

Web Tool Railway Museum

EPS – IDPS 2016

Final Report

European Project Semester on Escola Politècnica Superior d'Enginyeria de
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by:

Hannelore Hauquier

Milan Jakovic

Jorge Landaeta

Gijs Kleine Schaars

Jan Peer Stöcklmair

Supervisors: Ariadna Llorens, Ana Grande Jiménez

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d'Enginyeria de Vilanova i la Geltrú**

UNIVERSITAT POLITÈCNICA DE CATALUNYA



Abstract

This project is a product of collaboration between the EPS students at EPSEVG and Catalonia Railway Museum. The goal was to create a web tool, test it and launch it.

The aim of the web tool is to facilitate the communication between railway museums on a global level. A need for such a tool is present because at the moment there is no existing platform for a fast, private and simple communication between railway museums. The web tool functions like a forum, the message board will enable the possibility to have discussions, group chats and other functions that can be expected in a forum. AngularJS, as the backend framework, and Lumen, for the backend, were used to develop the web tool. The code is documented well, to make sure that next developers have an easy start and are able to implement new features quickly.

Since this is a forum that will be used by colleagues on an international level the main language will be English, with a possibility to translate it to any other language. The web tool gets translated by the Google translate widget, owned and powered by Google.

Before the launching of the web tool a user survey was complete. The test persons included museum personnel, students, usability professors, family and friends. After a mostly positive feedback, few corrections were made before the web tool, with the name "Elephorum", was launched.

Students & Stakeholders

Hannelore Hauquier

University: AP Hogeschool

Speciality: Frontend and Backend programmer

Milan Jakovic

University: HiOA

Speciality: Human computer interaction designer

Jorge Landaeta

University: Universidad del Bio-bio

Speciality: Graphic designer/Visual communication

Gijs Kleine Schaars

University: Hanzehogeschool Groningen

Speciality: Human computer interaction designer and Usability expert

Jan Peer Stöcklmair

University: University of applied sciences Sankt Pölten

Speciality: Frontend and Backend programmer

Supervisors & Stakeholder:

Ariadna Llorens EPSEVG supervisor

Ana Grande Jiménez Museum supervisor

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1 Introduction

Within the European Project Semester (EPS) program at Escola Politècnica Superior d'Enginyeria de Vilanova i la Geltrú (EPSEVG), a team of students was working together with the Catalonia Railway Museum to create a web tool for communication between railway museums all over the world.

EPS is a student exchange opportunity given to students in their third year of college by universities in 12 European countries. The program is mainly designed for engineering students, but students from other backgrounds that can contribute to an engineering project are welcome to participate. The idea is to let the students work with a real life project in international teams of 3-6 students to give them a first meeting with the industry and to improve their communication skills with people from different cultures [1].

The Catalonia Railway Museum, located in the City of Vilanova i la Geltrú, is one of the most important railway museums in Europe. In the museum, 160 years of railway history is on display and the chance to explore over 50 vehicles including a collection of 28 steam locomotives is on offer to visitors [2]. This is the third consecutive year that the museum has cooperated with EPS-students from EPSEVG.

Previous projects have been:

- A Study of Interaction Design in the Catalonia Railway Museum
- Developing multimedia actions for the Catalonia Railway Museum

Currently, railway museums around the world have no common platform for communication. They run independently, with none or minimal interaction with one another and this is something the railway museum of Catalonia wants to change. There are existing sites on the web where museum personnel can meet, but those sites are open for everyone interested. The idea behind this project is to find a meeting spot on the web for railway museum personnel only; this to filter out unwanted guests and keep the topics on the web tool relevant to the daily drift of a railway museum. The lack of a common communication platform is unfortunate because, on a global level, there is always something to learn from your colleagues.

This may include how to run the business, how to organize exhibitions, creating fun and interesting activities for the visitors, and other things.

In cooperation with the Catalonia Railway Museum, the main objective for this project was to create a web tool to give an opportunity to share ideas, knowledge, and experience with colleagues across borders. The web tool will function like a forum, it will give the opportunity to open discussions regarding different topics, share pictures, and other things of interest. The forum will be private and only accessible for railway museum personnel. People can join by sending a request and receiving an acceptance by the admin or by being invited by an admin. At first hand Ana, the museum supervisor, will be the sole admin of the web tool, but this will be changed as soon as there are more active users. This means that she will be in charge of creating groups, managing the forum categories, promoting the web tool to colleagues employed in other museums, and basically maintaining it. The people who will benefit the most from this project are the communication director and the main director of the railroad museum in Vilanova, because they are getting a communication forum of which they are the admins from the beginning. After that the people who will benefit the most are the communications directors and the main directors of railroad museums all over the world, because all of them are then able to communicate easily with other museums and because of that, improve their own museums.

