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USABILITY AND USER EXPERIENCE PROJECT
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Master in Digital Humanities and Digital Knowledge – UNIVERSITY OF
BOLOGNA

PROJECT MANAGEMENT REPORT

The Bologna
Museo Civico Archeologico

part of the BOLOGNA CIVIC MUSEUMS SECTOR

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Materials

- Google Form questionnaire

<https://docs.google.com/forms/d/e/1FAIpQLSe5Nf-GjK4WWCKVuPuTM-3aEhRaS3mvKLCabQYmRBYICaBHIw/viewform>

- Screenshot of MCA and SG*
- 2 recordings of Thinking Aloud*
- Urgency Curves*
- SUS Tests*
- Blueprints*
- Wireframes*
- C&A diagrams*

*in the materials folder

Introduction

This report is the final result of a user experience design project of the website of the Museo Civico Archeologico in Bologna. It is among the most important archaeological collections in Italy and is above all representative of local history, from prehistory to the Roman age. The museum is part of the Musei Civici Bologna. The goal is to facilitate online organisation and booking for high school teachers (30-45 years old) who want to propose their students an educational experience in the museum.

- We start by **analysing the user** base to understand which user segments the website should cater to and what are the needs of such users.
- Next, we **analyse the existing resources**, which include the study of the existing tools on the Museo Civico Archeologico by observing the design of the Santa Giulia website.
- We then perform a feasibility study to **define the context** of the service and **the tasks** that the intended users can be expected to perform on the site.
- Lastly, we produce a **design proposal**, which we subject to inspection and user testing.

We end up with what we think is a usable and complete design that can actually succeed in helping the specific users of the website of the museum to be able to understand the peculiarity of the service in a meaningful and effective way.

Index

1. Ethnographic research
 - 1.1 Segmentation
 - 1.1.1 Demographic segmentation
 - 1.1.2 Psychographic segmentation
 - 1.2 User research
 - 1.2.1 Google Form questionnaire
2. Assessment of existing resources
 - 2.1 Expert Usability Review
 - 2.1.1 Choice of guidelines
 - 2.1.2 First Inspection of the System
 - 2.1.3 Direct analysis: system vs. guidelines
 - 2.1.4 Reverse analysis: guidelines vs. system
 - 2.2 User testing
 - 2.2.1 Definition of the testing protocol
 - 2.2.2 Testing process
 - 2.2.3 Analysis of the results
 - 2.2.4 Urgency Curve
 - 2.2.5 Conclusions
3. Feasibility Study
 - 3.1 Context of use
 - 3.1.1 Intended users
 - 3.1.2 Intended tasks
 - 3.1.3 Environmental and technical constraints
 - 3.2 Scenarios
 - 3.3 Personas
4. Design Proposal
 - 4.0 Adoption of a design model
 - 4.1 Information Architecture
 - 4.2 CAO=S
 - 4.3 Interaction Design
 - 4.4 Structure Blueprint
 - 4.5 Wireframes
 - 4.5.1 Homepage
 - 4.5.2 School page
 - 4.5.3 Search tool
 - 4.5.4 Purchase page
5. Evaluation of design
 - 5.1 Inspection: heuristic analysis
 - 5.2 User testing: thinking aloud
6. Final recommendations

1. Ethnographic research

1.1 Segmentation

In this project management report the primary focus is to understand the needs of our target user group since it may not fully grasp the unique features and benefits of the service compared to other competitors, or they may not be aware of our service at all. Therefore, the primary objective is to enhance the experience of this specific audience by gaining a deep understanding of their unique needs and goals.

We are looking for individuals:

- who are interested in the topics presented by the museum
- within the educational environment
- who are looking for educational experiences to offer to students
- not with a lack of experience and motivation

Those who do not fall into these categories will be excluded a priori.

In accordance with official guidelines, our design approach will adapt to the best practices for facilitating effective communication and engagement with our target users.

1.1.1 Demographic segmentation

The demographic segmentation of our target audience for the Museo Civico Archeologico booking system study comprises the following criteria:

Age Range: Individuals aged between 30 and 45 years old.

Occupation: High school history and art history teachers.

Geographic Location: Teachers located within the geographic vicinity of the Museo Civico Archeologico.

Educational Background: Those possessing qualifications or teaching credentials relevant to the subjects of history or art history.

Technological Proficiency: Individuals comfortable with using digital reservation systems or technology in an educational context.

Booking Behaviour: Teachers who are likely to book visits to the Museo Civico Archeologico for their classes or educational purposes.

This demographic segmentation allows us to target a specific group of potential users who are both interested in the museum's offerings and likely to use the reservation system for educational purposes.

The team has determined that sex and the income of individuals are not pivotal factors for our outcomes.

1.1.2 Psychographic segmentation

This psychographic segmentation helps identify the mindset, values and motivations of your target audience, allowing the tailor-made system to resonate with their specific interests and needs.

We identify teachers who have a strong interest in cultural enrichment, history, and art appreciation, and are passionate about imparting this enthusiasm to their students who believe in the value of experiential learning and hands-on experiences, such as museum visits, as effective teaching tools.

Teachers who are also comfortable using technology in their teaching methods and see the benefits of an online reservation system to facilitate the booking process.

1.2 User research

User research is the methodical study of target users. Our goal here is to identify the reason for the user's lack of trust in the service. The user research involves conducting analysis with individuals selected from the potential user groups we outlined earlier. There are various methods of exposing design problems and opportunities, finding information crucial to the design process. Here it will be used a quantitative research.

Quantitative research: Google form questionnaire

In order to better define the profile of our user target, we have decided to structure a survey capable of returning quantitative data on their habits and needs.

The objectives of the questionnaire are as follows:

1. To ascertain if the user segments we initially identified in the previous section exhibit a genuine interest in the service, and whether they indeed represent a suitable target audience.
2. To gain deeper insights into the characteristics and behaviours of our target users, particularly in terms of their attitude toward online booking.
3. Deepen the psychological aspects of our users regarding their willingness to motivate the class to approach the subject of study.

It's worth noting that the questionnaire was exclusively designed in Italian, as the teachers involved are from Italy as well as the museum, and none of the participants required an English version.

Settings

We assume that they are high school teachers. Since our purpose is to identify the needs and attitude of our target audience in terms of skills and motivation, they will not necessarily be Emilia Romagna teachers. Google form questionnaire is in anonymous form to maintain the privacy of the persons filling it in.

To do this we use a popular method of measurement: the Likert Scale. An ordinal scale from which interviewees choose the option that best matches their opinion. A person's attitude is measured by subjecting the individual to a series of statements about the attitude object and asking him or her to express the degree of agreement or disagreement with each statement, from 1-5.

Questions

- 1) *Quanti anni hai?*
- 2) *Che materia insegni?*
- 3) *Qual è il tuo titolo di studio?*

- 4) *Al di fuori del mio lavoro, mi interesso di arte e storia.*
- 5) *Ci tengo a trasmettere l'entusiasmo per la mia materia ai ragazzi.*
- 6) *Mi interessa arricchire la mia classe culturalmente attraverso visite museali.*
- 7) *Credo nel valore dell'apprendimento esperienziale e delle esperienze pratiche, come le visite ai musei.*

- 8) *Mi sento a mio agio nell'utilizzo di sistemi di prenotazione digitale.*
- 9) *Vedo i vantaggi di un sistema di prenotazione online per facilitare il processo di prenotazione.*

- 10) *Mi sento sicuro a prenotare online esperienze che propongo ai miei studenti.*
- 11) *Riesco a trovare facilmente le informazioni dettagliate che riguardano visite e laboratori.*
- 12) *Ritengo importante la facilità d'uso di una piattaforma di prenotazione online.*
- 13) *Ritengo molto importante la flessibilità nelle date e negli orari di prenotazione.*
- 14) *Considero importante ricevere conferme di prenotazione e promemoria via email o SMS.*
- 15) *È fondamentale poter avere accesso a un canale di assistenza clienti per domande o problemi relativi alle prenotazioni online.*

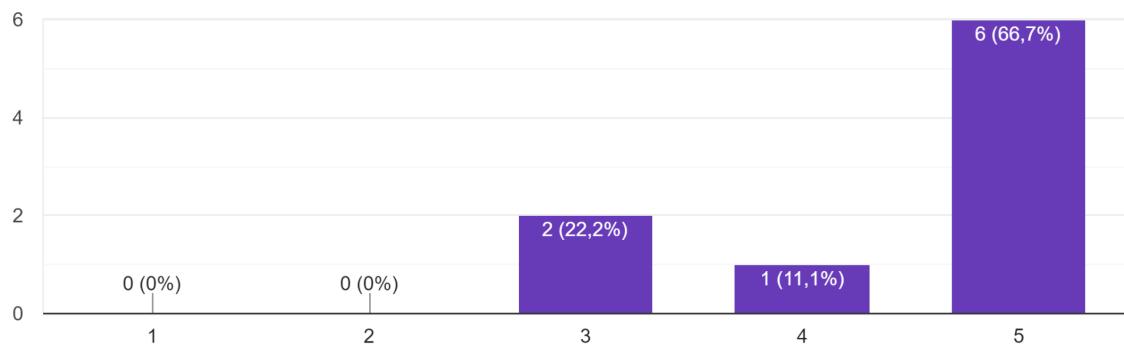
- 16) Desidero avere accesso a risorse educative aggiuntive, come guide didattiche, durante il processo di prenotazione.
- 17) Ho bisogno di poter personalizzare le prenotazioni in base alle esigenze specifiche della classe.
- 18) È importante per me capire come arrivare al museo con i miei studenti e avere info generali come orari di apertura.

Results

The results will be reported here below, 1 corresponds to Strongly Disagree, while 5 corresponds to Strongly Agree.

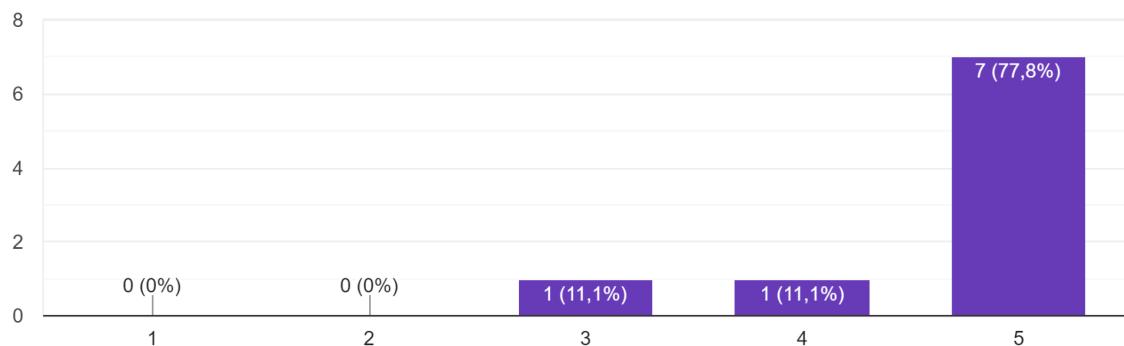
7) Credo nel valore dell'apprendimento esperienziale e delle esperienze pratiche, come le visite ai musei.

9 risposte

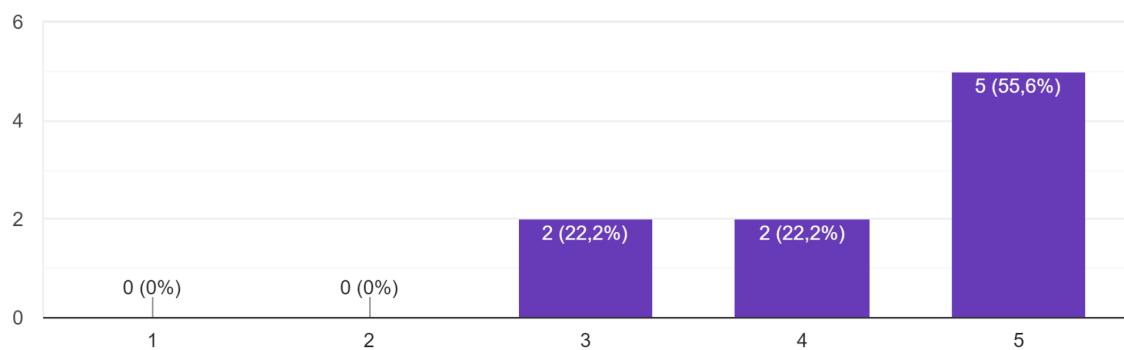


8) Mi sento a mio agio nell'utilizzo di sistemi di prenotazione digitale.

