Spazio Giovani Bologna

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INTRODUCTION

This report includes all the research, design and user tests carried out for the creation of an ancillary site about the *Spazio Giovani Bologna*. The website will be hosted on the site Servizio Sanitario Regionale - Emilia Romagna Azienda Unità Sanitaria Bologna. We have chosen to deal with *Spazio Giovani*, a dedicated space inside the family counselling centre, reserved for young people from 14 to 19. The service is free access and offers an environment where young people can face problems related to sexuality, affective and relational life, as well as gynecological problems, contraception and prevention. The service is also aimed at adults of reference for young people: parents, teachers, educators and sports coaches.

We believe that the section dedicated to the Spazio Giovani in the host site is not sufficiently valued and attractive enough for young people potentially interested in the services offered. The dispersive and confusing structure of the site makes users desist from its consultation. For example, a simple action, such as finding opening hours and phone number, is complicated and does not motivate users to benefit from services that *Spazio Giovani* offers.

As illustrated in chapter one, our research has shown that only 3.86% of young people in the territory of Bologna exploited the services in the year 2019. For this reason we believe that a correctly structured site and a correct dissemination of information could motivate more young people to exploit the full potential of the site to discover all the services of *Spazio Giovani.*

In order to get to the design of the prototype, we have first of all analyzed the target audience and carried out a research on official data provided by ISTAT and the *Sistema Informativo Consultori* (SICO). We then proceeded by analysing a reference site, in particular we chose the Spazio Giovani Parma site which represented, in part, our idea. After a series of analyses carried out by the team and thanks to user testing, we came to conclusions relevant to the development of the prototype of *Spazio Giovani Bologna* ancillary site.

1. ETHNOGRAPHIC ANALYSIS

1.1 SEGMENTATION OF TARGET AUDIENCE

In order to perform a correct segmentation of the users of *Spazio Giovani Bologna* subsite, we have drawn on the official data published by the *Servizio Sanitario Regionale - Emilia Romagna* provided by ISTAT and *Sistema Informativo Consultori* (SICO). SICO intends to monitor the activity and the characteristics of the users of the public counselling centres in the regional territory. The services surveyed by SICO include, in addition to the proper counselling centres, *Spazio Giovani*, *Spazio giovani adulti* and *Spazio donne immigrate e loro bambini*. Given the focus of our research, we analyzed in particular the results relating to *Spazio Giovani* of the Bologna territory for the year 2019. It includes six districts:

- Città di Bologna district
- Pianura Est district
- Pianura Ovest district
- Appennino Bolognese district
- Reno, Lavino e Samoggia district
- San Lazzaro di Savena district

The total number of users of Family counselling services for the year 2019 for the six districts above-mentioned is 62,396 of which **2,682** have called on *Spazio Giovani*.

We can see that female users have a clear predominance over the male ones. In fact, most of the services offered by *Spazio Giovani* are strictly related to needs such as pregnancy, emergency contraception, pregnancy interruption. However, it should be emphasized the presence of services such as psychological and dietary assistance that are available to everyone regardless of gender.

District	Females	Males	Total
Città di Bologna district	1,568	274	1,842
Pianura Est district	127	9	136
Pianura Ovest district	104	11	115

Appennino bolognese district	172	19	191
Reno, Lavino e Samoggia district	212	24	236
San Lazzaro di Savena district	156	6	162
Total	2,339	343	2,682

Table 1: Table of number of users, distinguished between male and female, of Spazio Giovani *centres of the six districts of Bologna. Data provided by SICO.*

Spazio Giovani is dedicated to young people from 14 to 19 years old who need a confidential environment in which to deal with personal problems related to sexuality, emotional and relational life, as well as gynaecological, psychological and prevention problems. In addition to young people, the service is also aimed at the adults of reference: parents, teachers, sports coaches. Here you can see a table showing the users divided by age.

0-13	14-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	>64	Total
13	1,062	981	411	41	13	29	22	42	30	18	8	12	2,682

Table 2: Table related to the users of Spazio Giovani *of the Bologna territory distinguished according to their age. Data provided by SICO.*

In particular, we note that the 14-19 age range is the one that makes the most use of the services offered by the counselling centre (total 2,043). These numbers may seem substantial but if we compare them with the ISTAT data (Fig. 1) for the province of Bologna (2019) for the same age range, we can see that only 3.86% actually use the services offered by the counselling centre.

Tipo di indicatore demografico	popolazione al 1° gennaio					
Seleziona periodo	2019					
Sesso	maschi		femmine		totale	
	▲▼		▲▼		▲▼	
Età						
14 anni	(p)	4 641	(p)	4 344	(p)	8 985
15 anni	(p)	4 429	(p)	4 163	(p)	8 592
16 anni	(p)	4 536	(p)	4 202	(p)	8 738
17 anni	(p)	4 578	(p)	4 221	(p)	8 799
18 anni	(p)	4 694	(p)	4 225	(p)	8 919
19 anni	(p)	4 615	(p)	4 216	(p)	8 831

Fig. 1: Table related to the total number of young people (between 14 and 19 years old) living in the province of Bologna. Total: 52,864. Data provided by ISTAT.

Access to the services of *Spazio Giovani* is guaranteed to both Italian and foreign citizens, even if it is evident that Italian citizens have a prevalence of access.

District	Italian citizens	Foreigners citizens	Total
Città di Bologna district	1,540	302	1,842
Pianura est district	127	9	136
Pianura ovest district	109	6	115
Appennino bolognese district	176	15	191
Reno, Lavino e Samoggia district	213	23	236
San Lazzaro di Savena district	148	14	162
Totale	2,313	369	2,682

Table 3: Table related to the users of Spazio Giovani *of the Bologna territory distinguished according to the District and citizenship. Data provided by SICO.*

The services provided by *Spazio Giovani* are different and with different turnout. We can note that the most requested assistance is the one related to the different types of contraception.

Birth	Abortion	Contraception	Gynecology / Andrology	Oncology	Infertility	Nutrition	Psychology and relational problems	Sessuology	Adoption / Foster care
13	124	1628	639	1	1	27	711	16	2

Table 4: Table related to the services provided by Spazio Giovani *of Bologna territory and the relative number of users. Data provided by SICO.*

1.2 USER RESEARCH

1.2.1 MARKET RESEARCH AND CONTEXTUAL INQUIRY

In addition to the official data provided by ISTAT and SICO, we wanted to have a more concrete and personal view of the phenomenon. We noticed, during our research, that the *Spazio Giovani* in Bologna has a google reference where 22 users have left reviews on the services. We report five of them for illustrative purposes.
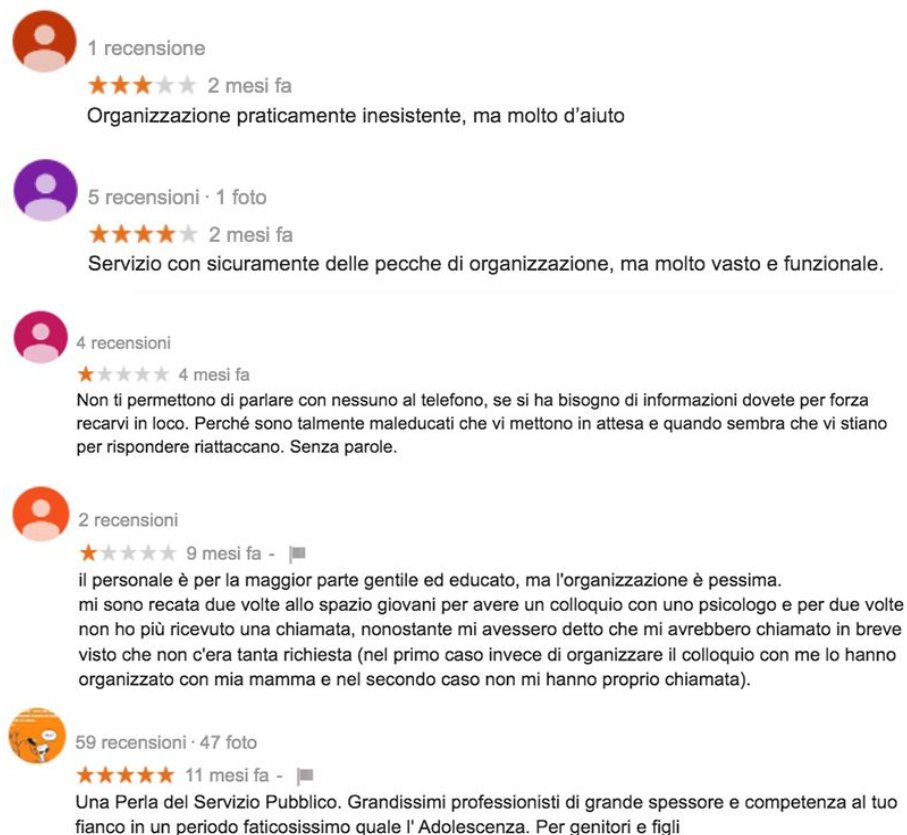

Fig. 2: Google user reviews for Spazio Giovani *of Bologna*

The reviews essentially reveal very similar considerations: the importance of the service is generally acknowledged, but there are complaints about disorganization and great difficulty in finding important information. Although from Google reviews already emerges a picture of users with defined problems, we have considered the medium not appropriate for our research, as it lacks in reliability. In fact, we do not have any kind of information about the authors of the comment that can confirm their identity and the credibility of their answers.

For this reason, we preferred to interview three young people of different ages to have a more direct and personal view of the services offered by *Spazio Giovani Bologna*.

We conducted the interviews via Skype, and they each took about ten minutes. In case an interviewee did not know the services offered by counselling centre, in particular *Spazio Giovani*, we briefly explained its function and its services.

Interviewee A: Beatrice, born in Bologna, is 16 years old. She attends the 3rd year of Liceo Scientifico Malpighi in Bologna.

Interviewee B: Costanza, born in Bologna, is 17 years old. She attends the 4th year of Liceo Sportivo Malpighi in Bologna. She is a professional swimmer.

Interviewee C: Silvia, born in Bologna, is 19 years old. She attends the 1st year of the Philosophy Bachelor's Degree at the University of Bologna.

Question	Interviewee A	Interviewee B	Interviewee C
Q.1: Have you ever heard about the existence of counselling centre and in particular about the services they offer to young people? If NO go to Q.6	No, I have never heard about it.	Yes.	Yes.
Q.2: How did you learn about the counseling centres?		Some friends told me about the existences of the counselling centre in Bologna.	My mom told me about the counselling center when I was 15 in case I wanted to talk to an expert on sensitive issues.
Q.3: Have you ever used his services?		No, but it in case I need it I would consider them.	Yes.
Q.4: If yes, for which services (if you want to tell us)?			A couple of years ago I went to counselling centre of Bologna to get more information about contraceptive methods and then this year I went to the counselling centre to take the birth control pill for free. I had several interviews and a gynaecological visit. Every 3 months I go to the counselling centre to pick up the pill.

Q.5: How do you consider your experience?			First, it was difficult to understand what are the days and opening hours of the different services, you must always contact them by phone to get even simple information. Then, at the counselling centre in Bologna I didn't feel comfortable because the service is not carried out in an organised manner and is confusing.
Q.6: Was it simple to find information?			No, as I said before, with the exception of the telephone number, other information are not easy to obtain.
Q.7: if you haven't used the counseling centre, do you think these are services you might be interested in?	I'm not interested in these services nowadays, but I think they might be useful for young people.		
Q.8: Do you think it could be a useful service for the teenagers?		Yes, I think it is useful because a teenager can feel more comfortable talking to experts rather than parents.	Yes, absolutely because if you do not have a confidential relationship with parents it can be useful to have a service of this kind, even in case of economic problems being a free service.
Q.9: Would you like more information about the services it offers?	No, in this moment I do not need more information.	Yes, maybe in the future.	Yes, because *Spazio Giovani* has numerous services and I may be not familiar with all of them.
Q.10: How would you find information (ask a friend Search the internet)?	In order to find more information I would search on internet.	I would first ask for help from my friends who have used the services to give me some more info, then I would search the internet basing on their advice.	I tend to try to find them on the internet even if in some cases it is not easy, so I often ask friends who have already used the service.
Q.11: Do you think that a site designed specifically for counselling centre of Bologna could be useful?	Yes, because being a service offered by your city, I think it may be easier to get useful information.	I think that the site could also be used by schools to create interesting initiatives on these themes.	Absolutely yes, it would be very useful to have a site where you can find all the information without having to call them every time.
Q.12: Which functions could facilitate the use of the site (chat with	I think live chat could facilitate the use of the site and improve its	I know there are many services offered, but I only know a few. I think that if it	I would like an outline of the services with the steps: which services and how to

		were indicated in a simple and clear way what are all the services offered and how to access them, maybe being able to book online, it could be of help to everyone.	use them so that you don't always have to call; frequently asked questions and also the possibility of booking visits online.
experts, FAQ, automatic booking of visits, etc.)?	value.		

Table 5: Table related to the interviews carried on the opinions of three people included in our target audience.

1.2.2 TASK ANALYSIS

To have an idea of how the information about Spazio Giovani Bologna are reachable through the sections present in the AUSL Bologna website, we have selected a series of tasks that the user most likely to perform on the site to reach different goals.

We observed that in some cases it is possible to reach the same goal through two very different paths (identified as path A and path B) and all of them require a long sequence of clicks or a high search time to complete the task.

TASK	ACTUAL PATH
Look for general information about services for young people offered by the counselling centre.	1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) Click "Spazio giovani" on the left, in the "Mappa del sito" section; 5) Search among the contents the information regarding the clinics in the territory.
Look for opening hours and address of Saragozza's counselling.	**PATH A:** 1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) Scroll down the page to the link "Elenco dei consultori" and click on it; 5) Search among the list of counselling centres in the territory of Bologna those with the wording "Consultorio familiare e spazio giovani" (on the second page); 6) Select the Poliambulatorio Saragozza and click on the link "Consultorio familiare e spazio giovani"; 7) Search for the desired information among the contents. **PATH B:** 1) Open a browser and make sure you have access to the

	Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) On the left, in the "Mappa del sito" section, click on "Spazio giovani"; 5) Search, among the contents, for information about the Poliambulatorio Saragozza.
Book a gynaecological visit.	**PATH A:** 1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) Scroll down the page to the link "Elenco dei consultori" and click on it; 5) Search among the list of counselling centres in the territory of Bologna those with the wording "Consultorio familiare e spazio giovani" (on the second page); 6) Select the clinic you prefer or the one nearest to you; 7) Search among the contents for the telephone number of the clinic of your choice; 8) Call and book a gynaecological visit. **PATH B:** 1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) On the left, in the "Mappa del sito" section, click on "Spazio giovani"; 5) Search, among the contents, for information concerning the clinic chosen or the nearest one. 6) Call and book a gynaecological visit.
Information for free contraception	Such information can not be found on the "Consultori familiari" website. Changing the type of query on the search engine in "Contraccezione gratuita Bologna", the information within the site exists and can be found on the page "Consulenza per contraccezione", but you can not get there directly in a logical and intuitive way.

Counselling for teachers, parents, educators	**PATH A:** 1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) Scroll down the page to the link "Elenco dei consultori" and click on it; 5) Search among the list of counselling centres in the territory of Bologna those with the wording "Consultorio familiare e spazio giovani" (on the second page); 6) Select the clinic you prefer or the one nearest to you; 7) Search among the contents for the telephone number of the clinic of your choice; 8) Call and and ask for information. **PATH B:** 1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) On the left, in the "Mappa del sito" section, click on "Spazio giovani"; 5) Search, among the contents, the information concerning the clinic chosen or the nearest one, select the e-mail or telephone number to contact them.
Look for information concerning the morning-after pill.	1) Open a browser and make sure you have access to the Internet; 2) Write the query "consultorio Bologna" in the search bar; 3) Click on the link "Consultori familiari -- AUSL di Bologna"; 4) On the left, in the "Mappa del sito" section, click on "Spazio giovani"; 5) Search, among the contents, the information concerning the morning-after pill,

Table 6:Table related to the major tasks identified and carried on by the team.

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2. ASSESSMENT OF EXISTING RESOURCES

In order to identify the resource on which to carry out an assessment, an accurate sector benchmark of the Italian *Spazio Giovani* sites has been made.