The team consists of five students of which three designers, namely Gijs Kleine Schaars, Milan Jakovic, and Jorge Landaeta, and two programmers; Hannelore Hauquier and Jan Peer Stöcklmair. There are two supervisors to guide the team: Ariadna Llorenes from EPSEVG and Ana Grande Jumenez who represents the Catalonia Railway Museum.

In the first stage of the project, before the mid-term defense, the team has mainly focused on gathering information from the museum on the desired design of the end product and what functions to include. The programmers have discussed, researched and agreed upon what programming language to use for the programming of the web tool. Based on the already discussed features of the web tool they made the first version of a working back-end system. One working prototype is produced by the designers to give a picture of how the web tool might look like when completed. This prototype will further be used to make adjustments and will be the basis for the final product. Until now the students and the museum have agreed upon the main design and functions, and the next step, after the mid-term defense, is to start with the front-end programming, come up with a name for the web tool and to decide on small details regarding the design.

The report contains 8 sections. The subsequent segment is about the research done to gain a better understanding of the railway museum and other similar products. The third section explains the approach and how the name of the web tool came to be. Afterwards the process of making the prototypes and graphic design, and how the final look of the

web tool was achieved, are described. The programming part of the project is covered in chapter 5. In this section, the different frameworks used, methods of documenting the work and a number of features are elucidated. Section 6 describes the different web pages and functions of the final product. Lastly the conclusion, which contains a link to the web tool, and further research are mentioned.

2 Research

2.1 Related projects

2015/2016 is the third year that the museum cooperates with the EPS students from UPC Vilanova to create a project, therefore there are 2 previous projects:

Project year: 2013/2014

Name: A Study of Interaction Design in the Catalonia Railway Museum

Their first cooperation was in the academic year of 2013/2014 and the project was to develop a smartphone application for the Museum. The aim of this project was to create an application using the IOS system and to implement a mobile section into the museum web page. After a first and successful cooperation with the EPS students, the museum continued to ask for students and created new tasks to be solved.

Project year: 2014/2015

Name: Developing multimedia actions for the Catalonia Railway Museum

In the academic year of 2014/2015 the project's goal was to create a new website about railway heritage. That year's cooperation was also successful, and the website designed by the students is still used by the museum today to welcome and inform guests and others interested on the web.

2.2 Railway Museum

The museum is the most important railway museum in Catalonia and functions as more than just a look throughout railway history. It is located just next to Vilanova i la Geltrú train station, at the former station depot. Still today, a part of the museum is operating as a railway workshop for repairs and maintenance of Rodalies trains. Its mission is as quoted:

"The Catalonia Railway Museum's mission is to be a unique and important heritage site into custody communication and knowledge of the world of the railroad. A leisure center public service, socially rooted in the territory, through the goods that guard and immaterial memory, let show the consequences of the continued action of man in the process of scientific and technical transport by train innovation, as well as major social, economic and cultural effects caused connectivity in history.

The playful and informative vocation requires space interaction elements of analog and digital offering emotional and rewarding experiences."

It has one of the most extensive collections of steam locomotives on earth and one of its main aims is to open up the fascinating world of the railway and its main attractions to us all. The museum has taken upon itself the role as the guardian of an exceptional heritage, documenting it, raising awareness and building a space that actively conveys the values embodied by the railway. The museum wants to be the benchmark cultural Centre for railways in Catalonia, and offer a unique experience that can be adapted to all kinds of visitors. To make this possible, they have created activities for families, school groups and seniors which include audio-visuals, exhibitions, fun areas for kids, a shop, a library, the chance to explore its proudly presented exhibition and to discover what travelling was like from the second half of the 19th through to the 20th century [2].

In 2015, the Museum received remarkable economic resources from the 1.5% of cultural budget of the Ministry of Public Works for the recovery of valuable historic buildings of the old steam locomotive depot where the Museum is located, and the restoration of the three emblematic water tanks. These resources allow to increase the exhibition space and the definitive European projection of this unique heritage equipment.

2.3 Similar forums and tools

NodeBB. NodeBB is written entirely in NodeJS and is made in Canada. NodeJS is a cross-platform script which is written in C++ and uses the Google V8-Engine [3]. NodeBB is an already completed forum for the modern web. This forum is also optimized for different tools and suggestions, such as responsive-ready, SEO optimized, real-time streaming and much more. It can be integrated into your existing website and social media networks. NodeBB comes with everything that is needed in forums and the forum for the railway museum, except for the admin approved sign-up. This tool is a good example of how the actual forum for the final web tool can look like [4].

Facebook. Groups in Facebook are a good example of how the web tool handles different actions. In those groups it is possible to add posts and comment on those, but only for people that belong to the group. The same logic will be used by the final web tool; everybody who has access to one subcategory can write topics and comment on those. The only difference between those two tools is the flexibility of the "group" [5].

3 Approach

3.1 Meetings

Team meetings are of great importance on the road to success with the project. They are mainly used to keep everyone updated on the progress, solve any problems that may have occurred along the way and to plan future steps. The team has figured out several ways to hold meetings, both formal and informal.