9 risposte

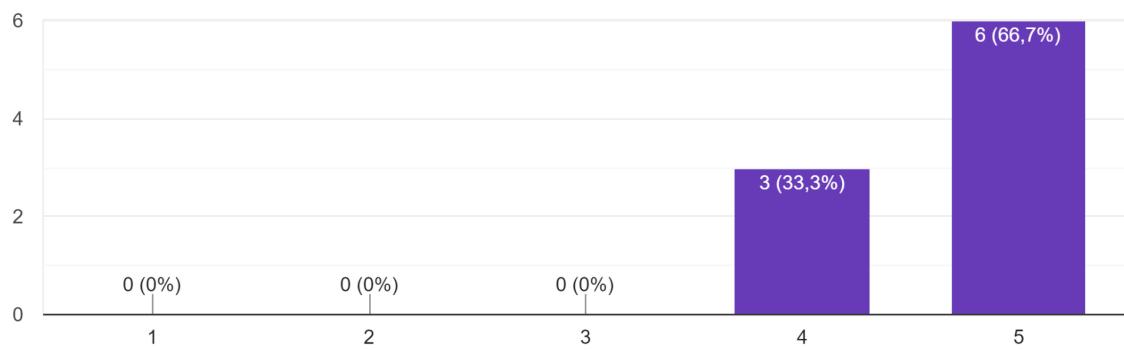


9) Vedo i vantaggi di un sistema di prenotazione online per facilitare il processo di prenotazione.
9 risposte



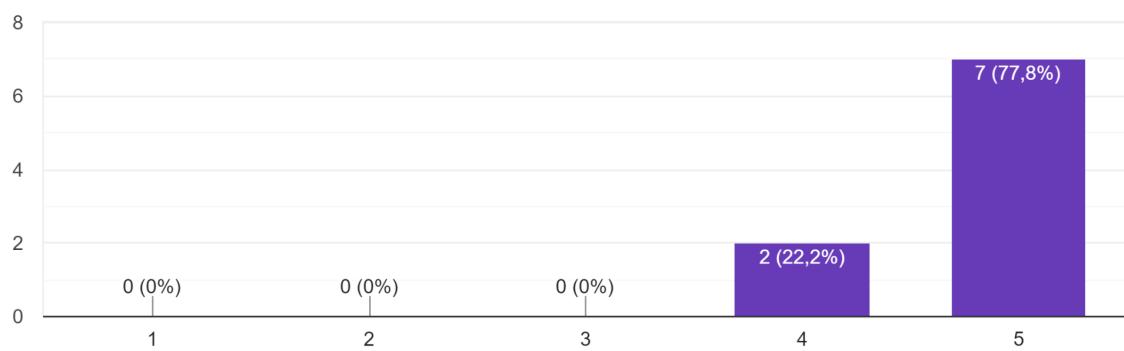
È fondamentale poter avere accesso a un canale di assistenza clienti per domande o problemi relativi alle prenotazioni online.

9 risposte



È importante per me capire come arrivare al museo con i miei studenti e avere info generali come orari di apertura.

9 risposte



Conclusions

First, we see that **the questionnaire confirmed the validity** of our segmentation, as most of the teachers involved expressed a genuine interest in transmitting enthusiasm for their subject to their students as well. Over 50% of respondents firmly believe in the value of hands-on learning experiences, such as enhancing their classrooms culturally through museum visits. In terms of their technological proficiency, a noteworthy trend emerged. A higher number of teachers expressed confidence in utilising online booking systems compared to those who found offline booking processes more accessible.

The **questionnaire also provided valuable insights into the obstacles and needs** faced by the target group concerning online booking. It became evident that while many teachers were comfortable with technology, there were still certain challenges that they encountered. Common impediments included concerns about data security, the complexity of online booking platforms, and the need for user-friendly interfaces. Furthermore, the results suggest that a user-centred approach, taking into account flexibility and customer support, is essential to improve the experience of teachers in booking museum visits online.

2. Assessment of existing resources

In this chapter we will inspect two different existing websites. The first, namely the Museo Civico Archeologico of Bologna¹ will be the system we would work on, the second, Museo di Santa Giulia² will be our driving model in order to improve the UX design of the first one.

For each of these systems, we performed experience usability inspection and user testing.

Museo Civico Archeologico dell'Archiginnasio di Bologna (MCA)

The website is the official digital platform of the Museo Civico, an important cultural institution in Bologna, both for its collection and for its role in the city's history. The webpage completes the common task associated with a cultural institution: it allows citizens to be informed about visiting activities and subsequent information (opening schedule, prices, laboratories, etc.) , as well as advertising for related cultural events/activities.

¹ (<http://www.comune.bologna.it/museoarcheologico/>)

² (<https://www.bresciamusei.com/musei-e-luoghi/museo-di-santa-giulia/>)



Museo Civico Archeologico

HOME
10 BUONE RAGIONI PER NON VENIRE AL MUSEO
INFORMAZIONI
NOTIZIE
COLLEZIONI
EVENTI
DIDATTICA
ARCHIVIO MOSTRE
LUOGHI
NEWSLETTER
REGOLAMENTO DEL MUSEO

Museo Civico Archeologico
Via dell'Archiginnasio 2 - 40124 Bologna
Tel. 051.27.7211
Direzione e Uffici
Via de' Musei 8 - 40124 Bologna
Tel. 051.27.7211
mca@comune.bologna.it
MAP



10 buone ragioni per non venire al Museo

10 buone ragioni per non venire al Museo
NON venire al Museo Archeologico di Bologna SE...

Seguici su

cerca nel sito

ORARI DI APERTURA

FINO AL 26 NOVEMBRE 2023

Tutti i giorni dalle 10.00 alle 19.00
Chiuso il Martedì (se non festivo)
La biglietteria chiude un'ora prima

DAL 27 NOVEMBRE 2023

Lunedì, Mercoledì, Giovedì e Venerdì dalla 9.00 alle 18.30
Sabato, Domenica e festivi dalle 10.00 alle 19.00
Chiuso il Martedì (se non festivo)

La biglietteria chiude un'ora prima

Prenota l'accesso e acquista online il tuo biglietto (per evitare code e lunghe attese, l'acquisto online del biglietto è fortemente raccomandato)

Per la visita al Museo e alle esposizioni temporanee la mascherina non è più obbligatoria ma consigliata. La mascherina è consigliata anche per partecipare a spettacoli, concerti, convegni ed altri eventi al chiuso.

Il Museo Civico Archeologico di Bologna ha sede nel quattrocentesco Palazzo Galvani fin dalla sua inaugurazione ufficiale, avvenuta il 25 settembre del 1881.

Ospita le ricerche dei più importanti studiosi italiani del Museo Universitario e la collezione del pittore Pelagio Palagi e degli scavi condotti a Bologna e territorio tra la fine dell'Ottocento e gli inizi del Novecento.

Il Museo si colloca tra le più importanti raccolte archeologiche italiane ed è soprattutto rappresentativo della storia locale, dalla preistoria all'età romana.

La sua sezione etrusca è il punto di partenza per conoscere la civiltà dell'antica padania, che ebbe come capitale Bologna, l'Etruria Felina.

Le antiche collezioni conservano capolavori dell'arte greca e romana; di particolare rilievo è la raccolta di antichità egiziane, una delle più importanti d'Europa.

Il Museo Civico Archeologico è parte del SETTORE MUSEI CIVICI BOLOGNA | AREA ARCHEOLOGIA

Evento

Settembre 2023

L	M	W	T	G	V	S	D
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30		

IL MUSEO E' ANCHE FUORI DAL MUSEO
La Capanna di Margherita ai Giardini Margherita è la riproduzione in scala reale di un'antica abitazione etrusca.



Museo di Santa Giulia (SG)

Museum Of Santa Giulia is the counterpart of the MCA in the city of Brescia. The two institutions have almost identical roles and perform similar tasks, however the two websites are deeply different in terms of design and usability. Because of this we decided to use SG as a hint to improve MCA functions.

Fondazione BRESCIA MUSEI Visita Mostre e Eventi Musei e Luoghi Attività

Home / Luoghi / Museo di Santa Giulia

Museo di Santa Giulia

Il Museo Unesco Santa Giulia 360° Collezione Mostre ed eventi Informazioni Servizi Come arrivare Pubblicazioni

Acquista il biglietto

Un viaggio attraverso la storia, l'arte e la spiritualità di Brescia, dall'età preistorica a oggi.

Unico in Italia e in Europa per concezione espositiva e per sede, il Museo della città, allestito in un complesso monastico di origine longobarda, consente un viaggio attraverso la storia, l'arte e la spiritualità di Brescia dall'età preistorica ad oggi in un'area espositiva di circa 14.000 metri quadrati.



To compare the two systems, we identified three main aspects to consider:

- 1)The design of the homepage
- 2)The presentation of the activity offer (for the specific target)
- 3) How the user is accompanied in the booking process.

2.1 Expert Usability Review

2.1.1 Choice of guidelines

Before assessing the functionality of these systems, we need to provide and justify reliable guidelines for our inspection and evaluation.

Because of this we choose to take advantage of Shneiderman's eight golden principles of good interface design since these guidelines provide a dry yet reliable resource to decide what should be the backbone characteristics of a user friendly web design. According to Shneiderman, a system should demonstrate:

1. Strive for consistency.

Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent colour, layout, capitalization, fonts, and so on, should be employed throughout. Exceptions, such as required confirmation of the delete command or no echoing of passwords, should be comprehensible and limited in number

2. Seek universal usability.

Recognize the needs of diverse users and design for plasticity, facilitating transformation of content. Novice to expert differences, age ranges, disabilities, international variations, and technological diversity each enrich the spectrum of requirements that guides design. Adding features for novices, such as explanations, and features for experts, such as shortcuts and faster pacing, enriches the interface design and improves perceived quality.

3. Offer informative feedback.

For every user action, there should be an interface feedback. For frequent and minor actions, the response can be modest, whereas for infrequent and major actions, the response should be more substantial. Visual presentation of the objects of interest provides a convenient environment for showing changes explicitly.

4 Design dialogs to yield closure.

Sequences of actions should be organised into groups with a beginning, middle, and end. Informative feedback at the completion of a group of actions gives users the satisfaction of accomplishment, a sense of relief, a signal to drop contingency plans from their minds, and an indicator to prepare for the next group of actions. For

example, e-commerce websites move users from selecting products to the checkout, ending with a clear confirmation page that completes the transaction.

5. Prevent errors.

As much as possible, design the interface so that users cannot make serious errors; for example, grey out menu items that are not appropriate and do not allow alphabetic characters in numeric entry fields. If users make an error, the interface should offer simple, constructive, and specific instructions for recovery. For example, users should not have to retype an entire name-address form if they enter an invalid zip code but rather should be guided to repair only the faulty part. Erroneous actions should leave the interface state unchanged, or the interface should give instructions about restoring the state.

6. Permit easy reversal of actions.

As much as possible, actions should be reversible. This feature relieves anxiety, since users know that errors can be undone, and encourages exploration of unfamiliar options. The units of reversibility may be a single action, a data-entry task, or a complete group of actions, such as entry of a name-address block.

7. Keep users in control.

Experienced users strongly desire the sense that they are in charge of the interface and that the interface responds to their actions. They don't want surprises or changes in familiar behaviour, and they are annoyed by tedious data-entry sequences, difficulty in obtaining necessary information, and inability to produce their desired result.