The sites taken into consideration were those of:

- **Spazio Giovani Parma**[1]: The site has been chosen as the reference site for the assessment. It is detailed, rich in information and the contents are useful even if the design is dated; the current design version dates back to 2013 but the contents are regularly updated. The site offers a wide possibility to interact anonymously with questions and via forum, live chat (not working) and question/answer. Moreover, *Spazio Giovani Parma* is a service provided by *Servizio Sanitario Regionale - Emilia Romagna*.

- **Spazio Giovani Rimini**[2]: *Spazio Giovani Rimini* is a service provided by *Servizio Sanitario Regionale - Emilia Romagna*. The site's graphics are youthful, but it contains information that is strictly necessary even if organised logically. It presents examples of possible questions without providing the answer.

- **Spazio Giovani Enna**[3]: The service is not provided by *Servizio Sanitario Regionale - Emilia Romagna*. The site has useful content and navigation is intuitive, but it is dated and the graphics are not attractive.

- **Spazio Giovani Genova**[4]: The service is not provided by *Servizio Sanitario Regionale - Emilia Romagna*. The site' s navigation is intuitive but it contains information that is strictly necessary even if organized in a logical way and it does not present any kind of interaction for young people.

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[1] http://spaziogiovani.ausl.pr.it/spaziogiovani/index.php Last consultation on 24/05/2020.
[2] http://www.spaziogiovani360.it/index.html Last consultation on 24/05/2020.
[3] http://www.asp.enna.it/portale/consultorio/spazio-giovani.html Last consultation on 24/05/2020.
[4] http://www.centrogiovani.asl3.liguria.it/materiale.asp Last consultation on 24/05/2020.

2.1 EXPERT USABILITY REVIEW

2.1.1 CHOICE OF GUIDELINES

Regarding the guidelines, we have chosen to adopt userfocus.co.uk guidelines[5].

They have been specifically developed for the evaluation of websites, and this ensures a more contextualized analysis than more general guidelines. These guidelines can make a significant contribution to usability by promoting consistency and good practice.

The Guidelines are 247, organized in 9 different categories:

- Home page usability
- Task orientation
- Navigation and IA
- Forms and data entry
- Trust and credibility
- Writing and content quality
- Page layout and visual design
- Search usability
- Help, feedback and error tolerance

These categories allow us to accurately analyze the various sections of the site and mark a site as either conforming or not conforming to the guideline This allows us to identify its strengths and weaknesses, which is useful for the development of our site.

2.1.2 FIRST INSPECTION OF THE SYSTEM

Azienda Unità Sanitaria Locale di Parma of *Servizio Sanitario Regionale - Emilia Romagna* has created the subsite *<#Spazio Giovani>. Il consultorio online per adolescenti dell'Azienda USL di Parma[6]*.

The connection and collaboration with the official page of *Servizio Sanitario Regionale - Emilia Romagna* is evident. *Spazio Giovani* website is in fact easily accessible from the official page of the *Servizio Sanitario Regionale - Emilia Romagna*, but also through a search on the browser of the "Spazio giovani Parma".

The homepage of the site as first information does not report details about the purpose of the service and its characteristics, but only presents links to the various sections of the site

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[5] https://www.userfocus.co.uk/ Last consultation on 10/05/2020.
[6] http://spaziogiovani.ausl.pr.it/spaziogiovani/index.php Last consultation on 29/05/2020.

that can be reached both through the light blue navbar and through the contents of the homepage with a clear redundancy. It is evident that the site, also from the visual point of view, recalls a young style, although now with obsolete graphics. The current version in fact dates back to 2013.

There are two navbars. The first, in black, has the following sections:
- Homepage
- Info e orari
- Dove siamo

The second navbar, in light blue, has eight sections:
- Io e…
- Chiedi Avete chiesto
- Test
- Forum
- Meeting giovani
- Sondaggi
- News
- Chat

The first section "Io e…" describes the relationship between the teenager and various topics such as sexuality, use of substances, alcohol, food, smoking and road safety.
The section "Chiedi Avete chiesto" gives the possibility to read questions made by other users and answers provided by the experts of *Spazio Giovani* and the possibility to make new questions if the answers already present do not meet their needs.
The "Test" section allows you to test your knowledge on various topics, but although the basic idea may be useful, it presents the criticality of not reporting the wrong answers by clarifying which is the correct one.
"Forum" implies the opening of an additional page in the browser, from which it is possible to interact with other users by profiling in the "login" section. We believe that the forum mode can be useful in terms of content, but it is no longer a communication mode used by young people. However, there is a clear need for information and dialogue from users, as there are some questions/answers dated 2018, 2019 and 2020, although in much smaller quantities than in previous years.
The "Meeting giovani" section provides information about annual meetings that *Spazio Giovani Parma* organizes for both teenagers and adults.

The "Sondaggi" section offers a list of surveys in which visitors can participate and view the progress of the surveys.

The "News" section contains communications on current topics, events and information related to a target group of young adults (20-34 y/o).

The "Chat" section is currently out of use.

It is allowed to make searches on the website through a search bar; the results, however, return only to the questions/answers in the "Chiedi Avete chiesto" section where the searched keyword appears.

Moreover, in the footer in addition to the logo of Servizio Sanitario Regionale Emilia Romagna and sections that are usually found in the footer such as cookies, privacy and credits, there are important contents such as "Chi siamo", "Info e Orari", "Link util" and "Download" that in our opinion should have a more relevant position.

From a preliminary analysis, we believe that the site satisfies its purposes and that the material is useful and reliable. However, there are some considerable and obvious errors, including:

- Fundamental information such as "Chi siamo", hence the actual function of the consultory and other useful links are not adequately valued, since they are exclusively present in the footer.
- The chat, which would represent an effective method of communication, is not working.
- In general there is redundancy of links for access to the same content.
- Search function not implemented on the information present in the whole site, but only in the "Chiedi Avete chiesto" section.

2.1.3 DIRECT AND REVERSE ANALYSIS

We have carried out both direct and reverse analysis thanks to the stylesheet provided by userfocus.co.uk. The site proposes 247 guidelines, divided into 9 sections. Each section covers a different field of analysis.

The completed and annotated spreadsheet is attached to this report, named *ExpertReviewCheckpoints.xlsx*

First we proceeded with a systematic analysis, screen by screen, of which guidelines, when applicable, are violated, how often and with what impact. Then, we went on with the reverse analysis by carrying out the same analysis but inversely: an exploration of guidelines with respect to the system. Obviously, many of the problems found in the direct analysis were found in the reverse one as well, since all the errors encountered screen by screen affect the overall system performances. Therefore, as to provide a general overview and to avoid redundancy, we decided to present the two analysis together. In the following pages you will find, for each section defined by userfocus.co.uk, how many and which guidelines have been violated, where and with which impact. Whenever possible, errors have also been classified in relation to the Nielsen classification of errors to provide more comprehensive information on their severity. Afterwards, we have included a summary table of all errors identified, indicating impact, persistence and frequency.

Nielsen classification of errors	Description
Implementation	The completion of the task requires a feature that the user knows but which, although announced by the interface, is missing or does not work.
Catastrophic	The user cannot carry out the task
Major	The user completes the task after a significant time and relevant questions, doubts and wrong choices.
Minor	The user carries out the task in a excessive time and / or with a large number of errors and / or noticeable by the user himself
Cosmetic	The user completes the task in a reasonable time but you can see a possibility of improvement.

Table 7: Table of Nielsen classification of errors.

Before analyzing the results in detail, here is the screenshot of the Expert Review:

Summary of results				
	Raw score	# Questions	# Answers	Score
Home Page	3	20	19	58%
Task Orientation	10	44	28	68%
Navigation & IA	-1	29	21	48%
Forms & Data Entry	2	23	15	57%
Trust & Credibility	8	13	10	90%
Writing & Content Quality	11	23	19	79%
Page Layout & Visual Design	14	38	36	69%
Search	-11	20	20	23%
Help, Feedback & Error Tolerance	3	37	20	58%
Overall score		247	187	61%

Table 8: Table of results obtained from the analysis of guidelines.

The Expert Usability Review respects what we predicted in the first inspection of the system. The highest values are those of Trust & Credibility (90%) and Writing & Content Quality (79%) because it is a reliable site in terms of content as it is managed by the *Servizio Sanitario Regionale - Emilia Romagna*. As we imagined, the lowest value is that of Search (24%) because the function allows searches limited to a single section of the site and not fully functional.

There are also a number of categories that have an intermediate value because the site works but we can see a possibility of improvement.

Each of the 247 guidelines has been assigned one of four values:

- -1: does not comply with the guideline;
- 0: guideline not completely satisfied;
- 1: complies the guideline;
- Empty: the guideline is not relevant to the site.

Let's now see the strengths and weaknesses of the site and how they emerged from the scores of the various categories of guidelines, paying particular attention to the errors found in each section.

To emphasize our screen by screen analysis, when we found the violation of a certain guideline within the userfocus.co.uk categories (Homepage, Task Orientation, Navigation, etc...) we added the example related to the specific screen with the number that identifies the violated guideline.

HOMEPAGE - 58%

N. Violated Guidelines	Guidelines
7/20	1) The items on the home page are clearly focused on users' key tasks ("featuritis" has been avoided). 9) The value proposition is clearly stated on the home page (e.g. with a tagline or welcome blurb). 10) The home page contains meaningful graphics, not clip art or pictures of models. 11) Navigation choices are ordered in the most logical or task-oriented manner (with the less important corporate information at the bottom). 17) The home page of the site has a memorable URL. 18) The home page is professionally designed and will create a positive first impression. 20) The home page looks like a home page; pages lower in the site will not be confused with it.

The homepage has an outdated design that does not immediately create a positive first impression despite the fact that it is aimed at a young target. In addition, the information about the function of the counselling centre and the services offered is not immediately available, which is why it does not meet the standards of a classic homepage.

Important content is not properly highlighted on the homepage. For example, "Chi siamo" and "Link utili" are in the footer and not in the foreground as you would expect. We believe that no optimal choices have been made with regard to navigation (Cosmetic error).

The central part of the home page is occupied by graphics and images that refer to content of secondary importance.

Finally, we believe that the URL[7] of the site is not easy to remember, so the user is led to search the site through keyword queries in the browser search bar.

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[7] http://spaziogiovani.ausl.pr.it/spaziogiovani/index.php Last consultation on 24/05/2020.

TASK ORIENTATION - 68%

N. Violated Guidelines	Guidelines
6/44	15) The most important and frequently used topics, features and functions are close to the centre of the page, not in the far left or right margins. 25) Data formats follow appropriate cultural conventions (e.g. miles for UK). 37) When a page presents a lot of information, the user can sort and filter the information. 39) The site prompts the user before automatically logging off the user, and the time out is appropriate. 41) The site is robust and all the key features work (i.e. there are no javascript exceptions, CGI errors or broken links). 42) The site supports novice and expert users by providing different levels of explanation (e.g. in help and error messages).

One of the fundamental parts of the site, such as the chat, is not working: the user cannot complete the task and for this reason we believe that the site is not robust enough (41). (Catastrophic error).

By browsing the various sections of the site, such as the "Io e..." section, we found that links to important topics were placed marginally giving them little relevance. In particular, they have been placed in a sort of side menu on the right that does not adequately attract the user's attention (15). Moreover, in the same section, where there is a lot of information and long texts, the user does not have the possibility to filter or order them in any way. (Cosmetic error) (37).

Another section where we found the violation of the Task Orientation guidelines is the forum. The date of publication of the posts is not indicated following the Italian convention (DD/MM/YYYY) but the Anglo-Saxon convention (MM/DD/YYYY) which does not allow to easily identify the most recent posts (25). The second problem in this section concerns the log out procedure from the area; in fact no log out confirmation message is shown.

Finally, the site does not provide users who have higher computer skills to exploit the site in a different way according to their level of knowledge.

NAVIGATION & IA - 48%

N. Violated Guidelines	Guidelines
7/29	8) There is a site map that provides an overview of the site's content. 11) Good navigational feedback is provided (e.g. showing where you are in the site). 13) Links and navigation labels contain the "trigger words" that users will look for to achieve their goal. 21) Navigation-only pages (such as the home page) can be viewed without scrolling. 22) Hypertext links that invoke actions (e.g downloads, new windows) are clearly distinguished from hypertext links that load another page. 25) The site does not disable the browser's "Back" button and the "Back" button appears on the browser toolbar on every page. 28) If the site spawns new windows, these will not confuse the user (e.g. they are dialog-box sized and can be easily closed).

Although the site is rich in content and sections, no map has been included to get a general overview of the structure of the entire site. In this regard, there is neither a navigational feedback on any page that shows the user the path made to reach the current section, nor the back button that allows you to return to the previous page (Implementation error).

In the navbar, the first two sections "Io e..." and "Chiedi Avete chiesto" are, in terms of content and information, the core of the site. However, the titles of the sections are not clear and intuitive enough regarding their content (Minor error) (13).

In addition to these factors, another element that may confuse the user is the fact that download windows do not open in new tabs but replace the page the user was visiting (Cosmetic error). The links for downloads are identical to the links for carrying out actions (22). Finally, as far as the navigation of the pages is concerned, since there are pages with wide contents it is always necessary to use the scroll to view the entire content.

FORMS & DATA ENTRY - 57%

N. Violated Guidelines	Guidelines
6/23	1) Fields in data entry screens contain default values when appropriate and show the structure of the data and the field length. 6) There is a clear distinction between "required" and "optional" fields on forms. 13) With data entry screens, the cursor is placed where the input is needed. 17) The user can change default values in form fields. 18) Text entry fields indicate the amount and the format of data that needs to be entered. 19) Forms are validated before the form is submitted.

The forms on the site are few and require simple or strictly necessary information. They are related to the creation of an account to be able to interact in the "Forum" and in the "Chiedi Avete chiesto" sections, to ask questions directly to the experts of the counselling centre. In both forms there are no default values but it is up to the user to enter the data in the fields, which do not present a clear distinction between required and optional fields (1 - 6 - 17).

Both are very not well designed and this is noticeable also by the fact that once you open the form page, the cursor is not placed in the first box to fill in (13).

The purpose of the form in the "Chiedi Avete chiesto" section is to allow users to send messages to the counselling centre, so there is no maximum limit of characters for the length of the message (18).

Finally, once the form is completed, there is no validation before the information is submitted (19).

TRUST AND CREDIBILITY - 90%

For this particular section of userfocus.co.uk no guidelines have been violated. The major strength of the website is the scientificity and credibility of the contents. This because it is a site directly managed by the *Servizio Sanitario Regionale - Emilia Romagna*. However the percentage is not 100% because we decided to not give an answer to three questions since they are not applicable in this specific case:

- Delivery cost Delivery costs are highlighted at the very beginning of checkout (6)
- The site avoids marketing waffle (7)
- The visual design complements the brand and any offline marketing messages (12)

WRITING AND CONTENT QUALITY - 79%

N. Violated Guidelines	Guidelines
3/23	4) Pages use bulleted and numbered lists in preference to narrative text. 13) The site uses maps, diagrams, graphs, flow charts and other visuals in preference to wordy blocks of text. 15) Links and link titles are descriptive and predictive, and there are no "Click here!" links.

The site has sections rich in content as its main purpose is to provide information to the user. Although there are long texts, they are not organized in lists and are not enriched with graphical diagrams. On the page "Info e Orari" and "News", some links are labelled "Clicca qui" (Click here) (15).

PAGE LAYOUTS AND VISUAL DESIGN- 69%

N. Violated Guidelines	Guidelines
9/38	2) The layout helps focus attention on what to do next. 12) Icons and graphics are standard and/or intuitive (concrete and familiar). 15) Pages on the site are formatted for printing, or there is a printer-friendly version. 16) Buttons and links show that they have been clicked. 20) There is a good balance between information density and use of white space. 21)The site is pleasant to look at. 24) The site has a consistent, clearly recognisable look and feel that will engage users. 26) Colour is used to structure and group items on the page. 29) On content pages, line lengths are neither too short (<50 characters per line) nor too long (>100 characters per line) when viewed in a standard browser width window.

The style of the site, in general, can not be considered graphically pleasing, comparing it with current standards, and does not capture the attention of young users because the graphics and layout are dated and do not reflect the preferences of today's teenager, even though the goal is actually that. For example, the icons and graphics used for the navbar do not reflect the current trend (12). Analyzing the several sections of the site, in particular "Io e..." and "Chiedi Avete chiesto", we noticed that there is not a good balance between texts, white spaces and colour (it is not used to give breath to very long texts). This has a negative effect on the user's concentration (Cosmetic error) (26 -29). Although they are informative texts, the option of making them suitable for printing has not been considered (15).