3.1.1 Team meetings

Team meetings are informal meetings run by the team. In this type of meetings only the students are present and there is no participation of the supervisors.

The meetings are held on a weekly basis and take place in the classroom after class or in the university cafeteria. Usually, the meetings are without fixed times but rather held when the team sees it meaningful to have a new meeting. They are mostly used to keep one another updated on each others progress and to clear up any uncertainties. Besides the physical meetings, the team has also created a group chat on WhatsApp which is used to stay in contact and help each other when working independently on the project. The group chat is also used to remind each other of different assignments, classes and to plan social activities together.

3.1.2 Supervisor and company meetings

Meetings between the team and the supervisors are of the formal sort of meetings run by the team. These meetings occur less frequently, approximately every 3-4 weeks and take place in the library of the Catalonia Railway Museum. Before every meeting, the team produces questions that are sent to the supervisors. Usually 2-3 days before the meeting so the supervisors have time to prepare the answers. When the meeting occurs, the team shows the supervisors the progress that has been made since the previous meeting and receives the answers to the questions sent in advance. A big part of the meetings is used to gather as much information as possible from the supervisors and to clear up any doubts. Besides this, a small part of the meetings is spent forming stronger relations between the students and the supervisors by abandoning topics related to the project and rather choosing topics that give the opportunity to get to know each other better. This has proven to help get a much more easygoing dialog between the students and the supervisors. After each meeting a "meetings scheme" is produced. This sums up the meeting agenda, new agreements, tasks and next scheduled meeting.

Besides the meetings, there is a WhatsApp group chat that includes all the students and all the supervisors. This is used by the students to get questions answered by the supervisors between meetings, to ask for an urgent meeting if needed, to share new ideas and basically to stay in touch between meetings.

3.2 Project Management

Atlassian Jira. Jira is a non open source project management tool developed by Atlassian. This tool offers a lot of built-in scrum tools, such as Kanban or scrum. It can also be improved by different add-ons.

The way Jira was used at this project was to track every single bug, improvement or task to document all different issues and to not forget these.