8. Reduce short-term memory load.

Humans' limited capacity for information processing in short-term memory (the rule of thumb is that people can remember "seven plus or minus two chunks" of information) requires that designers avoid interfaces in which users must remember information from one display and then use that information on another display. It means that cellphones should not require reentry of phone numbers, website locations should remain visible, and lengthy forms should be compacted to fit a single display. These underlying principles must be interpreted, refined, and extended for each environment. They have their limitations, but they provide a good starting point for mobile, desktop, and web designers. The principles presented in the ensuing sections focus on increasing users' productivity by providing simplified data-entry procedures, comprehensible displays, and rapid informative feedback to increase feelings of competence, mastery, and control over the system

2.1.2 First Inspection of the System

In this section we give a first look at the system as it appears; while reporting a brief overview, we also specify eye-catching violations of the guidelines, when presented, we state this violation in round brackets, giving the number of the corresponding guideline.

The inspection is conducted by dividing the system into three main topics: Homepage, presentation of the activities, and booking process.

Museo Civico Archiginnasio first inspection

1) Home

The system presents a small and not modifiable font size, both in the home and in all the other sections, the chromatic palette is very limited and does not help the overall readability of the texts (2). The fixed menu on the left is overall functional, so is the information section that describes how to arrive at the museum. The page looks flowing and easy to navigate. The same can be used for the activities calendar and research tool, although they are maybe too small.

Beside this the informations hierarchy is really confusing both graphically and Semantically (1,8). There is not a clear organisation of different sections dedicated to different topics but just a long text with arbitrary layout and no understandable logic(1,4,5).

When present, links are not visible enough nor do they give sufficient feedback (3). There is no short-cut way to directly buy a ticket, but just a link to a third-party partner responsible for the online purchase.

2) Activity section

The teaching section shows the same weaknesses, but there the lack of organisation in the display of information is more serious since this page is topic-specific and propedeutica to the visits themselves (1,8).

There is a small and hard-to read in the upper part of the page through which it is possible to download the teaching offers (PDF file), despite the fact that booking partner offers a search tool just one page onward (6,8).

3) Booking

Tickets can be purchased on an external site. The first page shows a confusing log-in form in the upper part that seems to suggest the need to register in order to proceed to the purchase. This is not true. In the same space the presentation of the offer to the given user should be confusing, and it also brings the customer to a research tool that should be the very heart of the page instead (1,5,6,7,8).

Santa Giulia first inspection

1) Home

The page opens in the 'Brescia musei' section rather than on the page of the Santa Giulia museum itself. In the upper part of the page there is a header with the most useful links for the navigations, but the header is fixed so that it disappears scrolling the page down. There is also a navbar with more general information, contrary to the header, this nabber remains despite the page scrolling.

The page itself is fairly long with a very loose layout from one content to the other. The most important information is kept at the bottom of the page or in the aforementioned nabber. The information structure is meant to introduce the museum as a physical place at first, the context it is set in, the collections, and only later there is information about visits.

In the various sub sections of the home there are some multimedia contents (pictures, 360 degrees panoramics) as well with thematic proposals. Different subsections topics are explorable due to a horizontally scrolling menu. Sometimes this design choice could be chaotic(possible violation of 8). The upper part of the page (navbar, header and related links) may also violate 8,2 and 7.

Starting from the home there seems not to be a specific target (may it be a visitor, or a financier), nonetheless the service is clear: on one hand there is an information part about the museum and the city, on the other the possibility to organise a visit for different possible users.

2) Activity section

The upper part of the page is the same, beside the fact that the nabber doesn't represent the index anymore, but is now a sub-menu for specific targets (interesting choice, but maybe a violation of 1). Without the fix navbar is now necessary to scroll the whole page to find specific sections, this increases the time needed and may be asked the user to recall where he/she had found the information before.

3) Booking

Tickets can be purchased on an external site. Even though the site is a different one, the layout is almost preserved and the signature of the museum visible. There is a dense menu in the second half of the screen that shows all the possible events the museum is offering; this is redundant in respect of the previous page, and maybe a bit confusing. Nonetheless, the actual purchase page is clear and well organize. There is anyway a full recap of information held in the homepage that seems not to be necessary (1,5,8).

2.1.3 Direct analysis: system vs. guidelines

In this paragraph we compare the different sections of the website with respect to the guidelines. Evaluation is divided between " pros and cons", The number represents the given guideline.

Santa Giulia Direct Analysis

Menu

Pros: 3- Mouseover feedback. 6- menu is always visible

Cons: 1- different colours and shapes. 2- too many menus

Activity page

Pros:2 - different images for different sections 3- image zoom

Cons: Absent

School sections

Pros: 3 image zoom. 7- all the information are clearly visible

Cons: 1- layout is problematic. There are two different brochures to be downloaded, without any short-cut to avoid it. 8- base ground information are in another page

Activity Tool research

Pros:7- possibility to philtre the research

Cons: 2,3- it is not clear that the title of each activity is a link as well, to open the information form is not intuitive. There are no images to help understand the navigation. 8- in case a user wants to compare different offers, there is no way than close and open one at a time.

Specific Activity information page

Pro: 8- all the needed information are in the same page

Cons:7- 'share' button doesn't always work.

Museo Civico Archiginnasio Direct Analysis

During the inspection we found out that the website, for what concerns both the positive and negative evaluations, shows a high grade of redundancy, so different pages have the same characteristics in terms of usability.

Home

Pros: 1- the page is easy to navigate and concise

Cons: 7,8 - Semanticity is problematic, no clear criteria can be understood. 1,4,5-section organisation is hard to understand, similar links go to different information and topics, often redundant each other.

Teaching

Pros: 1- the page is easy to navigate and concise

Cons: 7,8 - Semanticity is problematic, no clear criteria can be understood. 1,4,5-section organisation is hard to understand, similar links go to different information and topics, often redundant each other.

Exhibitions Archive

Pros: 1- the page is easy to navigate and concise

Cons: 4,7,8- introduction page give too general information and does not help the navigation, no research tool is available and the only possible philter (years listing) can't be modified

Places

Pros:1- the page is easy to navigate and concise

Cons: 4, 7- introduction page give too general information, no customizable research criteria

Collections

Pros:1 - the page is easy to navigate and concise

Cons: 4,7 - page is redundant, it gives information already present in different sections. No customizable research criteria.

Information

Pros: 1- the page is easy to navigate

Cons: 5,7,8- lots of information in a single space without a clear organisation or semantic markers.

Events

Pros:1- the page is easy to navigate

Cons: 8- page content is really modest, this section does not really provide something useful.

2.1.4 Reverse analysis: guidelines vs. system

In this section we compare the guidelines to the different parts of the systems we are considering, in order to detect previously ignored violations. Since we found out that, at this stage of the investigation, all the most evident violations of the guideline had

already emerged in the direct analysis, we decided to list here which discrepancies are the most severe or appear more often.

Santa Giulia Reverse Analysis

Strive for consistency (1)

Violations of this recommendation appear often and affect different parts of the system. Pages seem to be overloaded of information (homepage) when not even different from the one presented elsewhere (e.g. activities mentioned in the upper section can't be found in the subsection) . The presence of a downloadable PDF brochure represents a serious obstacle in the overall coherence of the system design. In this regard, it is worth noting that the purchase task happens in a third-party website, with a completely different design and layout, inevitably breaking the flow of system navigation.

Seek universal usability (2)

This violation affects the whole system without exceptions. If it is fair to say that at this stage the overall usability seems satisfactory, it must be specified that no support is given to solve specific needs an user may have. E.g the only available languages are Italian and English, font size so small, light and fixed, so that in some cases it fades into the white background. So far, this violation seems to be the most diffuse and potentially the most severe.

Reduce short-term memory load (8)

This violation is particularly severe in the section that displays the offer of the museum, as well as the purchase process. Moreover the load of information may be problematic in the whole system. Even when not totally violated, this is a point of weakness that can surely affect the user experience.

Museo Civico Archiginnasio reverse analysis

Seek universal usability (2)

This point is fairly problematic for the system since it is completely ignored in any aspect. Once again this does not mean that the system is unusable, but that it has been designed without any care for user-specific need of accessibility. The fact that the museum is a public institution makes this violation more serious.

Design dialogs to yield closure(4)

A clear sequence of actions is hard to understand outside the homepage because of the load and redundancies of information, as well as the dense layout and the absence of any task-related feedback.

Reduce short-term memory load (8)

The experience of the system seems compromised by the lack of a clear organisation and proper display of information. Subsections of the system are often just a long sequence of paragraphs without a proper differentiation based on the topic they discuss. Recall informations from one section to the other is fairly difficult

2.2 User testing

When assessing existing resources, it is crucial to consider both the attributes and services provided by these resources, as well as how users interact with and utilise them. Usability tests are designed to comprehensively grasp user behaviour when engaging with existing resources, including the evaluation of error frequency and severity in relation to their tasks.

2.2.1 Definition of the testing protocol

We used the 'think aloud' methodology, in which participants vocalise their actions and thoughts while completing tasks within the test environment.

This testing approach is known as 'discount' or 'guerrilla' usability testing. This method is less elaborate than the 'deluxe' test and involves fewer participants, without the need for a team of usability experts. Despite its seemingly 'light' nature, it offers the advantage of being cost-effective and, above all, of being able to uncover user errors, thus providing valuable pointers for the definition of a new, efficient design.

To represent the target audience, we choose two distinct test subjects between the age of 30 and 45 years. Both of them were called to test both systems..

1. **Giorgia**, 45 years old, was a primary school teacher at the beginning of her career and now teaches art history in a high school. She has an adventurous nature and likes to discover new things. She often takes her children on trips and abroad during the summer. She has average skills in technology.
2. **Pietro**, 35 years old, father of three daughters and history teacher in an artistic high school. He is very passionate about his subject, he takes the students in the summer to visit cities of art and do experiences abroad. He is also the headmaster of his school and has high-level computer skills.

We designed 6 tasks for each system to test:

MCA Bologna

Home

- 1.a Change language
- 2.a Find your way to the museum
- 3.a Go to the ticket section

Offer

- 4.a Find the section for schools
- 5.a Use the filter tool

Purchase

- 6.a Buy a ticket

SG Brescia Museum

Home

- 1.b Change language
- 2.b Find your way to the museum
- 3.b Go to the ticket section

Offer

- 4.b Find the section for schools
- 5.b Use the filter tool and find out the minimum number of participants for the activity "Painted Fashion"

Purchase

- 6.b Buy a ticket for the Santa Giulia Museum

We measure success (whether the user succeeds or not, with or without help), efficiency (whether the user makes mistakes or backtracks), learnability (whether the user displays familiarity with the system in later tasks) and general enjoyment of the product. Furthermore, we integrate the test with a system usability scale (SUS) assessment.

2.2.2 Testing Phase

Participants were briefed on the scope and modalities of the test and asked for permission to record³ their speech. The users are informed on the system they are going to test and are reassured that it is the system that is being tested, and not themselves.

Test result for Giorgia x MCA Bologna

Task	Success	Efficiency	Learnability	Enjoyment
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³ In the materials folder.

2.a	Success	High	Good	High: symbol google maps has satisfied
3.a*	-	-	-	-
4.a	Success	Medium: waste of time searching through too much information	Good	Low: annoyed by the too-small text and to download the pdf
5.a	At first failure: 404 page not found <i>then</i> Success	Low: waste of time figuring out why he needs to register, tool not obvious!	Medium	Low: too many pages, type of visits not evident
6.a	Success	High	Good	Medium: not flexibility

3.a* not applicable since there is not a ticket section

Here below some quotes from Giorgia while she was doing the tasks:

4.a “Penso alla classe che devo accompagnare e penso subito qualcosa legato alla didattica” “Vedo visite e laboratori”

“Mi infastidisce la scrittura così piccola”

“mi tocca leggere tutto”

“avrei preferito avere uno schema per fare prima perché gli insegnanti non hanno tanto tempo. Leggere lo fanno, ma malvolentieri”

“A me di scaricare il pdf fa fatica”

5.a “perchè mi dovrei registrare se non ho ancora capito se troverò le informazioni che mi servono o no”

“Per ora questa pagina non mi è soddisfacente”

“Non trovo le proposte”

“Mi sono un po’ persa”

6.a “qui c’era scritto 22 ma poi sono 25”

“manca il costo”

“Qui è abbastanza agevole”

Test result for Pietro x MCA Bologna

Task	Success	Efficiency	Learnability	Enjoyment
2.a	Success	High: immediate	Good	High
3.a*	-	-	-	-

4.a	Success	Medium	Good	Low: annoyed by the download the pdf
5.a	Success with assistance	Low: tool hided, waste of time	Not very good	Low: too many pages
6.a	Success	Medium	Good	Medium

3.a* not applicable since there is not a ticket section

Test result for Pietro x SG Brescia Museum

Task	Success	Efficiency	Learnability	Enjoyment
1.b	Success	High: hesitation	Good	Normal
2.b	Success	High	Good	High
3.b	Success	Very high: immediate	Good	High
4.b	Success	High: immediate	Good	High
5.b	Partial success: he used the search tool to accelerate the task	High: immediate	Good	Very high: exclamation for possibility of filter info
6.b	Success	High: immediate recognition of the button	Good	Very low: confusion, and sense of lost due TICKETLAND IA is different website to book, is not anymore the museum site

Here below some quotes from Pietro while he was doing the tasks:

1.b “Era facilissimo bastava andare sulla bandierina”

3.b “Clicco BIGLIETTI per andarci”

4.b “Partirei cliccando su Visita, ecco Visita guidata”

“Poi c’è addirittura una sezione servizi educativi”

“Da diverse opzioni di visita”

“Si possono selezionare le proposte per grado di scuola, per luoghi oppure per argomento, beh questo è figo se posso dire!”