Furthermore, the links and buttons do not provide an indication of whether they have already been clicked, an element that would be useful for navigation (Cosmetic error).

SEARCH - 23%

N. Violated Guidelines	Guidelines
13/20	2) The search results page shows the user what was searched for and it is easy to edit and resubmit the search. 3) Search results are clear, useful and ranked by relevance. 4) The search results page makes it clear how many results were retrieved, and the number of results per page can be configured by the user. 5) If no results are returned, the system offers ideas or options for improving the query based on identifiable problems with the user's input. 7) The most common queries (as reflected in the site log) produce useful results. 8) The search engine includes templates, examples or hints on how to use it effectively. 12) Searches cover the entire web site, not a portion of it. 13) If the site allows users to set up a complex search, these searches can be saved and executed on a regular basis (so users can keep up-to-date with dynamic content). 15)The search box and its controls are clearly labelled (multiple search boxes can be confusing). 16) The site supports people who want to browse and people who want to search. 17) The scope of the search is made explicit on the search results page and users can restrict the scope (if relevant to the task). 19) The search engine provides automatic spell checking and looks for plurals and synonyms. 20) The search engine provides an option for similarity search ("more like this").

The site includes two search tools, one in the main site and the other in the "Forum" section. The queries of the search tool in the main site do not cover the contents of the entire site, they only concern the "Chiedi Avete chiesto" section. It is not possible to use filters to refine the search, nor does it provide automatic correction for any errors or advice for possible researches. In fact, if there are no results, no similar or alternative results to the previous search are provided. The found results are not sorted according to any relevance criteria, moreover it is not possible to sort and filter them and it is not possible to decide how many results to see per page. The search option is not precise about the number of results encountered (Implementation error) (2 - 3 - 4 - 5 - 7 - 8 - 12 - 13 - 16 - 17 - 19 - 20).

In the "Forum" section there are two search tools, one of which do not work. This may create confusion for the user (Minor error). The search tool is not visible because not clearly labelled. The search can not be updated and can not be saved. In the results the keyword is

not evident so it is not easy to identify useful results (Cosmetic error) (2 - 3 - 4 - 5 - 8 - 12 - 13 - 15 - 17 - 19 - 20).

HELP, FEEDBACK, ERROR TOLERANCE - 58%

N. Violated Guidelines	Guidelines
6/37	5) The site uses a customised 404 page, which includes tips on how to find the missing page and links to "Home" and Search. 21) The site provides feedback (e.g. "Did you know?") that helps the user learn how to use the site. 22) The site provides context sensitive help. 29) The site makes it obvious when and where an error has occurred (e.g. when a form is incomplete, highlighting the missing fields). 32) The site prompts the user before correcting erroneous input (e.g. Google's "Did you mean…"). 36) The site can provide more detail about error messages if required.

Feedback, error messages or more details can be shown in the "Chiedi Avete chiesto", "Chat", "Forum" sections. In case of erroneous actions the messages provided by the website are not sufficient for the user to understand what he/she did wrong or what actions are missing to complete the task (Cosmetic error) (21 - 22 - 29 - 32 -36). In the particular case of the non-working chat, the user receives an error message without being redirected to the home page or to the link of the missing page (5).

LIST OF DETECTED ERRORS

We report below the errors found during the Expert Usability Review, associating to each error the relative value of frequency, impact and persistence. Being an inspection carried out by the team without the help of tests with real users, frequency and impact can not be precisely established, but only hypothesized.

For the impact (the effect the problem has on completing the task), we used the Nielsen classification of errors that is reported here, to which we have associated a value from 1 to 5 depending:

- 5 - Implementation error
- 4 - Catastrophic error
- 3 - Major error
- 2 - Minor error
- 1 - Cosmetic error

For homogeneity, a scale from 1 to 5 will also be used to assess persistence and frequency. Frequency of the problem (the number of different users for whom the problem is noticed):

- 5 - we assume that all users will encounter this error
- 4 - we assume that most users will encounter this error
- 3 - assume that some users will encounter this error
- 2 - assume that a few users will encounter this error
- 1 - we assume that very few users will encounter this error

Persistence (the number and relevance of the tasks that are affected by the problem): a proportion has been made between the number of screens where the error occurs, where 5 represents a large number of screens, 1 represents a small number of screens.

Errors	Frequency	Impact	Persistence
Important content is not properly highlighted on the homepage. For example, "Chi siamo" and "Link utili" are in the footer and not in the foreground as you would expect.	4	1	5
One of the fundamental parts of the site, such as the chat, is not working, the user cannot complete the task.	2	4	1
There are a lot of information and long texts. The user does not have the possibility to filter or order them in any way.	5	1	3
There is neither a navigational feedback on any page that shows the user the path made to reach the current section, nor the "back" button that allows you to return to the previous page.	5	4	5
In the navbar, the first two sections "Io e..." and "Chiedi Avete chiesto" are, in terms of content and information, the core of the site. However, the labels of the sections are not clear and intuitive enough regarding their content.	3	2	2
An element that may confuse the user is the fact that download windows do not open in new tabs but replace the page the user was visiting.	1	1	1

There is not a good balance between text, white spaces and colour (it is not used to give breath to very long texts). This has a negative effect on the user's concentration .	4	1	3
The links and buttons do not provide an indication of whether they have already been clicked, an element that would be useful for navigation.	1	1	5
The results provided by the search function are not sorted according to any relevance criteria, moreover it is not possible to sort and filter them and it is not possible to decide how many results to see per page. The search option is not precise about the number of results encountered.	2	5	1
In the "Forum" section there are two search tools, one of which do not work.	1	2	1
In the "Forum" section the search tool is not visible because not clearly labelled. The search can not be updated and can not be saved. In the results the keyword is not evident so it is not easy to identify useful results.	1	1	1
In case of erroneous actions the messages provided by the website are not sufficient for the user to understand what he/she did wrong or what actions are missing to complete the task.	2	1	1

Table 9: Table of the errors detected during the Expert Usability Review.

2.2 USER TESTING

2.2.1 DEFINITION OF THE TESTING PROTOCOL

In order to test the website of *Spazio Giovani Parma*, Discount Usability Testing has been selected.
It could not have been otherwise, since this report is a simple proposal and not a project approved by the final client.
Discount Usability Testing (also called Guerrilla Usability Testing), proposed by Jakob Nielsen, is a cheap evaluation method based on thinking-aloud tests.

In our case, the tests were performed by three different users. The protocol for the test, the Informal Thinking Aloud, requires test users to literally think out loud during the test, expressing their thoughts, doubts and reflections about the steps and decisions to be taken to achieve their goal. Neither psychologists, nor laboratories, nor professional cameras are used. A team member manages the test and the user who performs the test. In particular, the manager of the test reads the tasks and the user tries to reach the goal specified in the task by browsing the website. The testers have been selected according to the characteristics of our target audience.

Due to the Coronavirus global pandemic, on-site research became impossible, just like with on-site work. For obvious reasons, we had to conduct all the test sessions remotely. The impossibility to talk to users directly is certainly a great limit. Despite that, remote sessions can still serve as a source of valuable qualitative data (especially when there is no better alternative available). For our interviews we decided to use Zoom[8] for a number of reasons:

- users can participate in a meeting even if they don't have an account—they can simply join via a shared link or code.
- It is possible for the users to take control over another one's screen.
- It is a new platform but widely used and known by our users since the Coronavirus spread obliged people to use it for large meeting especially.

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[8] https://zoom.us Last consultation on 25/05/2020.

Test type	Discount Usability Testing
Test methodology	Thinking Aloud
Reasons for the test methodology	The Thinking Aloud method has numerous advantages. It allows to know what users really think about the design. In particular, you hear their misconceptions, which usually turn into actionable redesign recommendations. This method is especially helpful for determining users' expectations and identifying what aspects of a system are confusing.
List of tasks to test	1) Look for information about what *Spazio Giovani* does, who it addresses and the services it offers (note that you should find this information in a single section). - [3 min to complete] 2) Find the telephone number and address of *Spazio Giovani* to book an appointment. - [1 min to complete] 3) Find information on emergency contraception. - [2 min to complete] 4) Find information about *Spazio Giovani Più 20-34.* - [3 min to complete] 5) Make a question to the counselling centre making sure that it is not present among those already made. The question is: "Is there a direct relationship between smokers and covid-19 predisposition?" - [4 min to complete]
Number of test	3+1 (pilot test)
Number of users	3+1 (pilot tester)
Choice of users	Tester 0: Fabio, 21 years old, was born in Rimini. Tester A: Francesca, 19 years old, was born in Bologna, and she is attending the first year of Maths at the University of Bologna. She has direct experience with the *Spazio Giovani* because she benefits from the service provided by Regione Emilia Romagna of free contraceptives. She has a good knowledge of website navigation. Tester B: William, 16 years old, born in Bologna, attends Laura bassi High School in Bologna. He is a young man sensitive to topics such as LGBT rights and Gender equality. He is active in his school to promote activities to raise awareness about sexuality and prevention. Tester C: Beatrice, 28 years old, was born in Bologna and has a degree in Law. She trains the under 16 volleyball team of a Libertas San Felice in Bologna. Despite her young age, she does not feel completely comfortable using technology.
Justification of users selection	Fabio has been chosen as a pilot tester because we wanted to check that organization of the test was efficient but he can not be included in the test because he does not fit the target audience. Francesca has been chosen as a tester because she has direct experience with *Spazio Giovani Bologna* but has never used the information available online as she always finds herself in difficulty in doing so; therefore she prefers to contact them by phone in case of need.

	William was chosen because of his young age. Given his interest in these topics he may be interested in finding useful information to share with friends.
	Beatrice was selected as a reference figure for young girls who tend to talk to her about personal issue. For this reason, she would like to find out more about topics that could help the girls.
Platform	Zoom
Test date	Tester A: 08/05/2020 Tester B and Tester C: 09/05/2020
Final assessment questionnaire	**System Usability Scale (SUS)** Ten questions, alternatively proposed with positive and negative enunciation, which are asked to respond according to a 5 levels Likert scale. Missing ratings are worth 3. No variation is allowed in the phrasing of the questions. It generates a score from 0 to 100, which provides the total value of a usability of the system. Scores higher than 68 indicate a good usability.

Table 10: Summary of the testing protocol.

EXPECTED RESULT

The following tasks have been selected because they are the most common actions that user could perform on the site and observe how users react to them. The tasks cover different aspects and sections of the site in order to obtain an overview.

Task 1: Look for information about what *Spazio Giovani* does, who it addresses and the services it offers (note that you should find this information in a single section).
We expect the user to be disoriented at first, but then complete the task with a reduced number of errors (among 2-3).

Task 2: Find the telephone number and address of *Spazio Giovani* to book an appointment.
We expect the user will complete the task in a short time because there is a special section in the navbar called "Info e orari".

Task 3: Find information on emergency contraception.
Due to the fact that it is not clearly specified in which sections the general and explanatory information is contained, we expect the user would open several sections before finding the

right one. In this case the time taken to complete the task may be high and negatively affect the user's consideration of the site.

Task 4: <u>Find information about *Spazio Giovani Più 20-34*.</u>
We believe that this is a very important task since *Spazio Giovani Più* contains useful information for the services for people from 20 to 34 years old. We expect that testers will take some time to complete the task.

Task 5: <u>Make a question to the counselling centre making sure that it is not present among those already made. The question is: "Is there a direct relationship between smokers and covid-19 predisposition?"</u>
We selected this task because we believe that the section where the solution is placed can match the FAQ section of a standard site, which is very useful considering the purpose of *Spazio Giovani.* It may take considerable time for the user to check which section the question can be asked in, but we expect that once the correct section is found, the user will complete the task in a short time

ORGANIZATION OF TEST

We contacted three users that represents the target audience identified. We had briefly explained our project without giving them too many details to influence the test.
The tests were carried out on Zoom, managed by two test drivers so that we could monitor the progress of the tasks more closely and maintain an active interaction. To better highlight the test mode and in particular Thinking Aloud method, we made a practical example on a task not included in our test. Before starting the test, we agreed on the following introduction to contextualize the test:

"The test consists of a series of tasks to be completed by browsing the website that we will tell you. The purpose of the activity is to test the website in terms of functionality and usability. We will not test your skills, so during the navigation you can feel comfortable. The tasks in total are 5 and for each task there is a different completion time, but you do not have to worry about it because we will stop you when the time is over. In case you feel like you are not able to to reach the goal and so to complete the task, you can easily tell us it, so we will keep on with the next task. If you will not be able to complete a task, it means that there is a design error in the website. I ask you to reflect aloud about the actions you are taking to reach the goal and about all the doubts you may have on it. Once you think you have reached the goal let us know, so we can carry on with the next task. In the case that you have not

understood the subject of the task, you can tell us in such a way as to provide you with further clarifications. During the test, furthermore, you can ask questions: they will help us to understand better what the problems are linked to the site. We can help you to clarify any doubts about the task but we can not help you to reach the goal."

FINAL ASSESSMENT QUESTIONNAIRE (SUS MODEL)

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

Source: UIUXTrend.com

Fig. 3: System Usability Scale questionnaire template.

All SUS questionnaires completed by users are attached to this report, named ***ParmaSUSquestionnaire.pdf***

2.2.2 TESTING PHASE

At this stage we referred to the recommendations proposed by usability.gov[9] regarding metrics testing. We have therefore classified the performance of our testers according to:

- **Successful Task Completion**: Each scenario requires the participant to obtain specific data that would be used in a typical task. The scenario is successfully completed when the participant indicates they have found the answer or completed the task goal.
- **Critical Errors**: Critical errors are deviations at completion from the targets of the scenario. Essentially the participant will not be able to finish the task. Participant may or may not be aware that the task goal is incorrect or incomplete.
- **Non-Critical Errors**: Non-critical errors are errors that are recovered by the participant and do not result in the participant's ability to successfully complete the task. These errors result in the task being completed less efficiently.
- **Time On Task**: The amount of time it takes the participant to complete the task.
- **Likes, Dislikes and Recommendations (General considerations):** Participants provide what they liked most about the site, what they liked least about the site, and recommendations for improving the site.

Pilot test - Tester 0

The pilot test was performed on 07/05/2020 on Zoom. Tester 0 is Fabio, a 21 years-old guy, which could not be included in the test because it did not fit the target audience.
The test was useful to make sure that questions were consistent, the team was prepared and the duration of the test was reasonable.
Thanks to the completion time of Tester 0 we were able to decide on a maximum time for the subsequent tests.

Tester 0	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task abandoned	The user was nervous because he couldn't find the required information and decided to abandon the task.		2.37 min

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[9] https://www.usability.gov/how-to-and-tools/methods/planning-usability-testing.html Last consultation on 10/05/2020.

Task		Critical errors	Non-critical errors	Time on task
Task 2	Task completed			0.29 min
Task 3	Task completed			0.20 min
Task 4	Task completed			0.31 min
Task 5	Task not completed	The user initially searched through the search bar if the question had already been asked. As no solution could be found, he thought of contacting the consultatory by email.		1.43 min

Test 1 - Tester A: Francesca

Francesca's test was performed 08/05/2020 on Zoom. The operating system used is Windows 10 and the search engine is Google Chrome.

The duration of the test was 15 minutes, including introduction, explanation of the test, performance of the tasks and the final assessment questionnaire.

Francesca	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task completed		Before she found the information in the correct section, she explored three different sections.	2.50 min
Task 2	Task completed			0.22 min
Task 3	Task partially completed	Having misinterpreted the task, she wasted time looking in the wrong section and ended the expected time for completion.		Out of time (> 2.00 min)
Task 4	Task completed			0.28 min
Task 5	Task completed			1.24 min

General considerations: Although Francesca was able to complete most of the tasks, she

confirms that she had problems finding the information because they are not well organized and dispersed. She says that given the difficulty in using the site she would not use it to search for the information she needs and that she would prefer to call them by phone.

Initially, in fact, she did not expect to find the main information, such as the function and activities carried out by *Spazio Giovani*, in the footer.

These impressions were confirmed by Francesca in the SUS questionnaire which obtained a result of 27.5.

