc.
- Some of the questions should be more concise and with different terminology (eg contemplating)

If you deem it necessary, please leave a suggestion on how we could improve the overall usage flow:

- Add an option where, if you click the escape button and have some filled-out questions, the app asks you whether you want to exit or not (in order not to lose progress).
- Perhaps having a separate guide to help might help.
- By automatically saving the introduced data but maintaining the option of later editing.