“Ci sono una quantità notevole di visite”

5.b “è un compito difficile che mi hai dato”

“io vado su cerca”

6.b “vado su BIGLIETTI e faccio ACQUISTA ONLINE”

“Ma cos’è sta roba”

“Non so dove sono finito, mi sono perso”

“Non viene fuori chiaramente”

Test result for Giorgia x SG Brescia Museum

Task	Success	Efficiency	Learnability	Enjoyment
1.b	Success	High: quick	Good	Normal
2.b	Success	High	Good	Normal: she took two paths
3.b	Success	Medium	Good	High
4.b	Success	High	Good	High
5.b	Success	High: immediate	Good	High
6.b	Success	Medium	Good	Very low: confusion, and sense of lost due TICKETLANDI A: different website to book, is not anymore the museum site

Giorgia has successfully changed the language without any errors. She located the museum's position in the footer; nevertheless, she was content with the directions received. To access the tickets, she realised they were at the bottom of the website and returned to the site to search for them, which took a bit of time. She found the school's section on her first attempt. Initially, she navigated through the entire page, not realising that there would be a more user-friendly tool on the next page. She opened the brochures. After seeing the number of pages to scroll through, she returned to the site and searched for another method until she found the filter and located the activity. She booked the ticket without any difficulty, although she still does not understand why there are other tickets and another separate website.

After completing the various tasks, the participants completed the **System Usability Scale (SUS)** questionnaire which includes 10 questions, proposed with positive and negative statements, to which they are asked to answer according to a 5-level Likert scale.

The average score is 68, if the score is under 68, then there are probably serious problems with the website usability. The points will be calculated following [this report](#)⁴:

- Deduct 1 point from the score for each of the odd-numbered questions.
- Subtract the value of each even-numbered question from 5.
- Sum up these adjusted values to obtain the total score.
- Multiply this total by 2.5.

The outcome of these complex calculations provides the final score on a scale of 100, that offers a clear and precise assessment of the performance.

SUS of Giorgia x MCA Bologna

1. I think that I would like to use this system frequently.	4
2. I found the system unnecessarily complex.	2
3. I thought the system was easy to use.	4
4. I think that I would need the support of a technical person to be able to use this system.	1
5. I found the various functions in this system were well integrated.	3
6. I thought there was too much inconsistency in this system.	3
7. I would imagine that most people would learn to use this system very quickly.	4
8. I found the system very cumbersome to use.	2
9. I felt very confident using the system.	3
10. I needed to learn a lot of things before I could get going with this system	2
	Total:
	70

SUS of Pietro x MCA Bologna

1. I think that I would like to use this system frequently.	3
2. I found the system unnecessarily complex.	2
3. I thought the system was easy to use.	3
4. I think that I would need the support of a technical person to be able to use this system.	1
5. I found the various functions in this system were well integrated.	3
6. I thought there was too much inconsistency in this system.	4
7. I would imagine that most people would learn to use this system very quickly.	4
8. I found the system very cumbersome to use.	2
9. I felt very confident using the system.	4
10. I needed to learn a lot of things before I could get going with this system	1
	Total:
	67,5

⁴ Nathan Thomas, How to Use the System Usability Scale (SUS) to Evaluate the Usability of Your Website. Usability Geek. Url:
<https://usabilitygeek.com/how-to-use-the-system-usability-scale-sus-to-evaluate-the-usability-of-your-website/>

SUS of Pietro x SG Brescia Museum

1. I think that I would like to use this system frequently.	4
2. I found the system unnecessarily complex.	2
3. I thought the system was easy to use.	4
4. I think that I would need the support of a technical person to be able to use this system.	1
5. I found the various functions in this system were well integrated.	3
6. I thought there was too much inconsistency in this system.	1
7. I would imagine that most people would learn to use this system very quickly.	4
8. I found the system very cumbersome to use.	2
9. I felt very confident using the system.	4
10. I needed to learn a lot of things before I could get going with this system	1
	Total:
	80

SUS of Giorgia x SG Brescia Museum

1. I think that I would like to use this system frequently.	4
2. I found the system unnecessarily complex.	2
3. I thought the system was easy to use.	4
4. I think that I would need the support of a technical person to be able to use this system.	1
5. I found the various functions in this system were well integrated.	5
6. I thought there was too much inconsistency in this system.	2
7. I would imagine that most people would learn to use this system very quickly.	4
8. I found the system very cumbersome to use.	2
9. I felt very confident using the system.	4
10. I needed to learn a lot of things before I could get going with this system	1
	Total:
	82,5

An overall score of 80.3 or higher is indicative of an exemplary performance, warranting an A grade. Positive feedback and enthusiastic recommendations from users are anticipated outcomes.

Achieving a score around 68 demonstrates a satisfactory performance, meriting a C grade. While commendable, there remains room for enhancement and optimization.

A score of 51 or below represents an unsatisfactory performance, resulting in an F grade. Urgent attention should be directed towards prioritising usability improvements in order to rectify this situation promptly.

2.2.3 Analysis of the results

Classification of Errors

We documented each of the errors the users made, while testing the applications. Subsequently, we conducted a comprehensive analysis of this data, assigning each

error a rating based on its Impact and Frequency, along with a categorization label to identify whether they were implementation errors, catastrophic failures, major issues, minor inconveniences, or cosmetic concerns.

The severity assessment framework for usability issues, introduced by Jacob Nielsen in 1994, evaluates both the frequency (the number of users who encountered a given usability problem) and the impact (the extent to which the problem hinders task completion). The Nielsen Severity Scale operates as a unidimensional scale, featuring a range of five points, spanning from 0 to 4.

- 0: Indicates a disagreement that the issue constitutes a usability problem.
- 1: Reflects a purely cosmetic problem, necessitating attention only if additional project time is available.
- 2: Signifies a minor usability problem, warranting a lower priority for resolution.
- 3: Highlights a major usability problem, demanding immediate and high-priority attention.
- 4: Designates a usability catastrophe, mandating immediate resolution prior to product release.

Thereafter, we constructed an urgency curve. The red line on this curve represents a fixed threshold: any errors surpassing this threshold necessitate immediate correction.

Errors detected in MCA User Tests

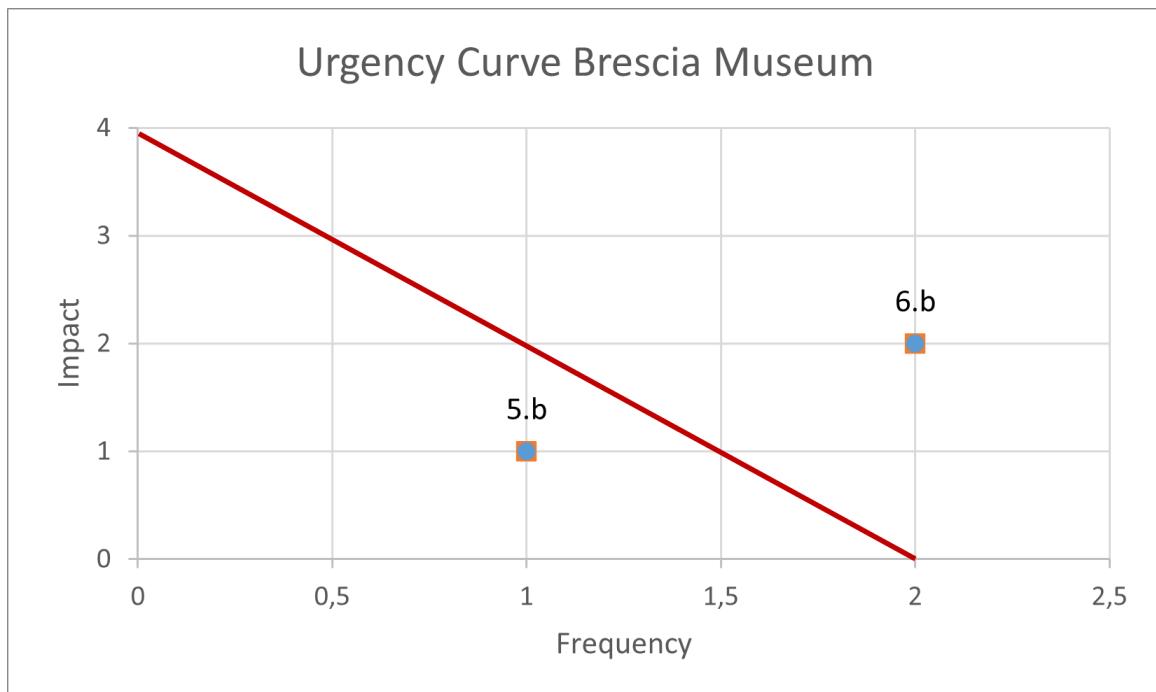
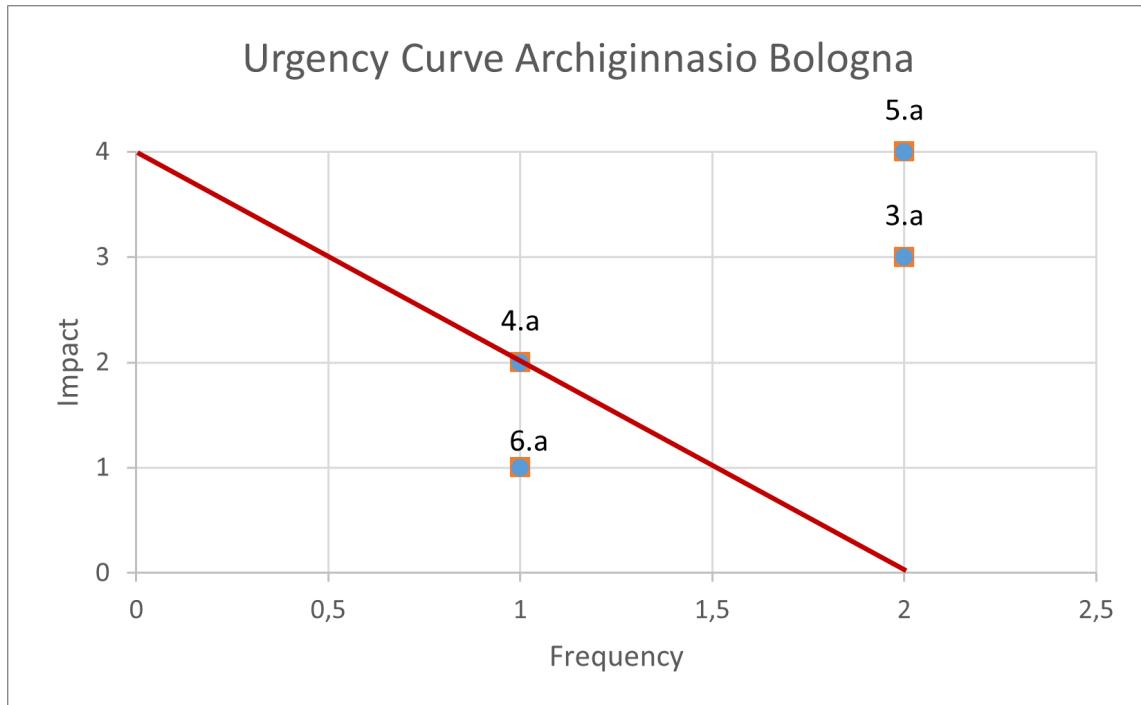
Error	Impact	Frequency	Usability problem
3.a	3	2/2	Major error: to be implemented
4.a	2	1/2	Minor error: too-small text and to download the pdf
5.a	4	2/2	Catastrophic failure
6.a	1	1/2	Minor error: not flexibility

Errors detected in SG Brescia Museum User Tests

Error	Impact	Frequency	Usability problem
5.b	1	1/2	Cosmetic error: Pietro used the search tool to accelerate the task
6.b	2	2/2	Minor error: confusion, another website

2.2.4 Urgency Curve

Utilising the insights gleaned from user testing, we have the capability to construct frequency/impact urgency curves. These tools enable us to quantitatively assess the influence of errors based on the degree of uncertainty and hesitancy they induce, as reported by the users during testing. Within this framework, the red line serves as a predefined threshold. Any errors exceeding this threshold are earmarked for immediate remediation.