Test 2 - Tester B: William

William's test was performed 09/05/2020 on Zoom. The operating system used is macOS and the search engine is Safari.

The duration of the test was 13 minutes, including introduction, explanation of the test, performance of the tasks and the final assessment questionnaire.

William	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task completed		Before reaching the goal he explored 4 different sections.	1.43 min
Task 2	Task completed			0.10 min
Task 3	Task not completed	He focused on the wrong section and ran out of time.		Out of time (> 2.00 min)
Task 4	Task abandoned	He explored 5 different sections before realizing that he couldn't find the required info so he abandoned the task		/
Task 5	Task completed			1.19 min

General considerations: Even though he believes that a website like this can be very useful to find relevant and reliable information (often having to do with fake news), he does not believe that it is organized in a logical way and that there is a lot of confusion. He believes that

people who are in real emergency and need information immediately may be even more confused, and suggests that it might be better to call. He found it particularly frustrating that key and primary information was not as evident on the homepage as he would have expected. In addition, he feels that in some cases terms used are too specific and scientific and difficult to understand for young people of that age who are unfamiliar.

For all these reasons, the result of the SUS questionnaire reveals a particularly low score of 25.

Test 3 - Tester C: Beatrice

Beatrice's test was performed 09/05/2020 on Zoom. The operating system used is macOS and the search engine is Safari.

The duration of the test was 18 minutes, including introduction, explanation of the test, performance of the tasks and the final assessment questionnaire.

Beatrice	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task not completed	Before she thought she had completed the task, she explored three wrong sections, reaching the fourth section that she mistakenly believed to be correct.		2.18 min
Task 2	Task completed			0.10 min
Task 3	Task completed			1.18 min
Task 4	Task completed			1.04 min
Task 5	Task not completed	After inspecting almost all sections of the site, she believed that she had searched for the information in the correct place without actually doing the search. The task was not completed because she did not find the correct section.		2.07 min

General considerations: Beatrice considers the site pleasurable mainly because she was convinced that she had successfully completed all the tasks. She believed that all the useful information is well highlighted. This opinion clearly influenced the SUS result, obtaining a result of 50. On the other hand, she doesn't consider the site very intuitive for secondary functions and says that finding information by phone is easier than using the site.

2.2.3 POST TESTING PHASE

ANALYSIS OF SUBJECTIVE AND OBJECTIVE DATA

Here general considerations we have detected from the tests we have conducted.

The positive aspect noticed by all testers is certainly the presence of useful and reliable information. Concerning this, the youngest user considered positive the fact that they were clearly dealing with topics that are generally considered taboo. However, all users pointed out that the contents are graphically too compact and difficult to read and search. It was noted that the presence of technical terms, although an indication of the scientificity and reliability of the content, can also be misleading if not accompanied by more familiar terms (for example, the term *contraccezione di emergenza* is not accompanied by the term *pillola del giorno dopo*). Another common consideration is that the homepage is confusing and that the labels of the sections containing the most relevant content do not clearly indicate their function.

Here a list of task by task analysis:

Task 1: Look for information about what *Spazio Giovani* does, who it addresses and the services it offers (note that you should find this information in a single section).
There is a general difficulty for users to find information about what *Spazio Giovani* does, who it addresses and the services it offers that are contained in "Chi siamo" section in the footer. In fact, users expected to find this information in a more obvious part of the homepage not guessing, initially, that it could be at the bottom. While one user did not complete the task, the other two first explored several other sections of the navbar.

Task 2: Find the telephone number and address of *Spazio Giovani* to book an appointment.
This is the most easily completed task by everyone as the information is easily found and positioned where users expected to find it (in the navbar and footer).

Task 3: Find information on emergency contraception.
In general, users have had difficulty identifying the correct macro section ("Io e…"), mainly because it is not clearly titled. Within the macro section, another problem is the side menu which is not immediately perceived as a subsection. Regarding this, an interesting note made by tester B is that, in a possible moment of emergency, when information must be found quickly, this site is not supporting the search. Task 3 has been completed only by tester C.

Task 4: Find information about *Spazio Giovani Più 20-34.*
The testers who managed to complete the task (2 out of 3 testers) performed the task

successfully only because they had already detected a link to the section in the previous tasks. In fact, tester B, who was not in the mentioned situation, abandoned the task because he was frustrated by the search.

Task 5: <u>Make a question to the counselling centre making sure that it is not present among those already made. The question is: "Is there a direct relationship between smokers and covid-19 predisposition?"</u>
The task was completed by 2 out of 3 testers. In general, all testers correctly identified the correct section in which to ask a question. However, the search for the questions already asked by users to the experts of *Spazio Giovani* was carried out differently and not always in the correct way.

IDENTIFICATION OF USABILITY PROBLEMS

In order to create the graph of the emergency curves, we list the errors detected in the User Testing phase and in the Expert Usability Review (chapter 2.1) with relative frequency, impact and persistence. As in the previous phase, we used the following evaluation criteria:
for the impact, (the effect the problem has on completing the task), we used the Nielsen classification of error that is reported here, to which we have associated a value from 1 to 5 depending:

- 5 - Implementation error
- 4 - Catastrophic error
- 3 - Major error
- 2 - Minor error
- 1 - Cosmetic error

For homogeneity, a scale from 1 to 5 will also be used to assess persistence (the number and relevance of the tasks that are affected by the problem) and frequency (the number of different users for whom the problem is noticed) in a proportional way.

Id error	Error	Frequency	Impact	Persistence	Phase of detection
1	The most important information is not highlighted. An intensive exploration is required to find the info.	5	1	2	User Testing
2	Lack of clarity in the identification of some sections.	3	2	3	User Testing
3	The same information can be found in different sections, which means that there are too many different paths to get there.	5	1	3	User Testing
4	In the absence of the back button users tended to click on the home button.	5	1	5	User Testing
5	Before completing the task the user need to explore several sections to find the right one to achieve the goal.	4	1	4	User Testing
6	Important content is not properly highlighted on the homepage. For example, "Chi siamo" and "Link utili" are in the footer and not in the foreground as you would expect.	4	1	5	Expert Usability Review
7	One of the fundamental parts of the site, such as the chat, is not working, the user cannot complete the task..	2	4	1	Expert Usability Review
8	Lot of information and long texts, the user does not have the possibility to filter or order them in any way.	5	1	3	Expert Usability Review
9	There is neither a navigational feedback on any page that shows the user the path made to reach the current section, nor the "back" button that allows you to return to the previous page.	5	4	5	Expert Usability Review
10	In the navbar, the first two sections "Io e…" and "Chiedi Avete chiesto" are, in terms of content and information, the core of the site. However, the titles of the sections are not clear and intuitive enough regarding their content .	3	2	2	Expert Usability Review
11	An element that may confuse the user is the fact that download windows do not open in new tabs but replace the page the user was visiting.	1	1	1	Expert Usability Review

12	There is not a good balance between text, white spaces and colour (it is not used to give breath to very long texts). This has a negative effect on the user's concentration .	4	1	3	Expert Usability Review
13	The links and buttons do not provide an indication of whether they have already been clicked, an element that would be useful for navigation.	1	1	5	Expert Usability Review
14	The results provided by the search function are not sorted according to any relevance criteria, moreover it is not possible to sort and filter them and it is not possible to decide how many results to see per page. The search option is not precise about the number of results encountered.	2	5	1	Expert Usability Review
15	In the "Forum" section there are two search tools, one of which do not work.	1	2	1	Expert Usability Review
16	The search tool is not visible because not clearly labelled. The search can not be updated and can not be saved. In the results the keyword is not evident so it is not easy to identify useful results.	1	1	1	Expert Usability Review
17	In case of erroneous actions the messages provided by the website are not sufficient for the user to understand what he/she did wrong or what actions are missing to complete the task.	2	1	1	Expert Usability Review

Table 11: List of errors detected in the User Testing phase and Expert Usability Review .

2.2.4 CURVES OF URGENCY

The errors detected in the User Testing and Expert Usability Review were placed in two bidimensional graphs, one considering impact and frequency and the other impact and persistence according to classification scores.

The threshold identified for the urgency curve is 3. The errors above this have been further divided into two urgency bands: errors to be solved immediately (red zone) and those to be solved afterwards (yellow zone), as shown in the graph below:
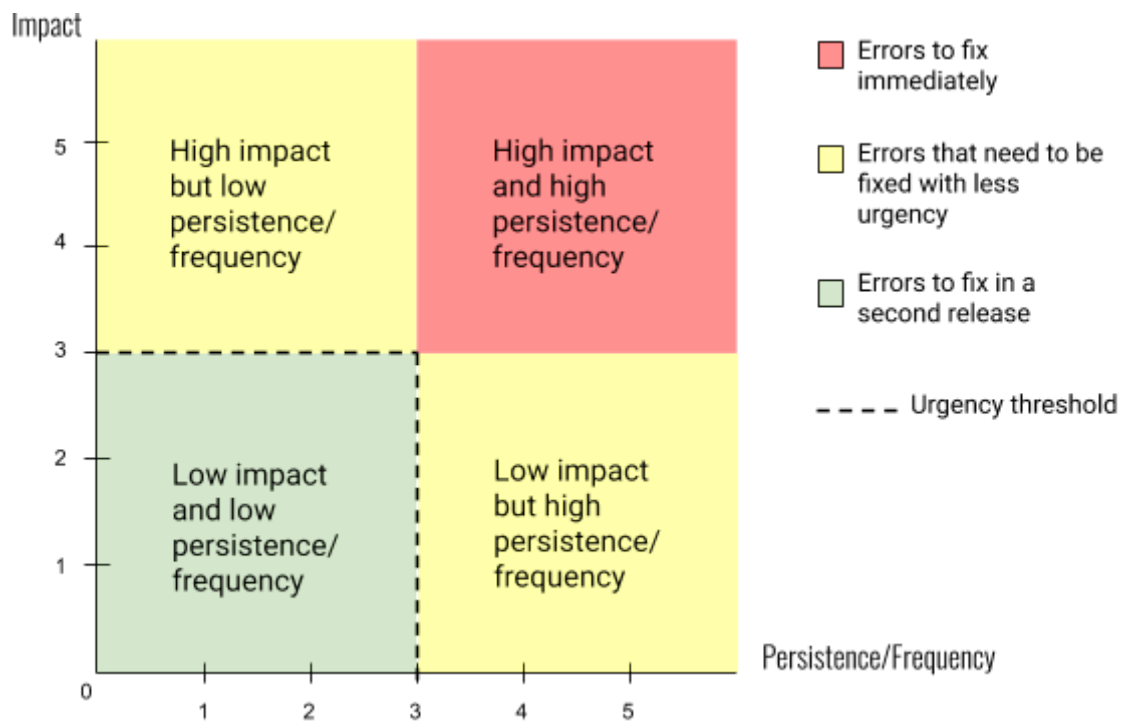
Fig. 4: Structure of the graph used for the urgency curve.

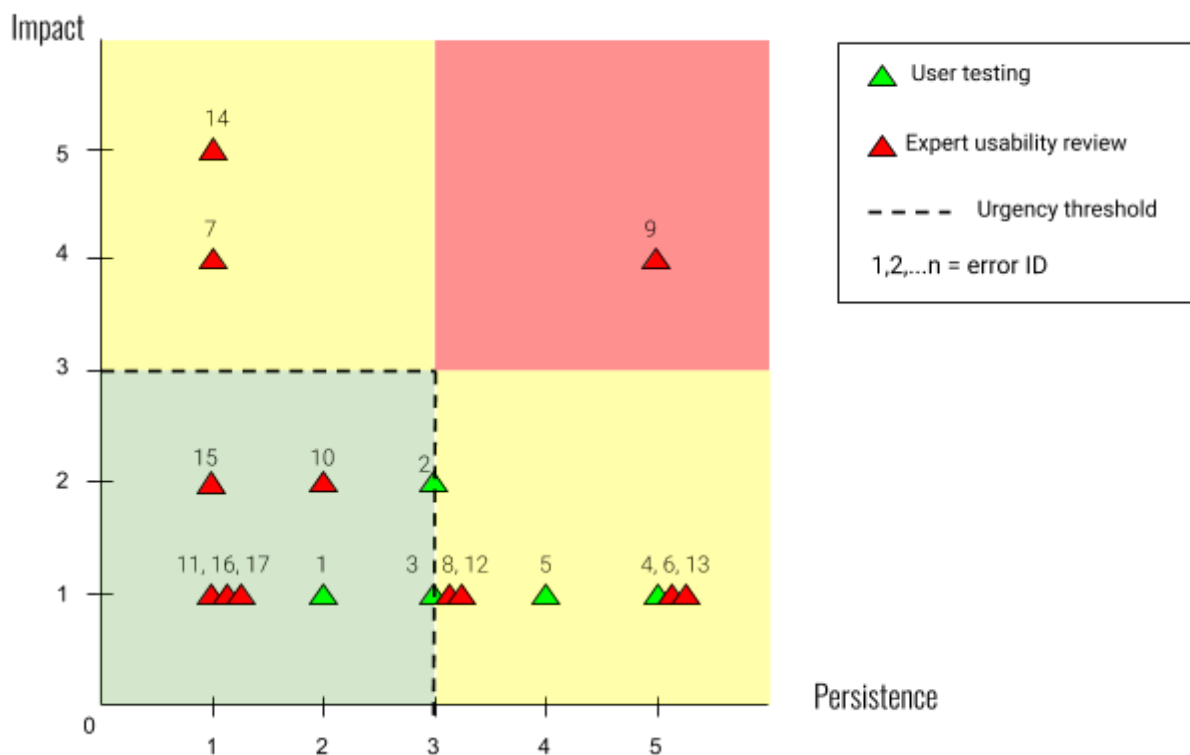## Impact vs Persistence

Fig. 5: Graph of the urgency curve considering impact and persistence.
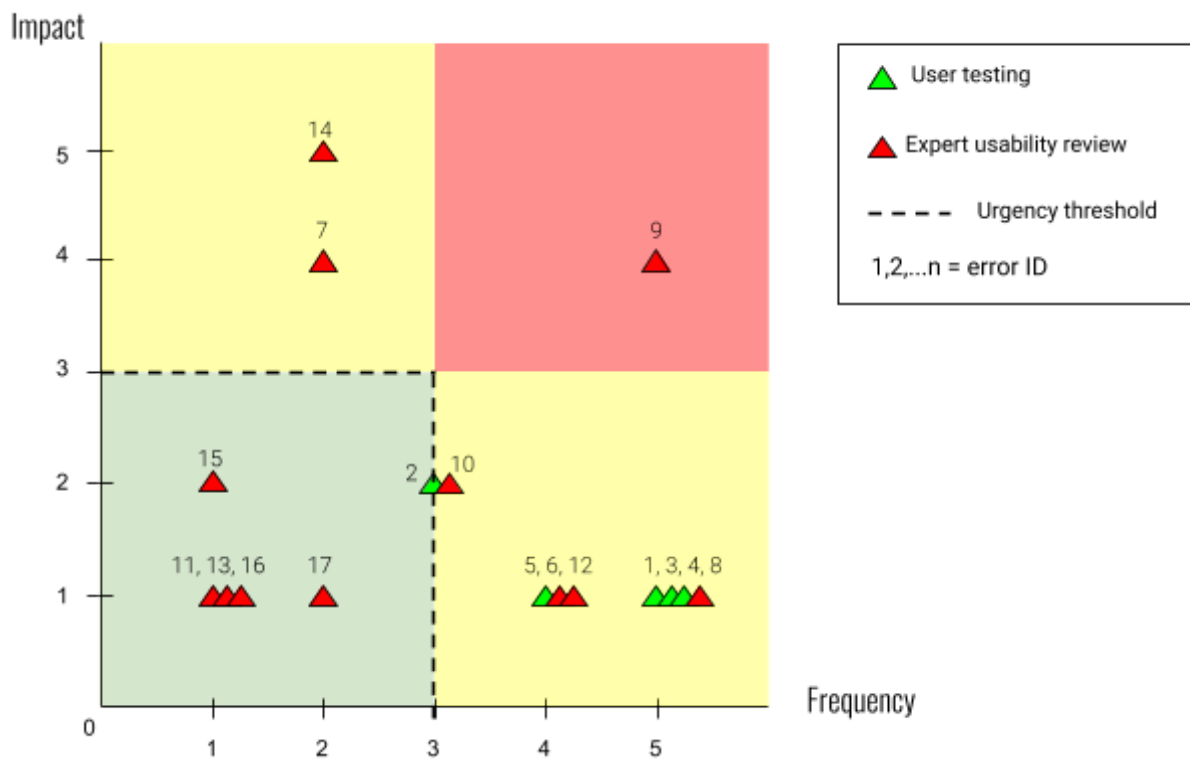
Impact vs Frequency

Fig. 6: Graph of the urgency curve considering impact and frequency.