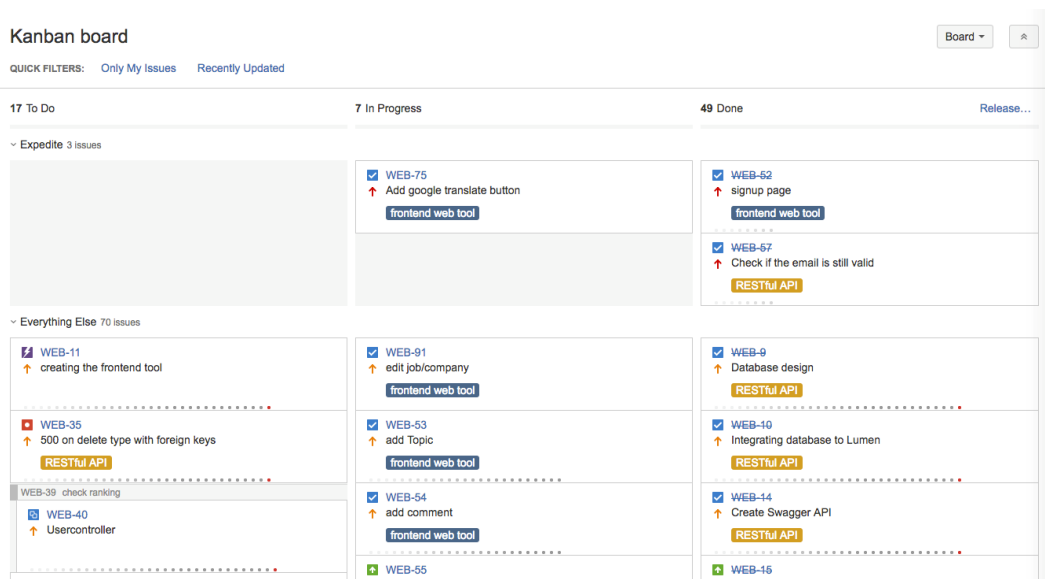


Figure 1. The way Jira has been used

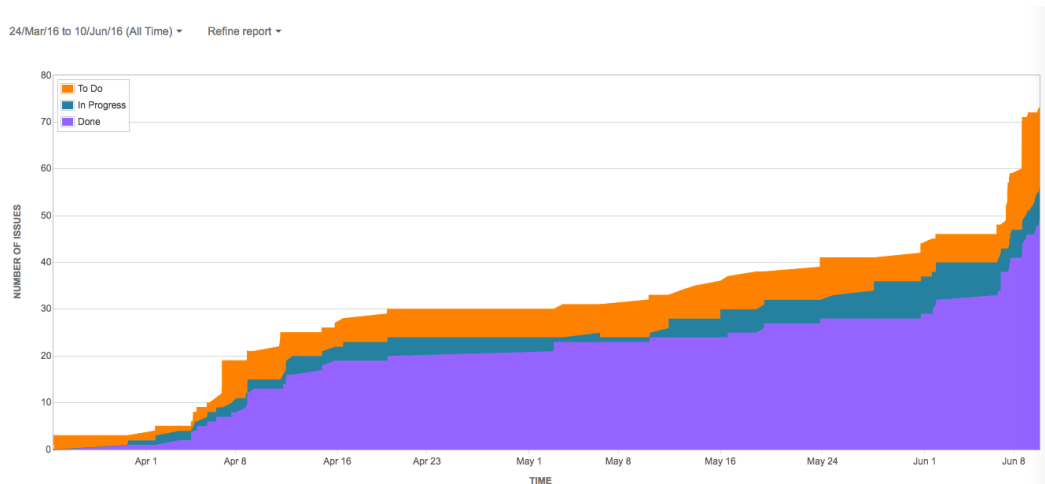


Figure 2. Cumulative Flow Diagram of all issues from 24 March 2016 until 10 June 2016

3.3 Name of the web tool

Because the project states that a whole new webtool is created, a whole new name and logo also had to be created. After some discussion, the people involved with the project settled on the name 'Elephorum'. And here is why:

George Stephenson (1781-1848) was one of the great pioneers in the inventing of early train life. In the early 1800's, he designed some of the first steam locomotives. On the fifth of May 1835, the first ever steam passenger railway in continental Europe was inaugurated. There were three steam locomotives used to transport the passengers between northern Brussels and Mechelen on this day: the Arrow, the Stephenson, and the Elephant.



Figure 3. Replica of the Elephant [6]

Since this was such an important event in train history, connecting people in a way that was unthinkable before, it was decided to name the forum after one of those steam locomotives, namely “the Elephant”. By combining the name of the train locomotive with the word “forum” we decided on “Elephorum” as the final name of our web tool [7]–[9].

4 Design

4.1 Prototypes

All the prototypes will be made by Gijs Kleine Schaars. These prototypes consist of:

- Different versions of the main (web) prototype
 - Prototype 1
 - Prototype 2
 - Prototype 3
- One version of a mobile prototype

During the meeting with the supervisor in which the final prototype was to be decided, there was unanimously chosen for number three. This is why, to remain consistent, the mobile prototype will be based on the third of the web prototypes.

For the prototyping, Axure RP PRO 7.0 was used. This program is made specifically for prototyping web tools and apps in which user experience is the main goal [10]. Central in the prototype will be the optimization of the user experience and usability, given that not every person that will be using the web tool is an experienced internet user, so it has to be layman-friendly.

For optimizing the user experience and usability, certain rules or heuristics have been established. These rules are one of the main things taught in the Human Technology studies, the studies that Gijs Kleine Schaars is following. Practically all of these rules can be found in the ten heuristics of user experience by Jakob Nielsen [11] and the book "Don't make me think" by Steve Krug [12].

In order to make this route go as smooth as possible, the following steps are defined:

1. Create a prototype based on HT-knowledge and the following pieces of literature:
 - Ten heuristics of user experience – Jacob Nielsen [7]
 - Don't make me think – Steve Krug [8]
2. Collect feedback from the project members, make iterations
3. Collect feedback from the supervisors, make iterations
4. Midterm defense
5. Create a survey to go along with the prototype and test its usability, distribute this survey amongst the actual users of the web tool

- Analyze the survey results and make the last iterations. These iterations are made directly into the web tool and not in the prototype, because if the survey is completed, the prototype loses its advantage and becomes irrelevant for the final product

As these steps explain, by the time of the midterm defense, there was already a decent prototype. At this point, the programming also started. The programmers focused on the creation of the web tool, while the UX-designer focused on the last flaws in the prototype and the defining of the last iterations that could be made. These iterations were suggested by the most important group: the actual users of the prototype. Also, these iterations were not processed in the prototype, but just in the actual web tool. This was done because the prototype becomes useless after the survey.

The first step of making the prototype was mainly done by heart, because the UX-designer has made designs similar to this before and knows the literature mostly by intuition. However, some aspects will be explained in the next section.