2.2.5 Conclusions

After testing the websites of MCA and the SG, we have a clear understanding of their strengths and weaknesses in terms of usability. Thanks to the thinking aloud test, the SUS, and the urgency curve, we can list the factors that determine their usability or lack thereof.

It is evident that the MCA website lacks several fundamental usability points. Users encountered difficulties in many areas, which will be our responsibility to improve. Analysing the urgency curve, the error that requires immediate resolution prior is task *5.a Use the filter tool*, classified as a "Catastrophic failure" as it hinders the user from progressing towards their goal in a linear and efficient manner. Task *3.a Go to the ticket section*, is non-existent, thus representing a "Major usability problem" demanding immediate and high-priority attention.

Regarding error *4.a Find the section for schools*, which falls on the red line of the curve, it is a "Minor usability problem." It is worth mentioning but can be addressed with a lower priority for resolution.

The identified problems from the user testing include the following:

1. **Readability:** Small font size and a condensed page.
2. **Poor Text Organization:** Information is poorly organised in terms of text structure, with only h1 and h2 headings and div elements. There is no clear hierarchy.
3. **Unclear Links:** Links are not distinguishable as links and are not highlighted.
4. **Lack of Feedback:** There is no feedback provided for user actions.
5. **Lack of Clear Immediate Booking Button:** There is no clear button for immediate ticket booking.
6. **Filter Ambiguity:** Users do not understand the existence of the filter. Clicking on "PROPOSTE" seems to imply that one must log in first. The login button is hidden. Having the list of visits and laboratories in another website is confusing to the user.

Our goal here is to address these issues comprehensively to enhance the usability of the MCA website and provide users with a more seamless and efficient experience.

On the other hand, the SG website, as indicated by the SUS results, "is indicative of an exemplary performance, warranting an A grade." It boasts an **excellent activity search filter**, which elicited an exclamation of surprise from one of the user: "Si possono selezionare le proposte per grado di scuola, per luoghi oppure per argomento, beh questo è figo se posso dire!"

Further advantages extracted from the impressions of the two users include the following:

- The prominently displayed "**Acquista il Biglietto**" button has brought a lot of satisfaction among users and allows them to immediately identify the booking area, expediting the achievement of the ultimate goal.
- The **section for schools is clear** and straightforward, catering to the needs of teachers who have expressed the challenge of limited time availability.
- **Information is presented in a more clear and well-organised manner.**

In this case, the only error above the urgency curve pertains to task *6.b Buy a ticket for the Santa Giulia Museum*. The difficulties here arise from user confusion, as they are redirected to another site, TICKETLANDIA, distinct from the museum's website for making reservations. Nonetheless, this has been identified as a "Minor usability problem", a case that therefore merits a lower priority for resolution.

Consequently, the website of the SG will be used as a reference point to enhance usability and improve the user experience of our target audience at MCA. Our goal is to equip the MCA website with the same strengths as the SG website and all its features that were appreciated by the user testers.

3. Feasibility study

In this chapter we start building concrete ideas for the redesign of the system; to do so, we will consider three specific aspects :

- The **context** in which our system will be used.
- Plausible **scenarios**.
- The **personas**, fictional character that can embody our expected users.

3.1 Context of use

In order to be sure to consider all the possible aspects that can influence our system, we can now start defining our expected users, as well as the task they should carry on and the eventual constraints they would face.

3.1.1 Intended Users

The intended users of our system are second degree teachers that want to expand the educational experience of their students in the humanities field. They strongly believe in the educational advantage of a direct experience of theoretical knowledge in the

real world and tend to be up-to-date about the cultural offer of the museological institution of their city.

Because of this we will assume that our users will be people with a higher educational degree (from bachelor to PHD) . We will also assume that they will have an active interest in the humanities field of study as a whole and won't consider the constraints of the specific matter they teach to the students. At the same time they will be professional in the specific subject they teach and will try to expand the understanding of the matter beyond the strictly-needed curricular lessons and concepts.

Because of these considerations they will be male or female alike, from 30 to 45 years old with , with a sufficient amount of free time to devote to the deepening of the educational experience of their students and the will to do so. There may be differences in their personal income from teacher to teacher due to the personal background and the years of service but we will assume them to always be in the middle-class range or further.

3.1.2 Intended tasks

We imagined a list of realistic tasks that can be carried on by our users; both for practical needs and for a successful system browsing in search of general information about the institution and about a specific event or exhibition.

We divided this task in three main points :

- First approach to the system (system browsing).
- Inspection of the cultural proposals.
- Purchase of products.

Specifically, we will divide these three points in different sub-task in order to better fit a real-world scenario.

1. System browsing.

- Find how to reach the museum.
- Move to the ticket online store.
- Find the section for schools.

2. Inspection.

- Explore the offers: find specific activities for schools.
- Select a visit for your class, use the research filter to gather information for the visit (e.g minimum number of participants).

3. Purchase.

- Buy a ticket

3.1.3 Technical and environmental constraints

We assume that our users will have at least one personal computer and that they will use it on a daily basis to carry out both professional and leisure activities. None of our users will have a knowledge of computer science beyond the ordinary (writing softwares, email, browsers,ecc.)

Even if our target users don't require any specific cultural or ethnic background, we will assume them to be Italian native or at least that they had spent a solid amount of time in the country.

3.3 Personas

After a general description of our intended user profile, we can now imagine real-world personas. Our character will be half male and half female in order to have an equal gender representation.

Mario Rossi

Mario Rossi is a high school history teacher who is passionate and dedicated to the growth and education of his students. With a warm and engaging personality, he manages to establish a relationship of trust and mutual respect with students. His passion for teaching goes beyond the mere transmission of knowledge, he is committed to stimulating students' curiosity, creativity and active participation in the learning process. His life experience profoundly influenced his educational vocation. Raised in a modest family, Mario had limited access to art and culture during his childhood. However, he developed a strong passion for history from a young age, and dedicated much of his free time to self-learning and visiting museums or cultural initiatives. The fact of being constantly exposed to new stimuli leads him to look for as many connections as possible between the topics he deals with in class and current events, even when it seems there are no such direct ones. Mario has a positive relationship with technology and uses it as a valuable resource to improve the teaching process and to stay updated on topics of interest to him. However, despite his positive approach to technology, Mario is aware of having limited knowledge of it, for this reason and; particularly careful to expose his students to as many stimuli as possible so that he too can learn to manage these new tools. Mario lives with his wife Chiara, who works as an employee and shares passions and hobbies with him. Having no children, they have a lot of time to live their passions together and they support each other.

Simona Salemi

Simona Salemi is a 45-year-old high school literature teacher, married and considered one of the most experienced people on the school's teaching staff. Thanks to her vast experience, she has become a point of reference for her colleagues, offering valuable support and advice. Simona is deeply passionate about her subject, literature, and she firmly believes in the importance of bringing out the connection between what students study in books and the world around them. She understands that this connection is crucial to making learning more meaningful and engaging for students. For this reason, she tries to organise trips to city museums with her students, so that they can personally experience the works of art, the cultural and historical influences that inspired the great literary authors. Since she got married she has lived with her husband in the city centre, also for this reason she has developed a great affection for the cultural institutions of her city over the years, this is also evident in the way in which she is actively committed to encouraging students to explore museums and appreciate local art and culture. She believes that museum visits are a unique opportunity for students to broaden their understanding of the world and enrich their imagination and creativity.

Marco Ferrari

Marco Ferrari is a young 30-year-old History of Art teacher, just starting out in his career, but full of motivation and passion for teaching. He chose this profession because he firmly believes that art and culture can enrich students' lives and offer them a broader perspective on the world. Marco is committed to stimulating and engaging his students through activities outside the classroom. He regularly organises trips to visit the city's museums, offering students the opportunity to immerse themselves directly in art and live a sensorial experience that goes beyond traditional lessons. Among his students, Marco has some who have shown behavioral problems. He is aware that their attitude may result from a lack of interest or involvement in the learning process. With the belief that art can be a form of expression and inclusion, Marco hopes that through these extracurricular activities he can help students overcome behavioral barriers, develop a greater sense of group belonging and build healthier relationships with others. classmates. In his life Marco has often had the opportunity to travel to different cities, particularly European ones, and this has contributed to his interest in art, and also for this reason he believes it is important to

leave the classroom to learn and discover it. Marco lives alone in an apartment in the city, when he is not working or busy, he loves to go out with his friends, twice a week he attends a drawing master class, a hobby he has always been passionate about.

Sara Romano

Simona is a young 37 year old philosophy teacher. She had the opportunity to obtain a doctorate abroad, in Scandinavia, thanks to her financial resources, and dedicated her thesis to alternative teaching for the humanities. This experience gave Simona a unique perspective and allowed her to gain in-depth knowledge of new methodologies and approaches in teaching. Her thesis on alternative teaching has become a point of reference for her teaching practice. Simona constantly tries to incorporate the concepts and stimuli of her research into her daily life in the classroom. She organises numerous outings with her students, especially to city museums, so that they can delve deeper into what they see through the teachings and explanations that she has provided during the lessons. For Simona, learning is not just limited to classrooms, but extends to direct experience and interaction with the art and culture around them. Simona is a young 37 year old philosophy teacher. Thanks to her medium-high family status she had the means to obtain a doctorate abroad, in Scandinavia, with a thesis on alternative teaching for the humanities. For this reason she tries to repeat the themes of her research in the daily life of teaching her students by organising numerous outings, especially in city museums, where she invites students to delve deeper into what they see thanks to the stimuli and concepts that she explained in class. Since in her thesis she reflected a lot on the role of new technologies in the process of learning and developing critical thinking, she is very careful to try to expose her children to this kind of stimuli, every time she has the chance. , seeks to enhance those cultural institutions that offer immersive and multimedia experiences. You have a very casual relationship with technology, and of a decidedly higher level than your colleagues. Simona shares an apartment with a dear friend of hers not far from the city centre; when she isn't working she plays sports and she dedicates herself to expanding the research topics of her thesis in the hope of being able to publish new articles again thanks to the experience gained from her teaching experience.

3.2 Scenarios

To have a better understanding of the effects in the concrete application of our system , we imagine some plausible situation our personas may face.
Each scenario is associated with a specific need-task relationship .

1. Collecting general information (Mario).

It is the 13th of December, the first trimester of high school is coming to an end , and Mario's students from the 5th class are already preparing for the final graduation exam. Because of this they have to keep updated and prepared about all the school programs of the past years and also try to have interesting ideas for their final pseudo-thesis. Mario knows that it is a period full of engagements and stress, so he thinks that easing the amount of work for his students can be beneficial both for their spirits and their school proficiency. To help them review the late Roman period they studied two years ago, he decided to organise an unofficial school trip to the local museum. Mario and his students will meet in the city centre after school and visit the museum; this hybrid moment of teaching will be a good occasion for the students to spend some leisure time together and remain focused on school subjects as well.