CONCLUSIONS AND SUGGESTIONS

In conclusion, what emerged from the Expert Usability Review and the tests conducted on users is that there is homogeneity in the considerations found by both analyses. The strength of the site is certainly the reliability and scientificity of the content: in our Reverse Analysis it has obtained the highest score and it is an aspect that users have widely highlighted and appreciated. A weak point was found in the navigation of the site that was not intuitive, especially in the need for a rapid search for content of primary importance. What emerged was that, due to the structure of the site, users are not encouraged to use it and would prefer to call the center instead. On the other hand, if the homepage were reorganized with the most important information in evidence, if the labels were explanatory of their function and if the contents were organized in a logical way, the site could gain more value and be exploited more by young people in Parma.

3. FEASIBILITY STUDY

3.1 CONTEXT OF USE

This section will describe the types of users designated to use the platform. In particular, the users' needs and their characteristics will be analysed. The technical and environmental constraints of the system will then be analysed.

Identification of users

The users identified for this platform are young people between 14 and 19 years old and reference figures such as teachers, parents, other educators living in the Bologna territory.. On the basis of the data analyzed in the Ethnographic Analysis (section 1) it is assumed that the main users will be young people between 14 and 19 years as the services offered are mainly dedicated to this target group.

Identification of tasks

- Find general information about *Spazio Giovani* (timetables, addresses, phone numbers, services offered);
- Find information related to:
    - contraception
    - birth
    - abortion
    - gynaecology
    - oncology
    - infertility
    - nutrition
    - psychology and relational problems
    - sexology
    - adoption
- Visit and consult the Frequently Asked Question (FAQ) section;
- Use the chat that allows you to interact with a bot, Bolo, which provides quick links to sections that might be of interest to the user;
- Consult the information sheets of experts working in *Spazio Giovani* of the territory of Bologna;

- Consult *Spazio Giovani Adulti* section;
- Access to the personal area to book online an appointment for a medical examination or colloquium.
- Book online an appointment without registering to the personal area.

Identification of technical and environmental constraints

The platform resides on a web space, so an internet connection is essential for its consultation. The service is available for both desktop and mobile devices, its responsive design makes it searchable from a wide range of devices. Access to the consultation does not require any authentication, with the exception of the personal area. This choice is intended to facilitate users in the conclusion of their tasks.

Identification of cultural constraints

According to the data analyzed most of the users are Italian. However, 13,8% of the users are of foreign origin. For this reason we foresee the English translation of the information to facilitate the comprehension of the present contents.

3.2 Scenarios

Camilla Marchesini is 15 years old and she is engaged to a guy. She is thinking about her first sexual intercourse. She searches for information on internet about first intercourse and she finds out the website of *Spazio Giovani Bologna*. She finds some information that seems reliable and she compares it with the personal experiences of her best friends.

Alessandra Marini is 19 years old and she moved to Bologna a few months ago to start her first year at the Faculty of Engineering. During a party she meets Giacomo, with whom she has an unprotected intercourse. A few weeks later she realizes she missed her period and the first pregnancy test is positive. Worried about the pregnancy and the consequences on the university career that has just begun, she immediately decides that the best choice is the voluntary interruption of pregnancy. She is suddenly reminded of the counselling centre she

had already contacted in the past for psychological assistance and, in panic, decides to call the dedicated number.

Jasmine Boudouma is an 18-year-old Moroccan girl who has been engaged for a year to Diego, a 19-year-old from Bologna, hiding it from his family. Jasmine's family is very conservative and would never approve of her relationship with Diego. Jasmine does not want to give up her relationship, but she wants to keep the eventuality of pregnancy as far away as possible, since it would complicate her situation considerably. She searches for information about the contraceptive pill and on the *Spazio Giovani* website she finds out that it is possible to use it free of charge for residents in Emilia Romagna up to the age of 26. She books a gynecological visit for the free pill. Then, she deletes the chronology after the search: it would not be the first time that her father checks her computer.

Paola Moro is 45 years old, a state employee and Giulia's mother, 14 years old. She is a single mother and very apprehensive: she is worried because her daughter has not yet had her first menstrual cycle and would like to book a check-up for her. She decides to take advantage of the service offered by the counselling centre as a free service and uses the site to book the gynecological visit. Two weeks later, Paola and Giulia go to *Spazio Glovani* in Via Sant'Isaia for the booked gynecological examination.

Professor Marco Rota is 52 years old and teaches sociology and psychology at the Liceo delle Scienze Umane Laura Bassi. Marco decided to dedicate a few hours of his lessons to illustrate some useful information to the students about the services offered by Spazio Giovani. In the past years the professor has collaborated with *Spazio Giovani* for some projects and decided to visit their website to give a lecture to his 4th grade class on the services offered by *Spazio Giovani*.

Thomas Costantini is 17 years old and he is a student of Marco Rota. He listened carefully to the teacher's lecture on the services of the counselling centre. When he comes home, he hears his parents arguing for the hundredth time. Thomas' family situation is complex: his father has recently lost his job and he often argues violently with his mother. This stressful situation makes him suffer a lot, but he has never talked about it with his friends. He had never thought about seeing a psychologist before, especially because he didn't think he

could afford one. After lunch, Thomas immediately searches for the site the professor talked about in class. He needs to talk to someone immediately about what happened and has been going on in the house for some time and starts talking to an expert. The expert suggests that he should book a visit; Thomas will go to the counselling centre three days later.

3.3 Personas

Camilla Marchesini

Anno di nascita: 2005
Nazionalità: italiana
Residenza: Bologna
Professione: studentessa

Camilla is a 15-year-old girl, born and raised in Bologna, she lives with her parents in San Vitale district. She attends the second year of the Liceo Artistico F. Arcangeli of Bologna. Her passion is freehand drawing and her dream is to become a tattoo artist. She has a very popular instagram page, where she publishes photos of her drawings. After school she spends a lot of time hanging out with her friends in the centre of Bologna chatting, in particular with Riccardo, a boy two years older than her with whom she has been engaged for a few months. She has a very good relationship with her friend Marta, with whom she usually confides for labour of love. They often talk about the "first time" but Camilla is not very sure about the information that Marta gives her. Camilla does not have a profound relationship with her parents, so she does not tend to confide in them and prefers to look for information online.

Technological environment: Camilla has a Huawei P10 Lite that allows her to stay connected at all times. In fact, she prefers to use her phone to do research online rather than using her computer, since she doesn't have a personal one but shares it with her family. She has many apps on her mobile phone of which she has a good knowledge but she thinks she needs to learn how to use computer well.

Alessandra Marini

Anno di nascita: 2001
Nazionalità: italiana
Residenza: Padova
Professione: studentessa

Alessandra is 19 years old, she was born in Venice and raised in Padua. She moved to Bologna 5 months ago to attend the degree course in Management Engineering. Her dream was to move to Bologna to live her first years of university as an out-of-home student. She found an apartment that she shares with 3 other girls in Pratello area.
She gets along very well with her roommates, even if she only met them recently, in fact every Friday and Saturday night they go to parties organized by the guys from the university.

She does not often go home to Padua because she prefers not to waste time traveling, as she likes to study a lot. In particular she believes she has made the right choice about the faculty. In order to contribute to the expenses incurred by her parents, she decided to find a job as a babysitter after class and study.

She is an independent girl who knows how to manage her time well and makes decisions without being influenced by others.

Technological environment: Alessandra has an excellent knowledge of the Office package and is very practical in web browsing, being tools she uses daily for university and study. She prefers to use the computer to do research while she uses the phone mainly for messaging and social networking applications.

Jasmine Boudouma

Anno di nascita: 2002
Nazionalità: marocchina
Residenza: Bologna
Professione: studentessa lavoratrice

Jasmine, 18 years old, was born in Bologna but her family is of Moroccan origin, in fact, in addition to Italian language she also speaks Arabic language. Her parents have lived for 20 years in Bologna, in Pilastro district, and with great sacrifice they managed to open a restaurant of Moroccan cuisine. Jasmine's family is very attached to traditions and is conservative. Jasmine loves to live in the western culture but she has always worn the veil as a sign of respect for her parents. She has 3 younger siblings and in order to help her family, in the evening, she works as a waitress in the family restaurant, although she still attends the last year of the Istituto Tecnico Agrario A. Serpieri.

The relationship with her parents is complicated so she has been hiding her relationship with Diego for almost a year. She knows perfectly well that his parents wouldn't approve the boy. In fact, they'd like her to date a boy who shares their culture.

Technological environment: Jasmine uses the computer she shares with her family in order to do homework or research for school, but she has a latest generation mobile phone that allows her to keep in touch with her friends and boyfriend. She is comfortable using the internet but she does not call herself an expert user.

Paola Moro

Anno di nascita: 1975
Nazionalità: Italiana
Residenza: Bologna
Professione: Impiegata statale

Paola is 45 years old, she is a single mother and she is raising her daughter Giulia, 14 years old, without the help of her father. She is satisfied about her job because it is a good role and she also is able to dedicate a lot of time to her daughter.

She is very close to Giulia, so deeply that Giulia defines her as a best friend. This connection leads her to be particularly apprehensive. Paola is in fact worried about the fact that Giulia is already 14 years old but has not had her first period yet.

Giulia has recently confessed to her mother that she is uncomfortable with the fact of not having her period. Paola receives advice on how to deal with a teenager's problems from friends who have children of the same age as Giulia. Her friends always offer her useful advice and are able to calm her down.

Technological environment: Paola uses the computer at work 8 hours a day. For this reason, when she comes home she prefers not to turn on her personal computer. In her free time she checks the emails on her mobile phone and accesses facebook to read the news shared by her friends. She does not define herself as an expert user but she appreciates the potential of technology.

Marco Rota

Anno di nascita: 1968
Nazionalità: Italiana
Residenza: Casalecchio di Reno
Professione: Professore

Professor Marco Rota, 52 years old. He was born in Milan but moved to Bologna for university when he was young, where he remained to work as a professor of sociology and psychology at the Liceo delle Scienze Umane Laura Bassi.

He lives in Casalecchio di Reno with his wife and a 10-year-old son. On weekends he loves to ride his bike and be outdoors with his family. He loves his job: he likes to teach and stay updated on psychology, so he frequently attends updating courses.

He thinks that in the Italian school not having sex education lessons is a misfortune. In fact, as he was able to see in American schools during his PhD, he decided independently to propose the same system in his class, spending a few hours of his lessons on this subject.

Technological environment: Professor Rota considers himself an expert in the technology and use of computers, he tries to keep himself constantly updated on new applications to maintain contact with his students.

Thomas Costantini

Anno di nascita: 2003
Nazionalità: Italiana
Residenza: San Lazzaro di Savena
Professione: Studente

Thomas is 17 years old, born and raised in San Lazzaro di Savena. He is attending the 4th year of Liceo delle scienze umane Laura Bassi in Bologna.

His parents argue often and violently and because of this difficult situation he does not perform well at school. He always has a multitude of thoughts, he does not live his age with carefreeness. At school he does not have good relationships with his classmates, the only friends he has are those with whom he plays online but he is not sure he can trust them. He really wishes he had someone he could talk to.

The only place he feels happy and carefree is online, which he uses to play role-playing video games (such as *Fortnite*).

Since a few years he learned with online tutorials how to develop small video games with Unity and discovered that he likes to program in Python, which he finds a simple and powerful language.

<u>Technological environment</u>: despite his young age, Thomas is an experienced user, passionate about technology and has no problem doing quick online searches. He is not interested in social networks.

4. DESIGN PROPOSAL

4.1 INFORMATION ARCHITECTURE

Information architecture (IA) focuses on organizing, structuring, and labeling content in an effective and sustainable way. The goal is to help users find information and complete tasks. To do this, it is important to understand how the pieces fit together to create the larger picture, how items relate to each other within the system.

The purpose of IA is to help users understand where they are, what they've found, what's around, and what to expect. As a result, IA informs the content strategy through identifying word choice as well as informing user interface design and interaction design through playing a role in the wireframing and prototyping processes.

Considering this initial analysis, a top-down approach to information architecture has been chosen. In a top-down model, a general structure of the system is formulated without delving too much into detail for any of its parts. Every part of the system is progressively refined by adding more details from the earlier design stages. The specification continues until that part is deemed to be sufficiently detailed.

The system is meant to be comprised in several parts, but all of them have to be connected to enhance the main functionality: motivate the users and provide them the information in a clear, direct and rapid way.

In the choices made for the design of the site we have also taken into account the results of the Expert Usability Review and User Testing analysis as they are carried out on a reference site with the same objectives as the site we are dealing with. Therefore we thought it was appropriate to take into consideration the problems that emerged so as not to propose them again, but instead to solve them.

The site has been designed as ancillary site of the main site of the Servizio Sanitario Regionale - Emilia Romagna Azienda Unità Sanitaria Locale (AUSL) of Bologna[10]. The site designed will be accessible by clicking on "Mappa del sito" → "Per i cittadini" → Spazio Giovani Bologna. The website will be also accessible through a link in the "Consultori familiari" section[11].
Since the Servizio Sanitario Regionale - Emilia Romagna has a site where reference is made to all the Aziende Unità Sanitarie Locali (AUSL), we believe that reference should also be

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[10] https://www.ausl.bologna.it/ Last consultation on 13/05/2020.
[11] https://www.ausl.bologna.it/per-i-cittadini/consultori-familiari Last consultation on 13/05/2020.

made to our site at Emilia Romagna Salute Guida ai Servizi[12], in the *Assistenza e consulenza per giovani* area, under the Bologna section.

We believe it is important that the site can be reached independently from the main site, by making a query with keywords in the search bar of the browser (e.g.: "Spazio Giovani Bologna" or "Consultorio Bologna").

Moreover, as there is also a site for all family counselling centres in Emilia Romagna[13], our site must also be present in the latter, in the relevant section "Spazio Giovani", which already lists links to the *Spazio Giovani* of Rimini and Parma.

The ancillary site has a clear homepage with navbar and footer that remains unchanged in all other sections of the site. The homepage limits scrolling and facilitates navigation as it is structured through four cards that contain links to four sections that are essential for users to navigate the site. An element always present, such as navbar and footer, is the chat. It must be possible in each section to ask for information to a chatbot that eventually could send the link with the contact of the interested *Spazio Giovani*.

On the basis of the feedback received during the testing phase, we have decided that the most specific technical terms will be accompanied by a more slang translation of the word. The synonym will be visible by hovering the word. E.g. "contraccezione d'emergenza" is synonym of "pillola del giorno dopo".

Following the analysis of *Spazio Giovani Parma* website through the userfocus.co.uk guidelines, we found the usefulness of links that change colour once visited and the importance of feedback when uploading.

The navbar is organized in the following way:

- Site logo with home page link
- Servizi
- FAQ (Frequently Asked Questions)
- Conosci gli esperti
- Spazio Giovani Adulti
- News & Avvisi

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[12] https://guidaservizi.fascicolo-sanitario.it/dettaglio/prestazione/3152772 Last consultation on 20/05/2020.
[13] https://www.saperidoc.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/928 Last consultation on 13/05/2020.

- Barra di ricerca
- Area personale (Accedi/Registrati)
- Select language (Italiano/English)

Home page:

- Four cards containing the following information:
  - Chi siamo
  - Dove siamo, Orari & Contatti
  - Servizi
  - Prenota una visita

Footer:

- Privacy
- Cookies
- Copyright
- Logo of Servizio Sanitario Regionale - Emilia Romagna with link to the site
- Links to social pages (Facebook and Youtube)

Additional element:

- Chat

Now we analyze in detail the sections that we have previously planned:

Servizi:

This area can be reached both from the navbar section labeled "Servizi" and from the bottom left card on the homepage called "Servizi". In this section is shown the list of services provided by *Spazio Giovani Bologna*. By clicking on the "+" sign next to each service, the explanation of the service and how to access to it is provided. The services offered are the following:

- Colloquio di accoglienza

- Colloqui informativi
- Visite ginecologiche
- Consulenza e prescrizione contraccettiva
- Certificazioni IVG (Interruzione volontaria di gravidanza)
- Consultazioni psicologiche per adolescenti
- Consulenze per genitori, insegnanti, educatori

FAQ (Frequently Asked Questions)

The section is divided into two parts:

- Domande e curiosità dei ragazzi
- Domande e curiosità di genitori, insegnanti ed educatori

These two macro sections include partitions on certain topics under which the most frequently asked questions are listed. The answer to these questions will be concise and when possible will have references to more detailed dedicated pages that can satisfy the user's request in a more comprehensive way.