4.1.1 The page order

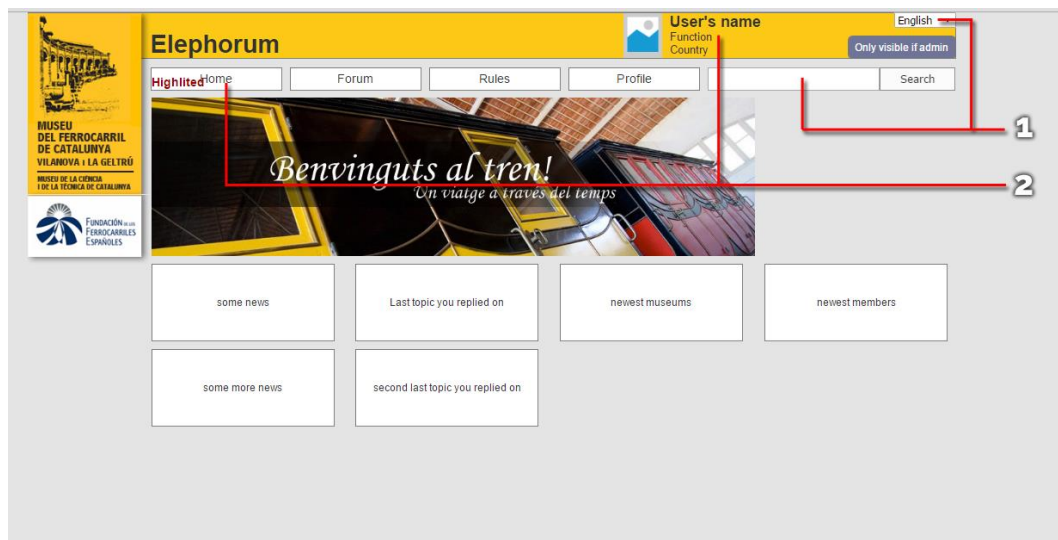


Figure 4. The home page of Elephorum. The first view

- Recognition rather than recall. When looking at different popular (forum) websites, one will notice that with most of them have the language settings in the absolute top right corner. Also, the search bar is at the right part of the menu options most of the time. This corresponds with Nielsen's sixth heuristic: Recognition rather than recall. Throughout the web tool, more examples of this can be found.

2. Visibility of system status. By highlighting the active page and put the users name on top of the page, the user always knows where on the web tool he is, and always has his personal data close to hand. This corresponds with Nielsen's first heuristic: visibility of system status. Throughout the web tool, more examples of this can be found.

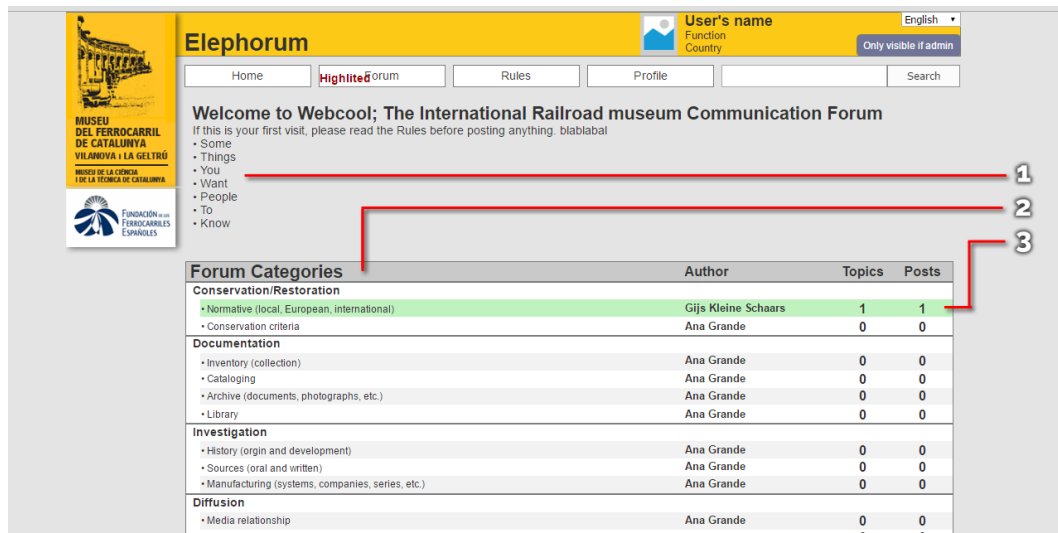
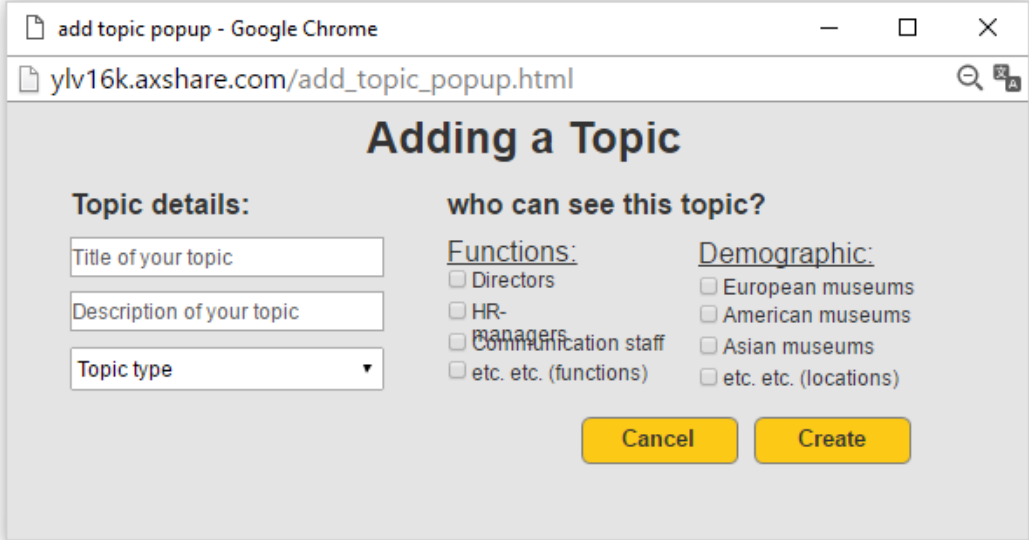