Different students have different organisation constraints, so Mario needs to know the opening hours of the museum, know how long the visit should be and check for the possibility of a group discount.

During a free hour in the morning schedule, Mario sits with his laptop in the bar outside the school building, he open the museum website and start taking note about opening hours and other useful details, since he knows that last time schedule changing may occur, he also take note about the phone number of the museum's booking office.

2. Event inspection (Marco).

Marco has just taken charge of a new 2nd-year class after the maternity leave of the previous teacher. The students were studying the crafting art techniques of the early middle age. Because of this Marco decided to close the work started by the colleague with a practical laboratory in the local museum ; this will be a good occasion for him to know his new students better and for them to end the learning of the subject in a coherent way before starting the new one. An passionate art teacher and amateur painter, Marco often browses the web in search of possible laboratories and practical activities. Because of this he has some memories about a laboratory held in the local museum. Before proposing the school trip to the school board he has to gather all the due information and also make a preventive contact with the museum to be sure of the feasibility of the school trip.

Arrived at home after an afternoon meeting with his colleagues at school, he opens his laptop and start preparing a mail to the school board to present his idea, in this document he has to enlist detailed information about date, time, place and pricing of the laboratory, as well as a letter of motivation to express the reason he wants to

promote this activity. To do so he browses the museum website searching for a specific activity and all the related details.

3. Purchase (Simona)

One of Simona's students from the 1st year needed to leave school for a while because of health issues, missing some of Simona's classes. The coming back to school process is a bit hard but nonetheless is going well, so the class council is trying to find a way to both incentivize the regain of the missed study as well as not to overload the student with too much material. After a meeting with his parents Simona proposed a tailored reduce program specifically for his situation. In this program, instead of having multiple oral exams, the student will present a paper based on his personal experience in the local museum, where he has to provide feedback about previously established topics.

The parents agreed, but since they are first generation immigrants from Morocco, they had some trouble browsing the museum website and booking the ticket; so Simona offered her help to manage the purchase.

At home, Simona sits on her couch while waiting for her favourite Tv show to start, in the meantime she opens her pc and starts the purchase of a single ticket for the specific age range of his student.

4. Design Proposal

After analysing the features of the SG website, our next step is to create a tailor-made website specifically designed for our target audience, ensuring that they trust the website and are motivated to consult and book a visit or laboratory in the MCA's one. We have analysed what was not working and what can be designed to enhance it. Will be our work here to address the best possible solutions in terms of usability and user experience design.

4.1 Information Architecture

The main objective of I.A. is to organise, structure and label content in order for users to adjust to the functionalities of the product easily and effortlessly find everything they need: it is focused on relations between information items and their management as system parts.

As highlighted through the user tests the most of the complaints and errors in the MCA website are due the wrong organisation of the information, that leads to a unsatisfaction and bad efficiency of the system. It indeed, must provide all the

information useful for the intended users and at the same time make them accessible and easily retrievable through the main interface.

We preferred firstly creating an overview of the system to help orient the reader into the hierarchical structure where we operated, as suggested by the **top-down approach**.

We can now draw these conclusions, thanks to the work we have done with the study of the guidelines (paragraph 2.1), the user testing (paragraph 2.2), and the scenarios (paragraph 3.2).

Homepage: The homepage should prioritise the delivery of immediate information and prominently display the most crucial details at a glance. This entails allocating more space for essential content elements. Notably, it is important to highlight the "Prenota Biglietti" feature and ensure the visibility of links. Drawing inspiration from the SG's approach, we recommend employing distinct colour coding for various types of information. Furthermore, we suggest expanding the Google Maps section for enhanced efficiency. It is imperative to optimise the font size.

Didattica Page: On this page, we want to underscore the importance of making the booking link more accessible, preferably as a prominent button. It is imperative to emphasise the search tool and reduce the use of PDF documents, as evidenced by their suboptimal usability. If necessary, PDFs can be made available as supplementary resources, positioned after the primary content. Employing expandable paragraph sections, such as accordions, can help streamline information presentation, and implementing hover-over feedback for these sections can enhance user interaction. In addition, it is ideal to highlight the "CONSULENZE" section by moving it higher up, perhaps to the side so that teachers can have a customer service channel to solve questions or problems related to activities. It is imperative to optimise the font size.

Search Tool: The search tool should draw inspiration from the successful SG model. This includes implementing a colour-coded legend, providing direct links to pages with essential information, and introducing a topic filter. We advise the removal of the login option, as it can cause confusion and additionally, it is essential to ensure that the "PRENOTA" button remains consistently visible. It is imperative to optimise the font size.

Purchase Page: To speed up the purchase process, it is recommended that a calendar selection function be adopted on the same page. Uniformity should be maintained between the selected ticket summary page and the date selection page, preferring

drop-down menus over multiple sequential page navigation. It is advisable to avoid compulsory registration in order to speed up the booking process and improve user convenience.

These recommendations are formulated to cater to the specific needs and preferences of our target audience, providing them with a user-friendly online environment.

4.2 CAO=S

To start the actual design of our system we first need to establish a design model to follow. Considering the inevitable constraints we are facing we decided to adopt the CAO=S model.

This choice will allow us to take advantage of a reliable model despite the lack of expert usability support, our limited user testing and the time we should invest to overcome such limitations.

This design model is based on the identification of the key **concepts** that will be part of the system, the **actors** involved in the manipulation of such concepts, and the actual **operations** the actors will perform. The result of the application of this model will later inform the design of **structures**.

4.2.1 Concepts

Concepts are the abstract entities that guide the interaction in the system, they are different from the data structures since they do not represent a real element of the system rather than the conceptual meaning perceived by the user.

Starting from our users' point of view we can identify the following concepts:

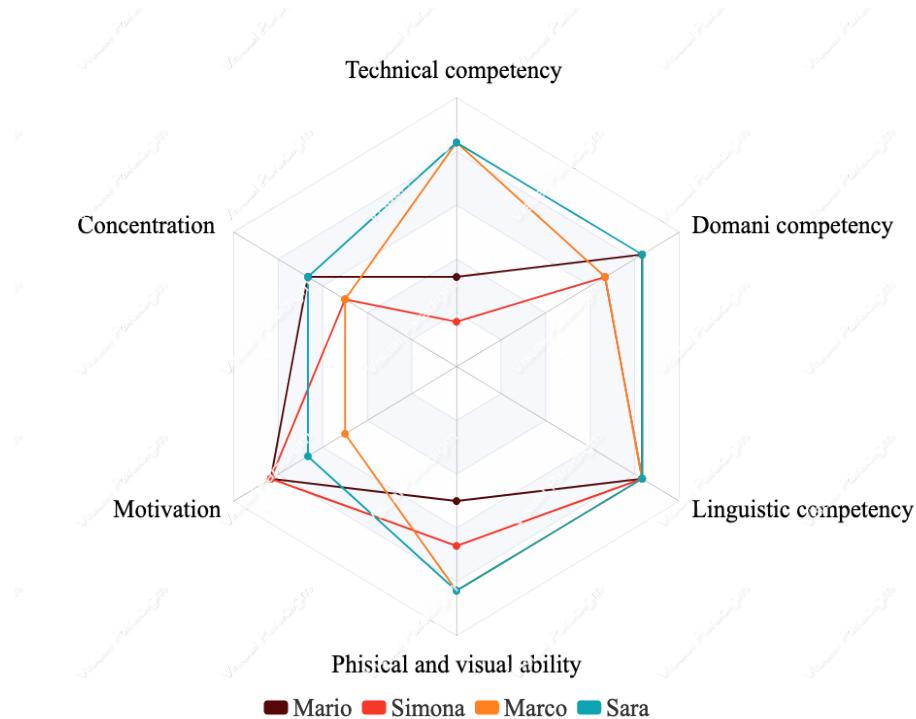
- **Museum**, the main interlocutor of the interaction, conceptual space that influences interaction.
- **Visitors**, role that describes and limits the nature of the user in this relationship.
- **Information**, the tool/ set of constraints with which the user is put in the position of being a visitor.
- **Visit**, physical purpose of the user, realisation of the museum/user relationship.
- **Collection**, material substance of the institution and distinguishes the visitor's interest.
- **Event**, variation in the methods of using the relationship with the museum.
- **Ticket**, indispensable tool, gap between general interest and visitor role.
- **Learning**, conceptual purpose of the visitor.
- **Place**, sia un vincolo per l'utente sia parte della manifestazione dell'ente museo.

4.2.2 Actors

Actors are the entities that interact with the concepts in the system. Actors are said to be direct when they actually interact with the system by using it; on the contrary, they are said to be undirected when they exert an influence without using the system.

In our case, we identified the only direct actors as our personas. At the same time we can also identify numerous indirect actors, such as all the human capital spent in the museum, being the authors of the material of the collection such as the administrative board of the institution. We decided not to expose indirect actors since their number would be very high and also because they have no pivotal role in this phase of the CAO=S design model.

Direct actors are characterised by six qualitative measures, each on a scale from 1 to 5, which should ideally indicate their ability to interact meaningfully with the system. Since our only direct actor is the end-user, we use our personas to carry out this characterization.



4.2.3 Operations

CAO=S model is based on the CRUD model, which describes four possible operations :

- Create
- Read (view)
- Update (edit)

- Delete

Here we use a table to summarise the single operations performed by single direct actor (our user) on single concepts:

Concept	Create	View	Update	Delete
Museum	Prerogative of the museum	Full individual: progressive.	Prerogative of the museum	Prerogative of the museum
Visitor	Single: The role of user	Full individual: Embedded in the user persona.	Specific update: Iteration can change the instance	Archival: Instances are fixed in time but recoverable in user personality
Information	Prerogative of the Museum	Individual full: All the needed info to perform the visit.	Prerogative of the museum	Prerogative of the museum
Visit	Types: physical creation of the interaction.	Individual full: fundamental instance of the user.	Global update: All the properties can be modified in time	Elimination: Instances no longer exist after the interaction has ended
Collection	Prerogative of the museum	Individual reduce: partial experience of the instance.	Prerogative of the museum	Prerogative of the museum
Ticket	Types: Implicit	Type: Implicit.	Prerogative of the museum	Prerogative of the museum
Learning	Persistence: The instance created exists after the end of	Multiple : Subject dependant	Specific update: Iteration can change the	Archival: Learning ends at the end of the interaction

	the operations.		instance	but can be recalled by the user.
Place	Prerogative of the museum	Multiple : Subject dependant	Prerogative of the museum	Prerogative of the museum
Event	Prerogative of the museum	Multiple : Subject dependant	Prerogative of the museum	Prerogative of the museum

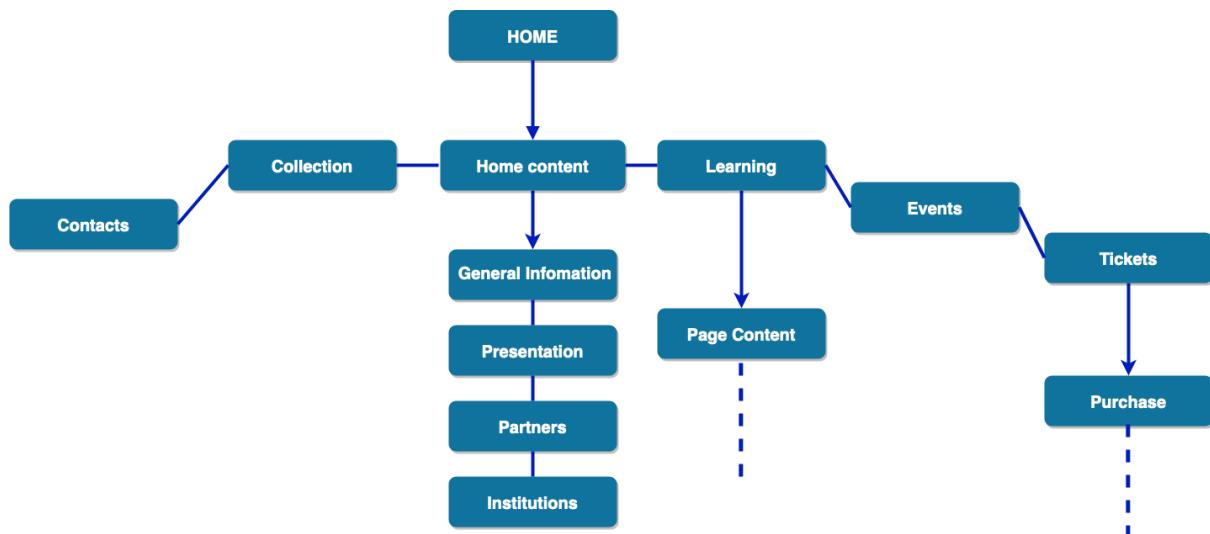
4.3 Interaction Design

With interaction design approach is defined the design of interactions between users and products, with the final goal of the creation of products enabling users to achieve their objective in the best way possible, eliminating negative feelings such as frustration and disappointment and fostering positive ones such as satisfaction and fulfilment. As part of the overall experience of using the system, Interaction design refers primarily to all physical and visual components the user interacts with.