If the user's question is not present among those already asked, under the two sections the user will find an invitation to contact the experts of the Spazio Giovani by email, phone or chat.

Conosci gli esperti:

On this page we propose a division of the experts according to *Spazio Giovani* of the Bologna area. Once you have selected the counselling centre of interest, you will be able to view the team operating in the *Spazio Giovani.* For each expert will be created a short identification card with photograph and general information on the specific profession.

Spazio Giovani Adulti:

This section will provide key information on activities and services for young adults between 20 and 34 years. As with the other pages, the presence of clear style that provides the information quickly, without other content that may distract the user is very important.

News & Avvisi:

In this section we provide a collection of notices and news from *Spazio Giovani*, in chronological order. In addition to the news and announcements valid for all *Spazio Giovani* centres (e.g.: Christmas break closure), the news related to specific counseling centers will be highlighted in a special section. The news that have more relevance or that will be valid for a long time (e.g. change of opening hours due to COVID-19) will be fixed at the top in order to be more visible and easy to find.

Barra di ricerca:

The search bar will be present in all sections of the site. Below it you can click on "Raffina la ricerca" to perform advanced searches by selecting "Solo risultati che contengono tutte le parole" (AND in boolean terms) or " Risultati che contengono una delle parole e risultati che contengono tutte le parole" (OR), "Risultati che contengono una delle parole escludendo le altre" (NOT).

If the user performs a search without refining it, all results that contain one of the searched words and results that contain both will be displayed (OR by default). In this case the user will be able to refine the search through a sidebar that will provide the alternatives shown above, with the possibility to search also results similar to the search performed.

In case the user makes spelling mistakes in the query or the search does not produce any results, the system will display the following message: "Forse stavi cercando *<parola suggerita>*", providing the results for the suggested word.

Area Personale:

The Personal Area of *Spazio Giovani* is a personal and confidential virtual space. As to access to the area you must register with your name, surname, e-mail and fiscal code. In this area you can handle information and carrying on all the following activities:

- Quickly view, request or cancel appointments.

- View medical records and results at the same time as your provider.

- View medication list and information about your treatments.

- Update personal information.

- Set up notifications and reminders about future appointments.

Personal Area gives you private, secure access to your health information any time plus useful tools to help you better manage your health. If you have problem to access to the personal area you can just click on "Recupera password" and you will be able to reset it. You can choose whether to reset your password via email or phone number, if you have previously entered it in your personal area.

Lingua:

The last heading of the navbar is language. This allows to select Italian or English. Selecting "Italian", the website will show the contents in Italian language, while selecting "English" the contents will be translated into English. We decided to insert this option because a percentage of the users of the counselling centre are foreigners and may prefer to read the information in English.

Chi siamo:

This section can be reached from the top left card on the homepage. In this section you can find general information on the function of *Spazio Giovani*. You can also find all the references to Servizio Sanitario Regionale - Emilia Romagna and Azienda Unità Sanitaria Locale di Bologna.

Dove siamo, Orari & Contatti:

The section can be reached from the top right card on the homepage. This section provides information on the contacts and opening hours of the six *Spazio Giovani* in the Bologna area. The user, through the "+" button, can select a specific counseling centre and see in detail its address, map, telephone number and timetables. The "Mostra tutti" option will show the information related to all the counselling centres.

Prenota una visita:

To book a visit quickly, the user is faced with two possibilities:

- If the user is already registered in the "Area Personale", it is sufficient to access their personal area and book a visit in the "Prenota una visita" section.
- If the user is not registered, he/she can create a new account and book a visit from the personal area or book a visit without creating a personal account, but still providing name, surname, e-mail and fiscal code in the tab that opens by clicking on "Prenota una visita senza registrarti" in the bottom right card of the homepage.

However, it is always possible to book a visit by phone. The numbers of the different clinics will always be easily reachable from the homepage.

Footer:

The footer presents micro-sections on privacy policy, cookie policy and copyright. There will also be the logo of the Servizio Sanitario Regionale - Emilia Romagna with links to its official site, and links to the social pages of *Spazio Giovani Bologna*.

Chat:

An element always visible, regardless of the section where the user is located, is the chat. The chat is always anonymous, which ensures that the user is always protected, and is managed through a chatbot that scans the keywords used by the user and provides a response based on the content of the site. If the answers provided do not meet the user's requests, the chatbot invites to contact the *Spazio Giovani* by sending a link to the contact page.

According to two studies by the Nielsen Norman group, we found that even though people prefer human chat support over chatbots, a faster response was one of the things users did like about chatbots[14]. We decided to take advantage of the chatbot function and not human support because experts would have a longer response time and could not guarantee continuous support to users.

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[14] The User Experience of Customer-Service Chat: 20 Guidelines, https://www.nngroup.com/articles/chat-ux/;
The User Experience of Chatbots, https://www.nngroup.com/articles/chatbots/.

4.2 CAO=S MODEL

During the designing phase of the subsite at issue, the CAO=S model has been used as a basis for the design proposal. The CAO=S model (Concepts, Actors, Operations generate Structures) is a draft model that allows to adopt a goal-oriented design approach in economically constrained projects.

It is based on a simplified implementation of a goal-oriented model, where the analytical part on the intended target users is simplified into simple analysis of a few of their fundamental characteristics. It allows a good quality development team without specific experience in the field of usability to avoid at least the most frequent errors in designing usable applications.

The CAO=S model is based on the study of the information types (Concepts) that the application must manipulate on behalf of the user types (Actors) by providing commands (Operations). A correct analysis of these allows to generate the three types of Structures managed by the model:

1. *Views*, which are display screens of properties of the concepts;
2. *Data Structures*, which are patterns for the persistent storage of concepts' properties;
3. *Navigation*, which consists in mechanisms for navigating from one view to another.

The solutions that CAO=S uses to increase the usability of applications are acting on features such as expected utility, completeness of content, the comprehensibility of the vocabulary (eliminating the terms of difficult interpretation).

CONCEPTS

Concepts are the types of information that are managed by the application. The concepts are the way in which the user perceives and understands the information regardless of whether and how it stored in the data structures. Concepts have data associated to them. In general, every concept must have at least one actor who creates instances of it, at least one actor observing them. The interface must indicate operations on the concept, but we may have problems when data concepts and structures differ. In our case, these are the problems encountered and how we have solved them:

- *Standardization problems and lexical differences*: in our case these two problems have been linked because we have seen different actors (Spazio Giovani experts vs users) use different words to express the same concept. To solve this problem, in the case of texts we thought of a mechanism to convert the word into the term known

through word hovering. In the case of search and use of chat we have inserted the possibility to show similar results.

- *Conceptual differences:* we refer to conceptual difference when the same word is used by different actors to describe different things. In case we find this problem in the development of the site, we will never use the word at issue, but specifications and clarifications to disambiguate the concept.
- *Polysemy*: in this case, the same word is used by the same actors to describe different things. To solve this problem, we will never use a polysemic word, but we will find acceptable synonyms for each different meaning.

The concepts (identified by the team) that operations manipulate are:

- **Category**: container of information related to certain topics.
- **Information**: content proposed to the user.
- **Results**: represent the answers to the user's searches.
- **Account**: space for users of the platform for the management of personal information and reservations.
- **Appointment**: request for a visit that the user makes to *Spazio Giovani Bologna*.
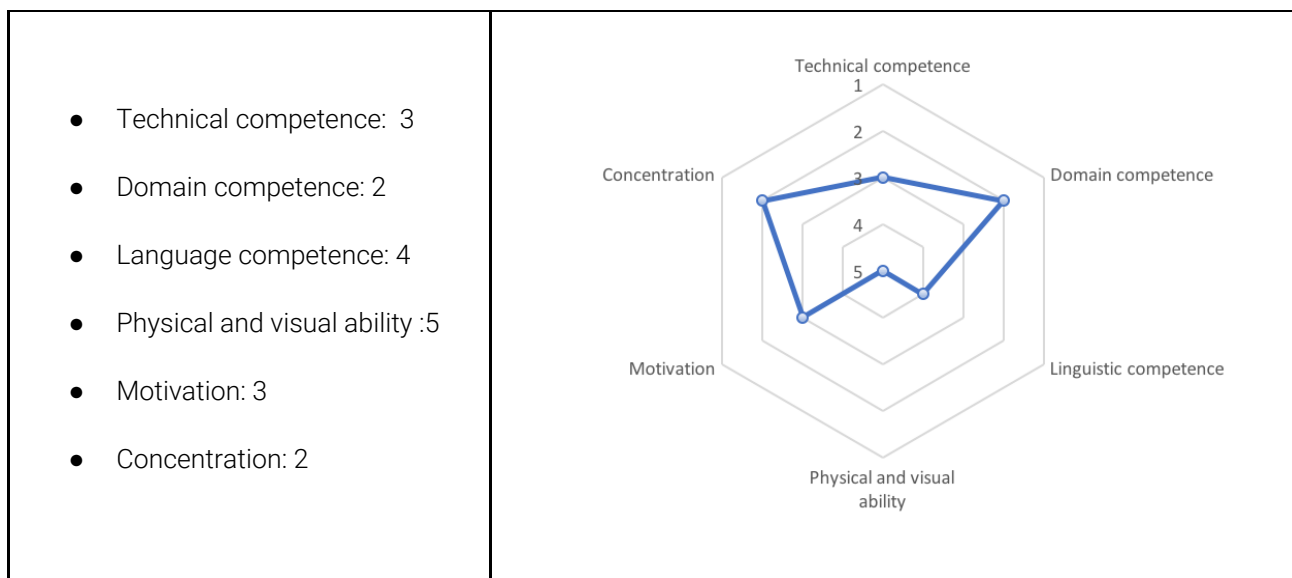- **Message service**: information request system through chat.

ACTORS

The actors are the categories of users that act on the application interfaces to perform their tasks by manipulating the data structures perceived through concepts. They are differentiated not for their own characteristics, but for the role they play within the application. The actors are described through the essential features that have a direct impact on interaction. They correspond to competences and abilities of exactly six basic user's characteristic with a clear impact on the implementation. For each feature, a numerical score from 1 to 5 is assigned, where 1 corresponds to a very low value and 5 to a very high value. The features at issue are:

1. <u>Technical competence</u> - It indicates mastery of the technical vocabulary, the use of applications and the use of the relevant devices. Nowadays, no longer one-dimensional, given the complexity of today's technology from PCs to tablets, and so on.

2. <u>Domain competence</u> - Knowledge of practices, terminology, subtleties on the subject of the system.

3. <u>Language competence</u> - Knowledge of the language of the system and the ability to understand the different communication registers.

4. <u>Physical ability</u> - Physical limitation, even partial and/or temporary, reducing the ability to use the device the system is running on.

5. <u>Motivation</u> - Motivations that cause the user to be interested in a task, to use the system at issue for the task (lower if use of the system is not a priority for the user's goals, or if he is required to use it, or if the tool is technically but not conceptually functional to a goal).

6. <u>Concentration</u> - Ability/possibility to provide adequate focus on the task.

Camilla Marchesini

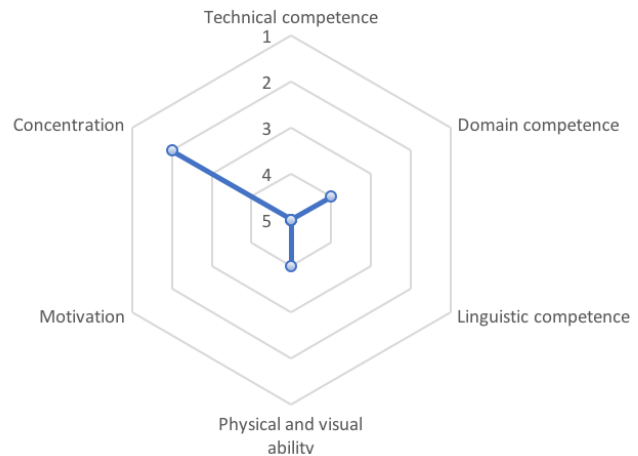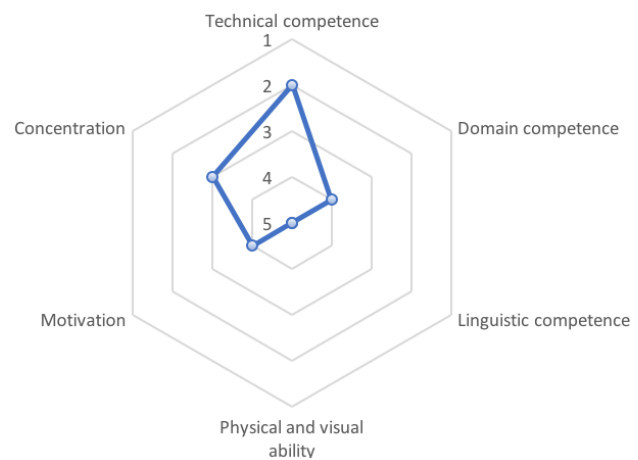|	
● Technical competence: 3 ● Domain competence: 2 ● Language competence: 4 ● Physical and visual ability :5 ● Motivation: 3 ● Concentration: 2	

Alessandra Marini

- Technical competence: 5
- Domain competence: 4
- Language competence: 5
- Physical and visual ability: 4
- Motivation: 5
- Concentration: 2

Jasmine Boudouma

- Technical competence: 2
- Domain competence: 4
- Language competence: 5
- Physical and visual ability: 5
- Motivation: 4
- Concentration: 3