Figure 5. The categories and the separation of the Elephorum

1. Because there are going to be users who have never used a forum before, some space was created above the forum. This way, admins are able to put extra information here which will help layman to better understand the way the forum works
2. The format of the forum was made similar to other forum formats. This way, every user who worked with a forum before, knows how to work with this one.
3. For the survey, clickable parts of the prototype have been made green. This is to help the user get to the part they need to be in order to properly fill out the survey.



The screenshot shows a web browser window with the title "add topic popup - Google Chrome". The address bar shows the URL "ylv16k.axshare.com/add_topic_popup.html". The main content area is titled "Adding a Topic" and contains a form with the following elements:

- Topic details:**
 - Text input: "Title of your topic"
 - Text input: "Description of your topic"
 - Dropdown menu: "Topic type"
- who can see this topic?:**
 - Functions:**
 - Directors
 - HR-managers
 - Communication staff
 - etc. etc. (functions)
 - Demographic:**
 - European museums
 - American museums
 - Asian museums
 - etc. etc. (locations)
- Buttons: "Cancel" and "Create"

Figure 6. Adding a new topic with the option to filter it from different jobs or museums

A unique selling point (USP) of the Elephorum is the add topic popup. If one adds a topic, a popup will appear where the user can indicate by whom this topic can be seen. This way, public topics can be seen by everyone, and private topics will stay private.

The prototype that was used for the first version of the web tool and for the survey, is found here: http://ylv16k.axshare.com/home_no_login.html

4.1.2 User survey results – analysis

Like this whole project, the survey was done in English, as displayed in appendix 1. Because the museum employees of all European Railroad Museums are aged somewhere between 18-65, there was assumed that everyone speaks English, or knows how to handle a translation program. In reality, this was proved wrong. There were some respondents who do not speak English, they used a translation program to understand the survey and gave the answers in Spanish. The Chilean member of the group, Jorge, translated these to English.

In total, there have been 13 replies, mostly from Spain and a little from the Netherlands. In appendix 1, there are the steps of the survey, and the six questions with all the answers listed underneath them.

There were many good answers, but also a lot of unusable ones. An unusable answer has one of the following reasons:

- People did not understand that the prototype was a prototype, so submitting does not give you an actual account, and starting a new topic does not make the actual topic appear.
- People put up a '5' in the first three questions, or had no comment in the last three questions (positive feedback, but not suited for iterations)
- People missed the question and gave an answer that does not make sense, for example because of a language barrier.

Below, there are the questions of the survey, with all of the unusable answers deleted. So only the answers that can lead to iterations on the web tool are displayed.

1. On a 1-5 scale, how easy was step 2? (Sign up)

- 2: I think the text "or Sign in" is too small and unattractive. It could be introduced in a box so that the user can click on any part of it, I mean a button that could be bigger than just the word to click.

2. On a 1-5 scale, how easy was step 5? (Add new topic)

- None, people were happy with the way things work, they only mentioned the topic didn't appear.

3. On a 1-5 scale, how easy was step 7? (Log out)

- 2: It wasn't easy to find the log out, if you don't realize that is in the user profile.
- 1: I don't see where I can log out.
- 3: It's not clear to find out the 'log out' button.
- 4: The logout button may be hard to find for someone with a low IT-profile. However, I clicked on the profile page and found it. It seems fine as it is, in fact, most people don't even use the logout button but just close the browser.

4. Are there any aspects of the prototype that you like?

- This is a question about positive things, it just told us what not to change but no suggestions for iterations

5. Are there any aspects of the prototype that you think are not clear?

- Add a new forum topic, I don't know where to develop my topic. There is little space to write.
- I think all is clear, although with the pictures it uses now in first it seems like a website from the museum instead of a forum.
- I could not find the log out.

6. Do you have any other comments that might help us understand this survey better or make the Web tool better?

- Since it's a documentation channel I think it would be good that also could function as a kind of repository in which we can upload documents of interest to the members on the list. So I think it would be good to include a tab or banner to give access to publications and also an area to upload documents and links
- maybe the social media buttons in every single page?
- Enhance functions of information sharing in social networks
- I would keep the windows underneath the photo as less as possible so you don't drown in a sea of information when you enter the forum. But personally I like it not to crowded. Nice work, I'm curious to see the end result!

After all of the relevant results of the survey were defined, a list of all the final iterations was made. This list was then processed by the programmers, and the usability of the web tool has been improved.