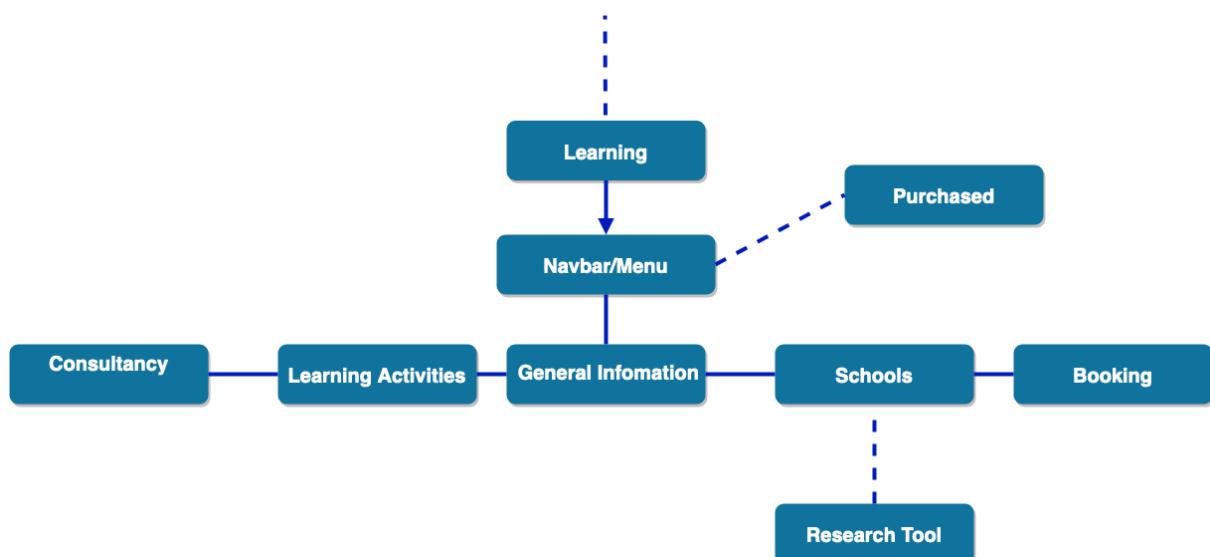
At this stage of our project, after the information architecture described in Section 4.1 and the CAO=S model in Section 4.2, we move on to concretely depict the state of the art of our design using **blueprints** for a detailed representation of the conceptual structure of the system and **wireframes** for the presentation of MCA core components.

4.4 Structure Blueprint

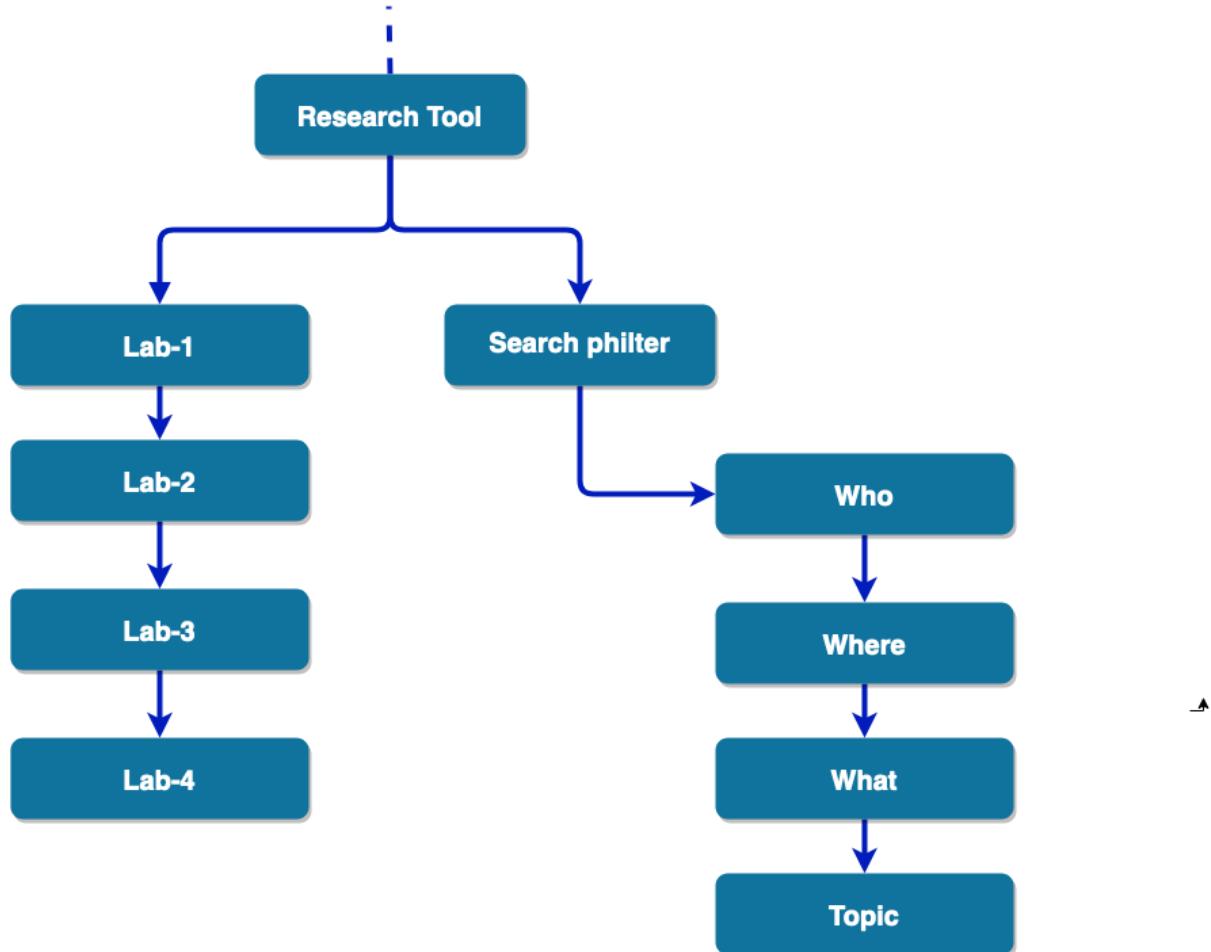
Here we proceed into the design creating some blueprints of the Information Architecture described at point 4.1, a schema in which we clarify the conceptual model of the system.



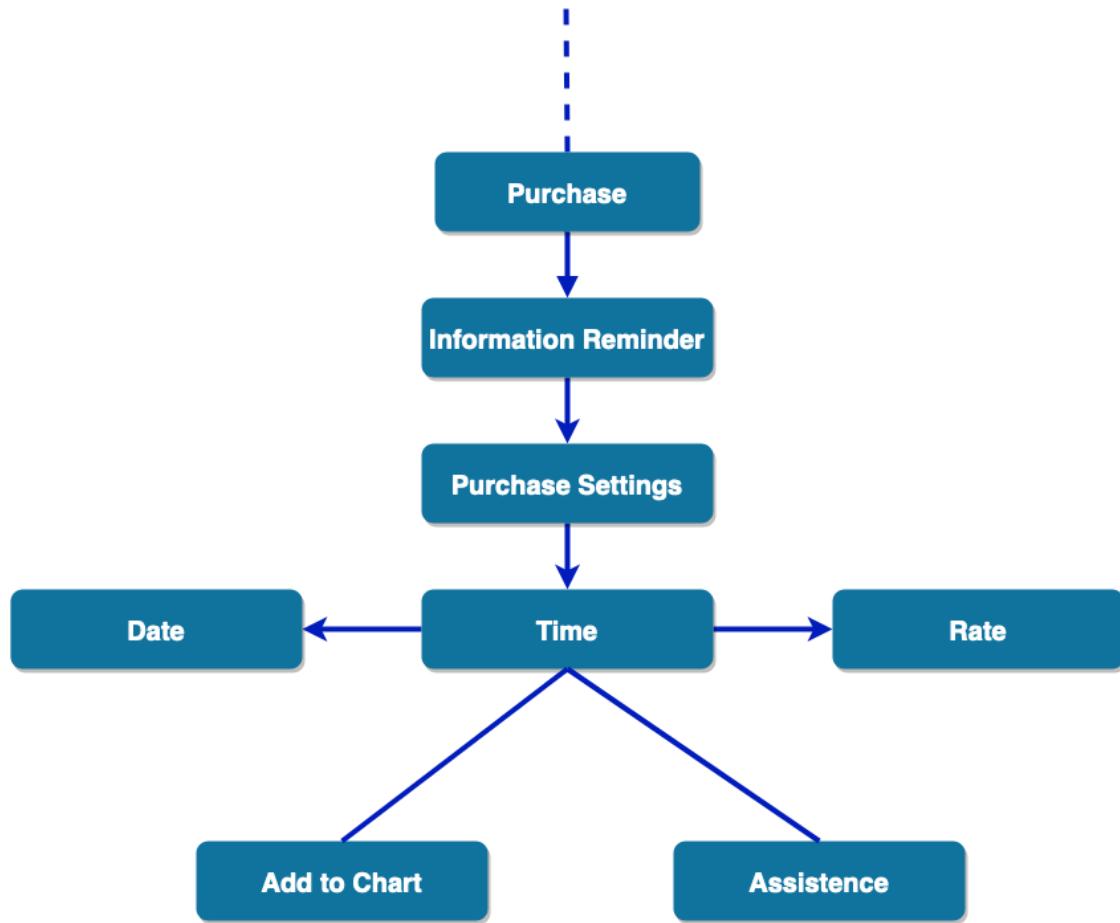
Here we proceed in detail with the deeper analysis of the learning section.



We then proceed to provide blueprints for the research tool.



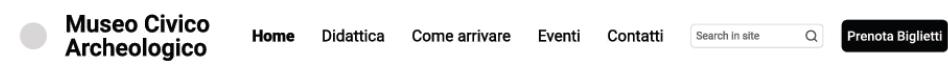
Finally the conceptual structure of the purchase page when the target user should be able to execute, without obstacles, their goal.



4.5 Wireframes

A wide range of wireframes of the application were created, in order to help us display the functional elements of the system: we used Figma, a web-based graphics editing and user interface design app.

4.5.1 Homepage



Esplora la Storia di Bologna

Scopri le ricche collezioni archeologiche dalla preistoria all'età romana.

[Scopri di più](#)

[Prenota Biglietti](#)

Antichi manufatti

Scopri i manufatti che raccontano il passato di Bologna.
Da ceramiche e utensili a intricati gioielli, la nostra collezione mostra la vita quotidiana delle antiche c...

[Preistoria](#) [Età Romana](#)



Programmi didattici

Coinvolgete i vostri studenti con programmi didattici coinvolgenti guidati da storici e archeologi esperti.

[Scuole Superiori](#) [Storia](#) [Storia dell'arte](#)



Visite virtuali

Esplora il museo comodamente da casa tua.

[Fai un tour virtuale e scopri la meraviglia del](#)

Fai un tour virtuale e scopri le meraviglie del museo senza lasciare la vostra classe.