Paola Moro

- Technical competence: 3

- Domain competence: 5

- Language competence: 5

- Physical and visual ability: 4

- Motivation: 3

- Concentration: 4

Marco Rota

- Technical competence: 5

- Domain competence: 5

- Language competence: 5

- Physical and visual ability: 4

- Motivation: 2

- Concentration: 4
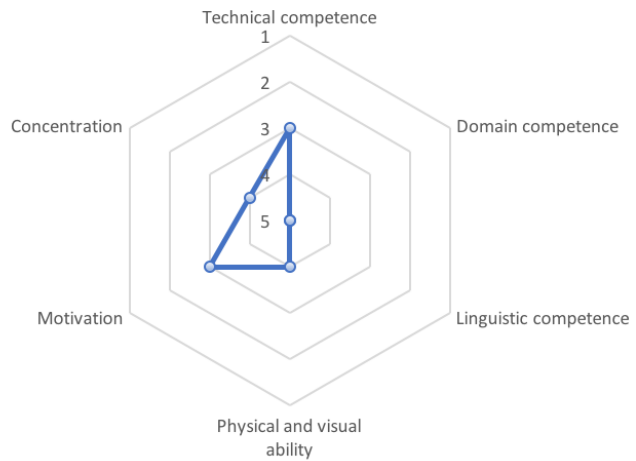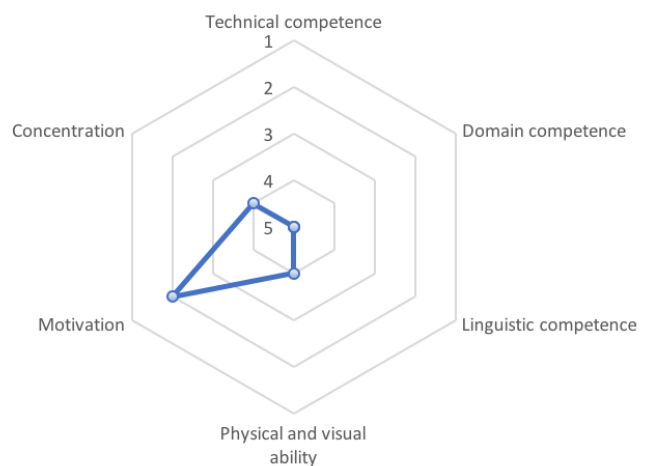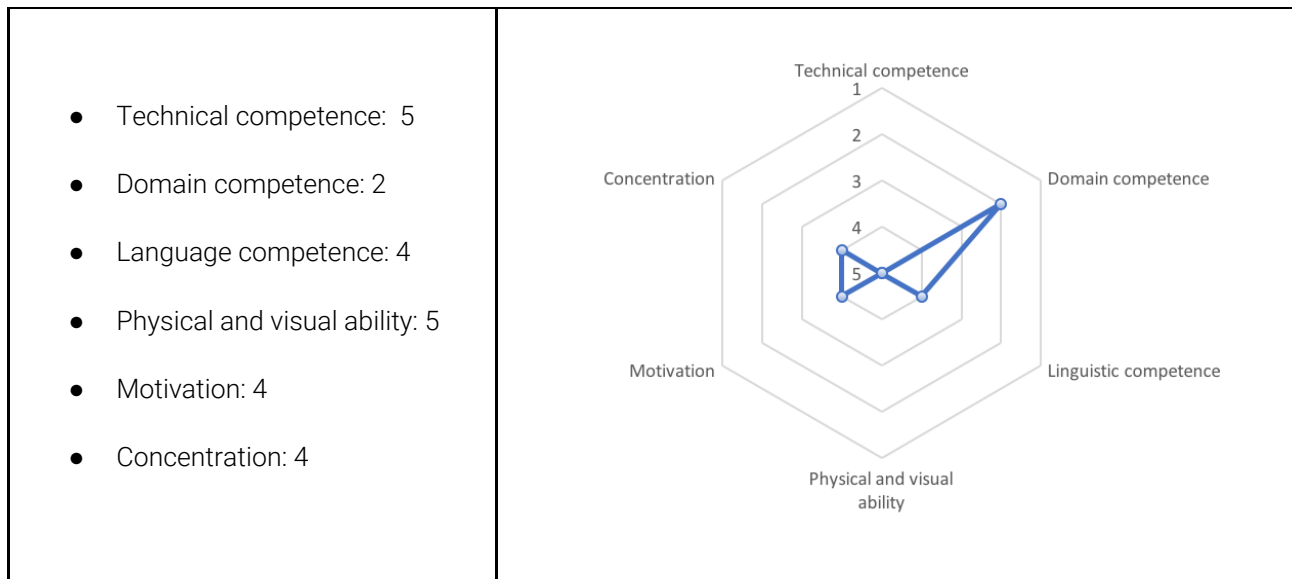
Thomas Costantini

- Technical competence: 5
- Domain competence: 2
- Language competence: 4
- Physical and visual ability: 5
- Motivation: 4
- Concentration: 4

OPERATIONS

Operations are actions available on the interface corresponding to manipulations on the concepts. Since the user believes to be manipulating concepts, and not data structures, operations coincide with the task, even if for each operation we may deal with several actions that manipulate data in the underlying structures.

Each operation acts on one or more instances of the concept, directly or indirectly, permanently or temporarily.

The operations are operations on the concepts, not on the data structures. Every command, every label, every widget must include terms associated with the concepts, and not with the terms of the associated system.

In this section are reported the types of operations that each actor can perform on the concepts described above. The operations according to CAO = S are of four types:

1. <u>Creation</u>: Account, Appointment, Message service
2. <u>View</u>: Category, Information, Results, Account, Appointment, Message service
3. <u>Update</u>: Account, Appointment, Results
4. <u>Remove</u>: Account, Appointment

We will analyze in detail each operation.

Creation: The creation consists in the generation of one or more instances of a concept in the initial state.

- <u>Types</u>: the creation will be mostly manual. The user has the possibility to create his/her personal account and to book a visit by entering personal information in the registration/booking form, and ask for information through the chat.
- <u>Default</u>: the initial state is never empty of values. The default values are fundamental to reduce the user work and reassure him/her about the meaning and the destination of the operation. Data entry fields are labelled according to the type of value to be entered.
- <u>Multiplicity</u>: the user can only create one instance at time.
- <u>Persistence</u>: the instances created will exist after the end of the operation for what concern the concepts "Account" and "Appointment". The user can create a personal account that will obviously remain active without the need to recreate it at each browsing session. The same thing is valid for the booking of the visit: if the user is profiled, once completed the operation will always remain visible. Regarding the chat once the browsing session is closed the conversation will not be more visible once the browsing session is over.
- <u>User memory</u>: the system do not suggest values previously entered by the user.
- <u>Failure notification</u>: when the system encounters a problem it will notify the user with a failure notification, e.g.: "Email non valida", "Email già presente", "Password errata".

View: the view is to display one or more instances of the concept in an understandable way. There are different types of views:

- <u>Full individual view</u>: All properties that are associated with the concept are visible. Whenever possible we opted for a full individual view, especially for content that is not too long.
- <u>Individual reduced view</u>: Only a few fundamental properties are identified and displayed and it is possible to switch to a complete individual view.
- <u>Multiple view (list)</u>: A reduced view of each item of the list is provided. It is possible to switch to an individual view and to perform operations on the list, as sorts, groupings, filters, database searches, and so on. In cases where the content was very extensive, we chose to organize it through lists whose entries can be expanded through an individual view for more information.

- Multiple view (lookup): It is possible to select one or more instances of the concept. In case the search results are many, they can be filtered.
- Multiple view (summary): Facts are grouped by concept and are displayed together. In order to organize the information logically, it has been grouped accordingly to their characteristics and displayed together.

Update: It is the modification of one or more features of one or more instances of the entity, without creating new ones. It is always possible to update the personal account by modifying contacts (e-mail, telephone number, address). When booking a visit, you can modify it if the appointment does not suit you anymore. The update is always possible also on the results of a searching session, by adding filters or change the query.

Remove: It consists in the deletion of one or more entities from the system. If you register in the personal area of *Spazio Giovani Bologna*, it is possible to delete your account by clicking on *Impostazioni > Elimina account*. Before the final deletion, the user will be notified and a confirmation will be requested. However, once deleted, it is still possible to register again, even though it will not be possible to recover the previous records. Additional information in the personal account, such as telephone number and address, can be easily removed as well. After having booked an appointment, it is always possible to cancel it directly from the website. All appointments that have already been attended and those that have been cancelled will be visible in the "Archivio" section. However, the user can permanently delete the records of the appointments saved in the archive. In this case as well, the user will be notified of the irrevocability of the action.

STRUCTURE

The last phase of the CAO=S model involves the merging of the previous parts in order to relate concepts, actors and operations within a single artifact.

In CAO=S model, the structures are:

1. *Data Structures* - The normalization of concepts generates persistent storage models of entity (DBMS).

2. *Views* - Models of screen through which the properties of entities are displayed. Each view is composed of actual visualization, commands that can be activated during viewing and dome of these commands are navigation-related.
3. *Navigation* - mechanism to activate view and commands to switch from a view to the next.

The resulting table will be useful in identifying the necessary structures, which will help in the implementation of the interface and navigation modes.

Given this data, we have created a table according the CAO=S model. On the axis we have put the concepts, the actors and operations. Inside the cells, we have annotated how the actor should perform the operation on the concept.

USER	Category	Information	Results	Account	Appointment	Message service
Creation	/	/	/	Manual insertion of personal data in the appropriate records.	The user can book a visit manually in the section provided.	Use of chat to request information.
View	Displayed on the homepage.	Displayed inside the categories.	Displayed after the user search.	The user can see the information about his/her account.	The user can see the information related to the reservation made.	The user can see the messages sent and the replies received.
Update	/	/	The user can change the parameters to obtain different results.	The user can change and update his/her personal information.	The user can change the reservation made.	/
Remove	/	/	/	The user delete some personal information or permanently remove his/her account.	The user can cancel his/her reservation.	/

Table 12: CAO=S Model, Structures.

4.3 INTERACTION DESIGN

It is a design framework of the overall system. It clarifies unambiguously:

- what services are available;
- a clear hierarchical organization of the functions of the system.

Interaction Design is a process in which designers focus on creating engaging interfaces with logical behaviors and actions. In other words, Interaction Design is about the way users interact with the interface and how they complete their goals.

4.4 BLUEPRINT

Blueprints are drawings that define:

- the component for the organization of the content;
- how these components are connected to each other.

We decided to structure the Blueprint of *Spazio Giovani Bologna* starting from the host website that is the AUSL of Bologna in order to give an idea of the connection between the two websites.

We used diagrams.net[15] to create the blueprint. It is open source, online, desktop and container deployable diagramming software.

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[15] https://www.diagrams.net/ Last consultation on 17/05/2020.

AUSL Bologna website

Servizi Online

Informazioni

Mappa del sito

Per i cittadini

Spazio Giovani Bologna homepage

Chat

Menu

Body

Footer

Logo del sito

FAQ

Servizi

Conosci gli esperti

Spazio Giovani Adulti

News & Avvisi

Search

Area Personale

Lingua

Subsection

Subsection

Chi siamo

Dove siamo, Orari & Contatti

Servizi

Prenota una visita

Privacy

Cookies

Copyright

Logo sito AUSL Bologna

Link alle social pages

- - - - -	Inclusion not considered	Ignored page
———	Include	Page
←——→	Bidirectional link	Element
——→	Refers to	Function
———	Refers to the same content	Component of page
——→	Refers to the various sections included in the element	Fixed

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4.5 WIREFRAMES

For the creation of the wireframes we used Balsamiq[16], that is a rapid low-fidelity UI wireframing tool that reproduces the experience of sketching on a notepad or whiteboard, but using a computer. It let you focus on structure and content providing predefined elements.

We created wireframes for both desktop and mobile versions, which, considering the age of the target user, are fundamental.

All wireframes developed by the team are attached to this report, named *FinalDesign.pdf*

Fig. 7: Wireframe of Spazio Giovani Bologna *homepage for desktop.*

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[16] https://balsamiq.com/ Last consultation on 25/05/2020.
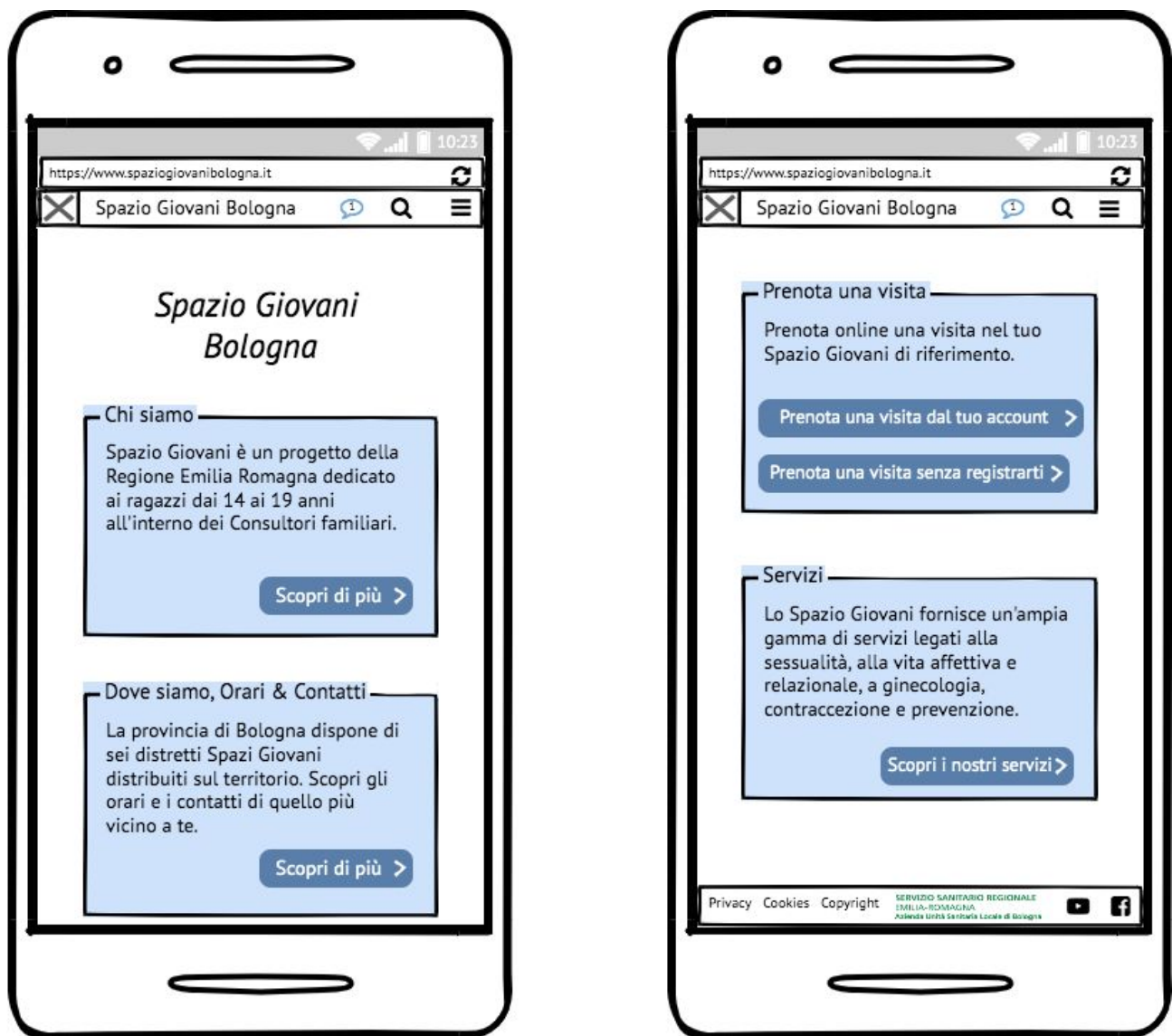
Fig. 8: Wireframe of Spazio Giovani Bologna *homepage for mobile.*

5. EVALUATION OF THE DESIGN

5.1 INSPECTION OF THE PROJECT

In the inspection phase we chose to apply a heuristic evaluation that is a usability engineering method used to identify the usability problems in a user interface (UI), making it easier to address and solve these potential issues, and to evaluate the usability of a system regardless of the tasks it is designed for (it is therefore a domain-independent evaluation).
In particular we have decided to use the 10 heuristics of Nielsen & Molich. These are one of the most used heuristics for User Interface Design. They were developed by Jakob Nielsen together with Rolf Molich in the early 90's. The final set, which you see here, was released by Nielsen in 1994.
We selected the 10 heuristic of Nielsen & Molich because the project is still a prototype and not an implemented site. We did not think it was appropriate to use specific guidelines such as Userfocus.co.uk as many guidelines would not be applicable.

The principles to determine the usability of a product are the following[17]:

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose and recover from errors
10. Help and documentation

1- Visibility of system status

The system provides feedback when the user books a visit, through a wheel that turns to indicate the processing phase of the request; another type of feedback is provided by links that change color after being clicked. For the other sections it was not necessary to insert a feedback system.

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[17] https://www.nngroup.com/articles/ten-usability-heuristics/ Last consultation on 19/05/2020.

2- Match between system and the real world

The contents are presented both in Italian and English to allow users to select their preferred language. By default the site is presented in Italian and there is the possibility to select the other language if necessary.

Since the contents are scientific, we have decided to insert synonyms when there are technical terms not frequently used in the common language.

As for the labels of the sections, we have chosen to use a clear, known and generally shared labels.

3 - User control and freedom

The user has the opportunity to revert to the previous page/section both through the back button and through the breadcrumbs always present in each page on the top left. Moreover, in some sections, for example in the "Registrati" window to create a new account and in "Prenota una visita", the user has the possibility to cancel the action started at any time. Moreover, the user has the possibility to cancel the booked visit both through the personal area and through the email received at the time of booking confirmation.

4 - Consistency and standards

We have maintained internal and external consistency throughout the system, for example: buttons with the same actions have the same name, color and position; the Settings (gear) and Logout (outward arrow) symbols meet the standards shared by the UX community. These features allow the user to quickly familiarize with the site and predict its functions.

5 - Error prevention

In our design we have tried to prevent the user from erroneously performing irreversible actions by providing feedback whenever such an action is present, for example the "Elimina account" action is preceded by an alert message warning the user of the irreversibility of the action. On each page there is the back button and in the sections where an action can be performed (for example "Prenota una visita") the user always has the possibility to cancel the action performed.