The final list:

1. Make buttons more clear, not just letters but also an outline.
2. Make more striking logout-options: one on the profile page, one on the fly-out of the profile, maybe add one on the settings page.
3. When adding a topic, make the text fields bigger. Some users seem to think that they cannot type beyond the field.
4. Get an option to upload documents and pictures to support their topic.
5. Increase the connection with social media on multiple places around the web tool.
6. Change the logo's to a universal Elephorum logo instead of the museum's logo.

4.2 Graphic Design

The graphic design of the web tool is made by Jorge Landaeta. The software used to design and layout the web tool is: Adobe Photoshop, a professional software for photo editing, and further Adobe Illustrator, a professional software to create vectors.

Currently these are two of the seven best and most commonly used design software. They are practical, versatile, and comfortable to design with, besides that they provide the necessary tools for the designer to deliver professional and good quality work [13].

Afterwards user-friendly prototypes were developed and completed, the visual design was developed using the 960° Grid System [14]. In order to decide the look and feel of the web tool, similar web tools, like forums and other popular social media websites, like Facebook, were examined.

4.2.1 Choose of colors

The colors chosen to be used in the web tool are the same as in the Catalonia railway museum's logo, in that way the user can easily make a direct connection between the institution and the web tool. A variation of orange (123C pantone), which is the dominant color in the logo, and also its analogous colors (these colors are close to it on the chromatic rose), have been used as a base for the colors in the web tool. These colors are warm and mostly associated with positive emotions such as originality, joy, closeness, fun and others. Besides that, black will be used for the header text of the web tool because it is a strong, neutral color and proved to be a better choice than the white color used in other titles [15].



Figure 7. Colors used on the web tool

Numerous image tests were carried out and different prototypes were designed to reach the final result, the steps in this creative process of visual identity of the web tool can be reviewed in appendix 3.

4.2.2 The design of the web tool

After development with pen and paper, the digital designs were created for the web tool. While creating the design it became apparent that there are certain elements which are repeated on all the different pages, like the header, the logos, the quick access tabs and the footer.

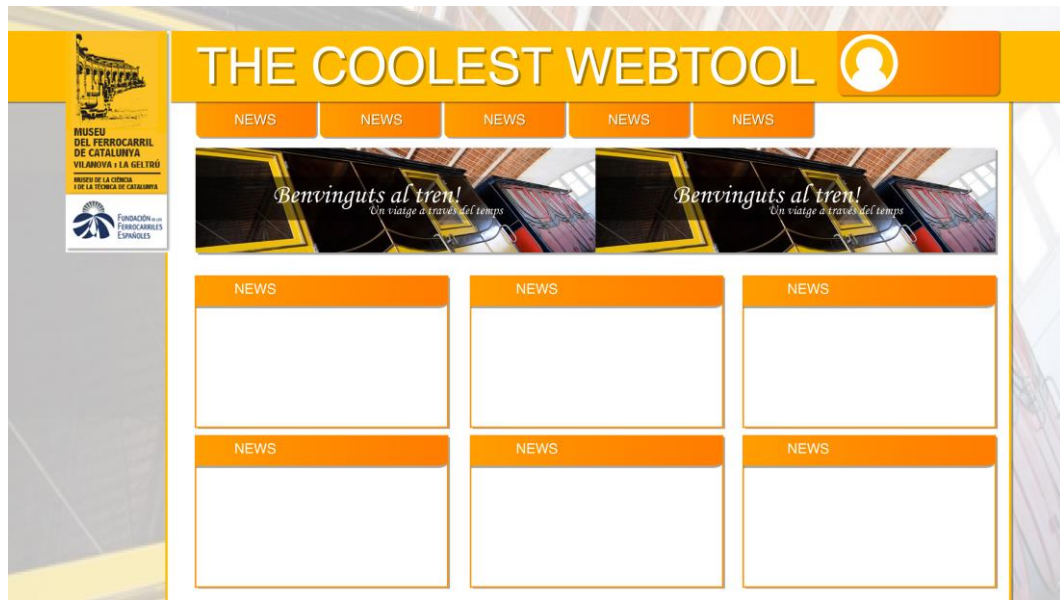


Figure 8. First digital drafts of the web tool

Using the 960° Grid System mentioned above, the web tool is comprised of different blocks, thereby helping the designer and programmers to move and edit items inside the tool without compromising the structure of it.