[Esperienze Virtuali](#)



Organizza la tua visita



Opening Hours

Monday to Friday: 9:00am - 6:00pm

Saturday and Sunday:
10:00am - 8:00pm



Location

Via dell'Archiginnasio, 2, 40124 Bologna BO,
Italy



Contact

Phone: +39 051 2757711

[See on Google Maps](#)

Email:

info@museocivicoarcheologico.bo.it

[Find Us on the Map](#)

4.5.2 School page

Museo Civico
Archeologico

Home Didattica Come arrivare Eventi Contatti

Search in site  Prenota Biglietti

Prenotazioni per le scuole

Facilita il tuo ingresso in museo prenotando online per la tua classe

[Prenota](#)

Attività Didattiche

Infanzia

Primaria

Secondaria 1°

Secondaria 2°

Attività per scuole

Esplora le attività disponibili per le scuole

[Scopri di più](#)

Attività Infanzia

Bambini Esploratori
Disponibilità: Settembr...



Attività Primaria

Viaggio nel Tempo
Disponibilità: Settembr...



Attività Secondaria 1°

Civiltà Antiche
Disponibilità: Settembr...



Attività Secondaria 2°

Archeologia al Liceo
Disponibilità: Settembr...



Consulenze

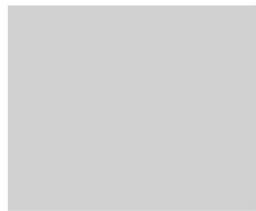
Sezione didattica
Museo Civico Archeologico di Bologna

La segreteria - attiva dal 19 settembre 2023 -
risponde il martedì dalle 9 alle 13; giovedì dalle 13
alle 17;

[Contatta](#)

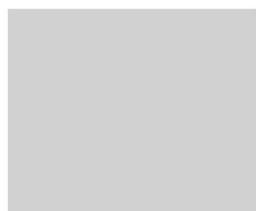
4.5.3 Search tool

Per le scuole



Laboratorio 1

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Laboratorio 2

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Laboratorio 3

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Laboratorio 4

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Chi ▾

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Dove ▾

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- C
- D
- E
- F

Cosa ▾

- AAA
- BBB
- CCC
- DDD
- EEE
- FFF
- GGG
- HHH
- III

Argomento ▾

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- ####
- ####
- ####
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Contatti

+39 XXX XXXXXX

+39 XXX XXXXXX

XXX@XXXXXX.com

4.5.4 Purchase page

Biglietteria

Informazioni generali

Orari di apertura
Lunedì, Mercoledì, Giovedì e Venerdì **9.00 alle 18.00**
Sabato, Domenica e festivi dalle **10.00 alle 19.00**

Chiuso il Martedì (se non festivo)

La biglietteria chiude un'ora prima

Dove siamo
Via dell'Archiginnasio 2 - 40124 Bologna

Acquista Biglietto

Seleziona la data, l'orario e il tipo di biglietto

Data
1 Gennaio 2022 2 Gennaio 2022 3 Gennaio 2022

Orario
10:00 - 12:00 14:00 - 16:00 16:00 - 18:00

Tariffa
Intero Ridotto Gruppi

Quantità
1 2 3 4 5

Aggiungi al carrello

ASSISTENZA

5. Evaluation of design

In this section we evaluate our design with the same tools and methods it has been used for the existing resources. The inspection phase takes place within the design team. For this reason, it is a rather cheap technique, but also rather inaccurate. For the testing, we will employ the same methodologies of 2.2, relying on discount, “thinking aloud” usability testing.

5.1 Inspection: heuristic inspection

In order to complete the evaluation of the new system we need to carry on an inspection before the real user testing. For this purpose we decided to adopt the **heuristic inspection** as a method. This evaluation is based on the adoption of a set of common rules or guidelines from previous experience to assess the design.

We decided to use the same guidelines considered in section 2.1.1 to have a common yardstick. However, since the developed wireframes can't substitute a real working system, we will not adopt these guidelines as stringent rules, rather than as a general suggestion to evaluate whether improvements are present or not.

The following table shows the adopted guidelines and the corresponding notes emerged from the inspections:

Guidelines	Notes
1. Strive for consistency	Improved: We adopted a standard and repeated layout, as well as font styles and colour. This layout eases the readability and overall perception of the page organisation.
2. Seek universal usability.	Partially improved/ Neutral: Since in the user testing none of the participants solicit the adoption of specific assistive technologies, no such improvements were made. Nonetheless, we think to have partially improved the usability of the system for our expected users.
3. Offer informative feedback.	Improved: even where present, informative feedbacks were modest and confused into the text section .The new layout improved their perception and organisation, resulting in a more immediate response.

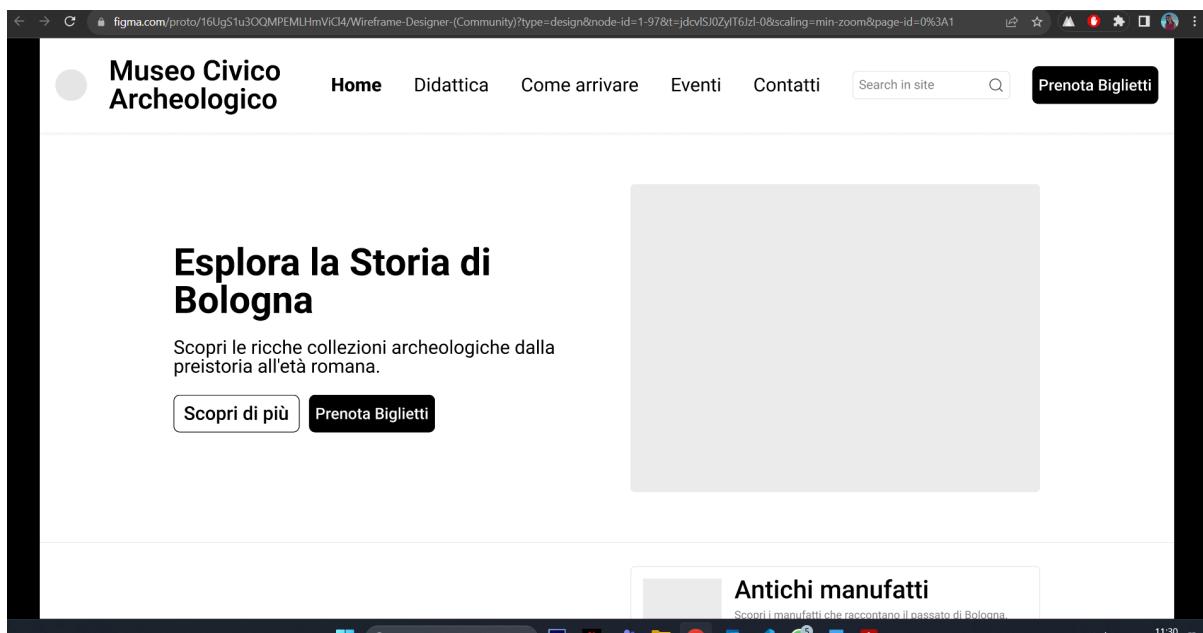
4. Design dialogs to yield closure.	Improved : page segmentation seems to be better organised into topics and tasks, so that the system browsing should be more immediate and directed towards specific actions.
5. Prevent errors	Not Given: we postpone this consideration after the real testing.
6. Permit easy reversal of actions.	Improved : the new division of system content is more rigid than the one before, so that topic segmentation can be better navigate to avoid unwanted actions
7. Keep users in control.	Not Given: we postpone this consideration after the real testing.
8. Reduce short-term memory load	Improved: we think to have concretely reduced the general sense of messiness of the system. The most immediate outcome of this modification should be the memory load needed in web browsing.

5.2 User testing: thinking aloud

As in the user testing of the first phase, but applied to your system now. We will address this phase of testing, as we did in User testing (2.2) with the resources we have, through the methodology of discount usability testing and in particular the thinking aloud method that suits our type of design and our possibilities. Using the same methodologies used in the previous testing work, it is more intuitive to observe the improvements made to the design. And as done previously, it will be possible to visualise the results through a system usability scale (SUS) assessment.

In this section, we perform our tests exactly on those wireframes, which we have arranged in small interactive scenarios, in the hopes of replicating the experience of a working system as closely as possible.

This was possible thanks to the preview option on Figma. Example:



Users

Antonella, 45 years old is a high school history teacher who is used to buying products online. She is always willing to take the students on visits. In recent years she has participated in and organised many school trips. She thinks that students can learn a lot outside the classroom.

Tasks

At least one for each of the wireframe:

Homepage

1. Find how to reach the museum
2. Move to the ticket online store
3. Find the section for schools

Didattica page

4. Explore the offers*: find specific activities for schools

Search tool

5. Select a visit for your class

Purchase page

6. Buy a ticket

*(for a successful result the user must interact with the filter tool)

Results

We measure success (whether the user succeeds or not, with or without help), efficiency (whether the user makes mistakes, backtracks or tries to leave the scenario), learnability and general enjoyment of the product.

Test result for Antonella x Design Test

Task	Success	Efficiency	Learnability	Enjoyment
1	Success	High	Good	Normal
2	Success	High: quick	Good	High
3	Success	High: quick	Good	High
4	Success	High	Good	High
5	Success	High	Good	High
6	Success	Medium	Good	Medium

SUS

As we did in 2.2, we integrate the test with a system usability scale (SUS) assessment.

SUS of Antonella x Design Test

1. I think that I would like to use this system frequently.	4
2. I found the system unnecessarily complex.	3
3. I thought the system was easy to use.	4
4. I think that I would need the support of a technical person to be able to use this system.	1
5. I found the various functions in this system were well integrated.	5
6. I thought there was too much inconsistency in this system.	2
7. I would imagine that most people would learn to use this system very quickly.	4
8. I found the system very cumbersome to use.	2
9. I felt very confident using the system.	4
10. I needed to learn a lot of things before I could get going with this system.	1
Total:	80

Improvements

The SUS test for the MCA website (results in 2.2.2) was an average of 68,75 which demonstrates a satisfactory performance meriting a C grade. Although appreciable, there is still room for improvement and optimisation.

After the new customization of the website and the User testing done on the design we propose, the SUS test has a score equal to 80. Raising the grade of 11,25 points indicates an improvement on the performance.

The opportunity to interview and test our work on dedicated users has proved invaluable and helpful. The testing work has proved useful because the results give us a way to analyse our choices. Having more time available for the design and implementation, it might be important to gain much more knowledge from users with very different experiences.

6. Final recommendations

In conclusion, this report represents the finalisation of our user experience design project for the Museo Civico Archeologico website. The primary objective was to enhance the online organisation and booking process for high school teachers (aged 30-45 years) seeking to provide their students with an educational experience at the museum.

What we wanted to get:

Our aim was to create a user-centric, intuitive, and efficient website that caters to the specific needs of this user segment, ultimately increasing their satisfaction with the museum website.

What has been achieved:

Through a comprehensive analysis of user profiles, existing resources, and a feasibility study, we have designed a website that offers a more streamlined and user-friendly experience. This includes improvements in information architecture, navigation, and usability.

Data and numbers that prove the result:

Our success can be quantified through a comprehensive data sources, including:

- User feedback, gathering feedback from users during testing phases and surveys has provided valuable insights into their needs and perception of the website's usability.
- Usability scores, based on established usability metrics, such as the System Usability Scale (SUS), have shown significant enhancements in usability scores. This quantitative data illustrates the tangible improvements in user-friendliness and effectiveness.
- Analysis of errors, a meticulous examination of user errors and issues encountered during testing provides quantitative data on the reduction of critical problems. The decrease in error rates signifies an enhanced user experience.

- Inspection findings, the results of heuristic evaluations have identified specific design issues and areas for improvement. The reduction in identified usability violations quantifies the success of design enhancements.

Recommendations for further improvement:

- To further enhance reliability, we recommend conducting additional user testing with a larger and more diverse user group to validate the improvements made.
- Continuously gather user feedback and conduct usability testing at regular intervals to identify areas for improvement and refinement of the website's design and functionality.

In summary, our project was successful, with a user-centred design in line with the needs of high school teachers and their students. However, there is always room for further enhancements, and we recommend an ongoing commitment to user testing, feature enrichment, and usability improvement to ensure the sustained success and effectiveness of the Museo Civico Archeologico website.