6 - Recognition rather than recall

The user does not need to remember fundamental information for the navigation of the website because it is always visible in the screens where necessary. We have tried to minimize the amount of information to remember. For example, during the booking phase of a visit, the user is given a list of services offered from which he/she can choose without having to memorize them.

7 - Flexibility and efficiency of use

The system allows users to speed up the process of booking visits once the user has registered with his/her personal account. In fact, users will not have to repeat their personal information each time they access the system.

8 - Aesthetic and minimalist design

We have chosen not to include decorative elements and to focus exclusively on the clear and linear management of the fundamental information that the user searches for on the site. For example, the homepage has been structured in order to provide immediately the user with the sections that we believe to be of major importance as they contain fundamental information and functions, i.e. "Chi siamo", "Dove siamo, Orari & Contatti", "Servizi" and "Prenota una visita".

9 - Help users recognize, diagnose and recover from errors

The system provides error messages if the user does not complete all the required fields when registering and booking a visit or when incorrect username and/or password are entered when logging in to the personal area. Moreover, with regards to the search function, if no search results are available or if there is a spelling error, the system provides similar alternatives to the search carried out. The errors are described in natural language and not through the use of error codes.

10 - Help and documentation

The system provides help to the user in case of need through the chat always present in each section that allows to redirect the user to the content he/she needs, but also through the hints in the fields to be completed in the forms for creating an account or booking a visit.

CONSIDERATIONS AFTER THE INSPECTION

During the inspection phase we found that the proposed design largely satisfied the requirements identified by the 10 Heuristics of Nielsen & Molich, such as the information provided, the minimalist graphics, a clear and linear structure that allows to quickly familiarize with the site and learn how to use it. On the other hand, however, the inspection allowed us to identify some issues that we have subsequently solved including the back buttons, the possibility to cancel the operations undertaken by the user, make the actions reversible and the possibility of logout from the personal area.

5.2 USER TESTING

In order to test the prototype of the website created for *Spazio Giovani Bologna*, Discount Usability Testing has been selected.

The tests were performed by three different users.The testers have been selected according to the characteristics of our target audience.

Due to the Coronavirus global pandemic we had to conduct all the test sessions remotely. The impossibility to talk to users directly is certainly a great limit. For our interviews we decided to use Zoom for the same reasons listed in the section *2.2.1 Definition of the testing protocol.* The tasks have been carried on thanks to the possibility to share the screen and leave the control to the user.

Although we had developed the wireframes for a responsive site suitable for the smartphone, it was not possible to test their usability remotely as neither Microsoft Teams nor Zoom give the possibility to grant screen control to perform tasks on the wireframes. We believe that young people could be more comfortable on a mobile site, rather than a desktop site, but we could only test wireframes designed for the interface that can be used from large screens for the reasons listed above.

The testers performed the four tasks on the wireframes (desktop version) made with Balsamiq, which allows to connect sections, buttons and links to the respective wireframes. This has been of great help to carry out the tests quickly and efficiently, also providing a sense of truthfulness of the prototype's functionality.

Test type	Discount Usability Testing
Test methodology	Thinking Aloud
Reasons for the test methodology	The thinking aloud method has numerous advantages. It allows to know what users really think about the design. In particular, you hear their misconceptions, which usually turn into actionable redesign recommendations. This method is especially helpful for determining users' expectations and identifying what aspects of a system are confusing.
List of tasks to test	1) Search for the telephone number and address of *Spazio Giovani* of San Lazzaro. 2) Register to the personal area. 3) Book a psychological visit/consultancy for educators from your personal area and after having booked it change the date. 4) Search for the most recent news on *Spazio Giovani* of Casalecchio.
Number of test	3 +1 (pilot test)
Number of users	3 + 1 (pilot tester)
Choice of users	Tester 0: Fabio, 21 years old, was born in Rimini. Tester A: Livia, is 18 years old, she was born in Bologna, and she is attending the fourth year at the Liceo Scientifico Manzoni in Bologna. She loves getting out with her friends and she is a fan of YouTube videos, in particolar she loves makeup tutorial and lifestyle videos. She uses social networks on a daily basis. Tester B: Alessandra, 34 years old, born in Cesena. She works as an educator for the "Treno della Memoria", an organization that plans trips that takes guys between 16 and 18 years old to visit extermination camps in Poland. In addition, during the summer, she teaches paddles to young people on the beach in Cesenatico. Tester C: Giorgia, 15 years old, born in Pesaro. She attends the first year at Liceo linguistico T. Mamiani di Pesaro. She has never heard about the services of Spazio Giovani or in general about counselling centre, even if she thinks they would be very useful. She admits not to be experienced with computers in general.
Justification of users selection	Fabio has been chosen as a pilot tester because we wanted to check that organization of the test was efficient but he can not be included in the test because he does not fit the target audience.

	Livia has been chosen as a tester because she represents the target user we would like to reach with the *Spazio Giovani Bologna* website. She is an open-minded person, willing to talk about what are called *taboo topics*, such as sex, gender and drugs. Alessandra has been selected as a tester given her work in close contact with young people. We believe that she might be interested in finding information about topics that could help the guys. Giorgia has been chosen as a tester since she is included in the lower age range of our target users. We thought it could be interesting to see how a very young person navigate on a website that deals with unknown topics.
Platform	Zoom
Test date	Tester A: 21/05/2020 Tester B: 22/05/2020 Tester C: 23/05/2020
Final assessment questionnaire	**System Usability Scale (SUS)** Ten questions, alternatively proposed with positive and negative enunciation, which are asked to respond according to a 5 levels Likert scale. Missing ratings are worth 3. No variation is allowed in the phrasing of the questions. It generates a score from 0 to 100, which provides the total value of a usability of the system. Scores higher than 68 indicate a good usability.

EXPECTED RESULT

The following tasks have been selected to highlight what we consider to be the critical points and strengths of the site, and to observe how users react to them. The tasks cover different aspects and sections of the site in order to obtain an overview.

Task 1: Search for the telephone number and address of *Spazio Giovani* of San Lazzaro.
We believe that users will complete this task quickly and without difficulty, considering that this information is easily accessible from a card on the homepage.

Task 2: Register to the personal area.
We expect users to be able to easily find the area where they need to register to create a new account. In this case there will be no possibility to complete the required fields as this is a prototype, so the time of completion will certainly be shorter than the real one.

Task 3: <u>Book a psychological visit/consultancy for educators from your personal area and after having booked it change the date.</u>

Once in the personal area we believe that users can take some time to understand the structure of the area. Once he/she has found the correct section where to book a visit, we believe that the user will have no problems to complete the task. The interface will guide the user step by step through the booking process. We have identified two different types of visits according to the tester who will perform the task: a psychological visit for under 19 testers and a consultancy for educators in the case of the adult tester (since the psychological visit is not for free for adults).

As far as the date change is concerned, we believe that the user will have no difficulty in changing what is required because also in this case he is guided by the indications provided by the system.

Task 4: <u>Search for the most recent news on *Spazio Giovani* of Casalecchio.</u>

Also in this case, we believe that the user will complete the task in a short time since the "News & Avvisi" section is visible and easily accessible from the navbar.

5.2.1 TESTING PHASE

At this stage we referred to the recommendations proposed by usability.gov[18] regarding metrics testing. We have therefore classified the performance of our testers according to:

- **Successful Task Completion**: Each scenario requires the participant to obtain specific data that would be used in a typical task. The scenario is successfully completed when the participant indicates they have found the answer or completed the task goal.
- **Critical Errors**: Critical errors are deviations at completion from the targets of the scenario. Essentially the participant will not be able to finish the task. Participant may or may not be aware that the task goal is incorrect or incomplete.
- **Non-Critical Errors**: Non-critical errors are errors that are recovered by the participant and do not result in the participant's ability to successfully complete the task. These errors result in the task being completed less efficiently.
- **Time On Task**: The amount of time it takes the participant to complete the task.

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[18] https://www.usability.gov/how-to-and-tools/methods/planning-usability-testing.html Last consultation on 10/05/2020.

- **Likes, Dislikes and Recommendations (General considerations):** Participants provide what they liked most about the site, what they liked least about the site, and recommendations for improving the site.

All SUS questionnaires completed by users are attached to this report, named *BolognaSUSquestionnaire.pdf*

Pilot test - Tester 0

The pilot test was performed on 20/05/2020 on Zoom. Tester 0 is a 21 years-old guy, which could not be included in the test because it did not fit the target audience.

The test was useful to make sure that questions were consistent, the team was prepared and the duration of the test was reasonable.

Tester 0	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task completed			0.12 min
Task 2	Task completed			0.15 min
Task 3	Task completed			0.25 min
Task 4	Task completed			0.17 min

After test changes: through the pilot test we were able to correct some aspects that the Tester 0, inspecting the wireframes of the site, suggested not to be very clear. In particular, he suggested that in the chat it is not clear whether it is interacting with a chatbot or a human being. He said that he would prefer to know if he is using a virtual assistant or human assistance. We have therefore fixed this by inserting "Bolo", the virtual assistant of *Spazio Giovani Bologna*.

Test 1 - Tester A: Livia

Livia's test was performed 21/05/2020 on Zoom. The operating system used is Windows 10 and the search engine is Google Chrome.

The duration of the test was 14 minutes, including introduction, explanation of the test, performance of the tasks and the final assessment questionnaire.

Livia	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task completed		She initially hesitated focusing on the first element of the navbar then she found the right section.	1.13 min
Task 2	Task completed			0.31 min
Task 3	Task completed			0.46 + 0.16 min
Task 4	Task completed			0.17

General considerations: She had no problem completing the tasks, and was able to quickly find the correct sections where to complete the task.

As can be seen from the SUS questionnaire which obtained a result of 97.5, Livia was satisfied with the navigation and structure of the site.

After test changes: considering that the user hesitated a few seconds focusing on the elements of the navbar without paying attention on the central body of the page, we thought of coloring the cards with a color that could attract more attention, in order to test it on the next user.

Test 2 - Tester B: Alessandra

Alessandra 's test was performed 22/05/2020 on Zoom. The operating system used is macOS and the search engine is Google Chrome.

The duration of the test was 12 minutes, including introduction, explanation of the test, performance of the tasks and the final assessment questionnaire.

Alessandra	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task completed			0.29 min
Task 2	Task completed			0.20 min
Task 3	Task completed			0.36 + 0.06 min
Task 4	Task completed			0.28 min

General considerations: considering the change made as a result of test 1 we noticed that the change has brought the desired effects, in fact user B has focused her attention directly on the cards of the main section of the home page.

She had no problem completing the tasks, and was able to quickly find the correct sections where to complete the task.

As can be seen from the SUS questionnaire which obtained a result of 92.5, Alessandra was satisfied with the navigation and structure of the site.

After test changes: The tester B browsing in the prototype of the site made us point out that she found the label "FAQ" unclear, considering it a highly technical section.

We believe that this judgment is due to the fact that in the section were not specified the categories and related questions, so we made some changes, making some examples of categories and questions.

The team also discussed whether to change the "FAQ" label but came to the conclusion that it should remain the same as it is the most widely known and used term.

Test 3 - Tester C: Giorgia

Giorgia's test was performed 23/05/2020 on Zoom. The operating system used is macOS and the search engine is Google Chrome.

The duration of the test was 11 minutes, including introduction, explanation of the test, performance of the tasks and the final assessment questionnaire.

Giorgia	Successful task completion	Critical errors	Non-critical errors	Time on task
Task 1	Task completed			0.42 min
Task 2	Task completed		She was able to complete the task by registering not from the navbar (Area Personale > registrati) but from the card dedicated to booking a visit by clicking on "Prenota una visita dal tuo account".	1.05 min
Task 3	Task completed			0.18 + 0.13 min
Task 4	Task completed		Before reaching the correct section, the user clicked on "Chi siamo" and "Servizi". After the third re-reading of the task the user turned to the navbar selecting the correct section and subsection.	1.52 min

General considerations:

The user was able to complete all the tasks but she had difficulties with tasks n° 2 and n° 4. We believe that the non-critical errors made by the user are due to the fact that she did not focus her attention on the navbar elements. Moreover, we believe that the different origin of the user compared to the territory of Bologna has affected the familiarity of the places included in the tasks (San Lazzaro and Casalecchio) and therefore partly also in the execution of the tasks. However, the user claims to be overall satisfied with the experience of browsing the prototype site. In fact, the final result of the SUS questionnaire is 80.

After test changes:

We noticed that the user has not focused enough attention on the navbar. We have considered making some changes to the color of this one, however Balsamiq does not allow such a change.

5.2.2 POST TESTING PHASE

ANALYSIS OF SUBJECTIVE AND OBJECTIVE DATA

Here general considerations we have detected from the tests we have conducted.

A first comparison, with the data previously collected for the *Spazio Giovani Parma* website, shows that it is less difficult for users to navigate and search for content within the platform. The use of clear, understandable and commonly used terms may have helped users in the navigation during the test.

All users were able to complete the assigned tasks without problems, except for tester C which had some difficulty in tasks n° 2 and n° 4 for the above mentioned reasons.

Users all said that the design of the site allows for fluid and simple navigation without too many obstacles that distract attention from completing the task.

Unlike the tests carried out on the *Spazio Giovani Parma* website where the testers found the actual reliability of the site, the results of the tests carried out on the prototype of the *Spazio Giovani Bologna* website did not take this aspect into consideration as we only included the text content relevant to the completion of the task. We believe that the information content should be included at a later stage.

Here a list of task by task analysis:

Task 1: Search for the telephone number and address of *Spazio Giovani* of San Lazzaro.
All users were able to complete this task in a short time. However, user A did not immediately focus her attention on the body of the homepage where the task solution was actually located. This led us to change the color of the cards to attract more attention. This change actually brought a better navigation of the site.

Task 2: Register to the personal area.
All users have completed the task. However, user C has completed the task anomaly in relation to the path predicted by the team and the path followed by the other users.

Task 3: Book a psychological visit/consultancy for educators from your personal area and after having booked it change the date.

The task was completed by all users quickly. We believe that this aspect is indicative of a good design that helps navigation.

Task 4: Search for the most recent news on *Spazio Giovani* of Casalecchio.

All users were able to complete this task. However, user C completed this task more slowly than the other users because in our opinion she focused more on the cards than the navbar where the solution was actually located.

IDENTIFICATION OF USABILITY PROBLEMS

Here we list the errors detected in the User Testing phase and in the evaluation of the design described through impact. We decided not to classify errors also through persistence and frequency because the Discount Usability Test, chosen to perform user testing, provides for immediate error correction in order to offer an improved version to the next user. So it is not possible to take into account persistency and frequency parameters.

For the impact, (the effect the problem has on completing the task), we used the Nielsen classification of error that is reported here, to which we have associated a value from 1 to 5 depending:

- 5 - Implementation error
- 4 - Catastrophic error
- 3 - Major error
- 2 - Minor error
- 1 - Cosmetic error

Errors	Impact	Phase of detection
Absence of back button	1	Evaluation of the design
Absence of cancel button	2	Evaluation of the design
Absence of logout button from personal area	2	Evaluation of the design
Absence of loading feedback	1	Evaluation of the design

Lack of attractiveness of cards present in the homepage	1	User Testing (task execution)
Lack of identification of the chat interlocutor	1	User Testing (extra task navigation)

6. CONCLUSIONS AND RECOMMENDATIONS

The prototype of the website we developed has been designed as an ancillary site for *Servizio Sanitario regionale - Emilia Romagna Azienda Unità Sanitaria Locale Bologna*, to motivate users to benefit from the services offered by the latter by providing a pleasant and efficient browsing experience.

We believe we have successfully achieved our goal, considering that the test results provided high values (>80) in relation to the SUS questionnaire. Users declared to be overall satisfied with the browsing experience on the prototype site's wireframes, further affirming that if there really was such a site they would use it frequently.

With the suggestions provided by the users, we have improved the prototype as we follow the instructions provided by the Discount Usability Test, in order to provide an improved version to the next tester.

All the activities in which we can think about an improvement are strictly related to the health emergency situation in which we find ourselves at the moment (May 2020). For example, we could have tested more users if we had been able to go outside the schools and above all we could have tested users resident/inhabitants of the territory of Bologna. Given the situation, in fact, for the choice of testers we could only turn to acquaintances of friends and family, avoiding direct relationships as much as possible.

Moreover, having been able to test only the wireframes related to large screens, it would be interesting to test also the wireframes for mobile.