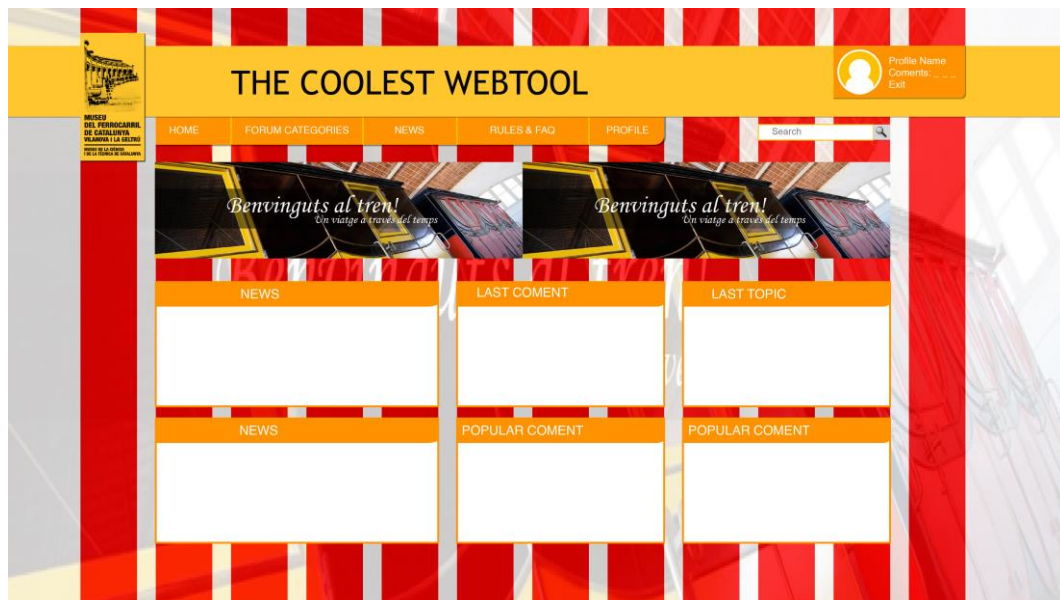


Figure 9. Example of how the 960° Grid System works

In each place of the web tool there's the header, this is the section located at the top of the web tool and it contains crucial elements like the logo, web tool's name, the profile and shortcut tabs and a button to change the language.

This section is the first to load and consequently the first that users will see; therefore, it is extremely important that all the elements are clearly visible. The header remains visible most of the times to allow the user easily move through the different sections on the web tool using the menu.

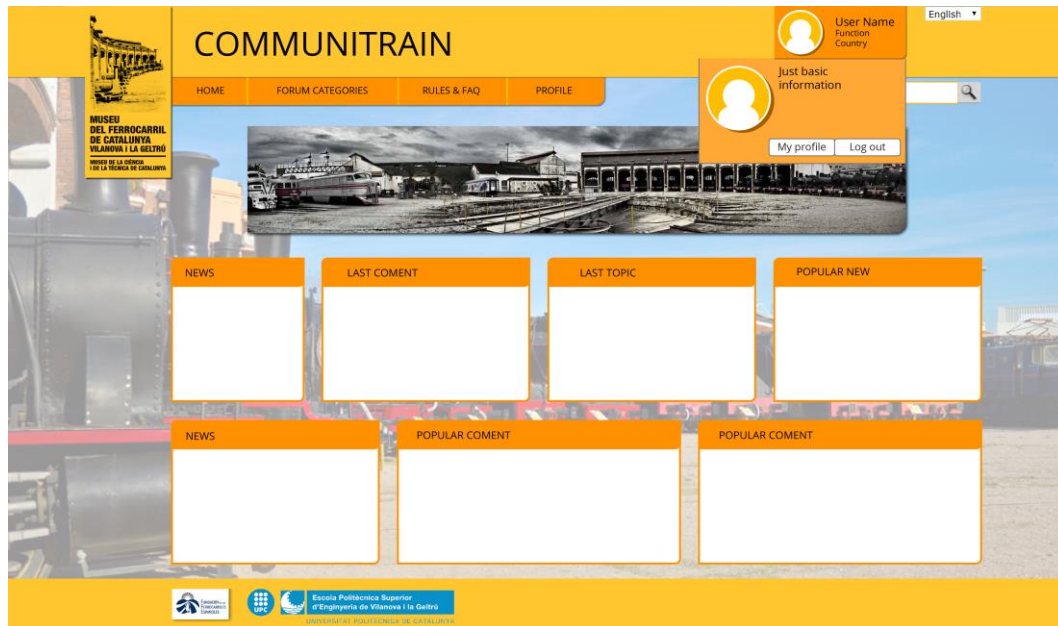


Figure 10. After mid-term web tool's design

The body of the web tool is the central part and contains the most important content. For that reason, it uses common geometric shapes such as rectangles, they make the design modern and sober which gives comfort and familiarity to the user. On the home page just below the header is positioned a banner picture related to the museum to give context at the web tool. During the early stages of development the web tool's background consisted of pictures of the Railway Museum provided by the museum itself. When implemented into the web tool, the picture's opacity was lowered to 40%-50% to improve visibility of the main content, but in the final stages of development it was decided to remove the background image and use a white background instead. The reason for this decision was that it makes for a cleaner look and is more ecofriendly.

Old CRT monitors consume more energy when displaying light colors, but the opposite is true for LCD monitors. With the widespread use of LCD monitors, the lighter the color of your website, the less energy it uses [16].

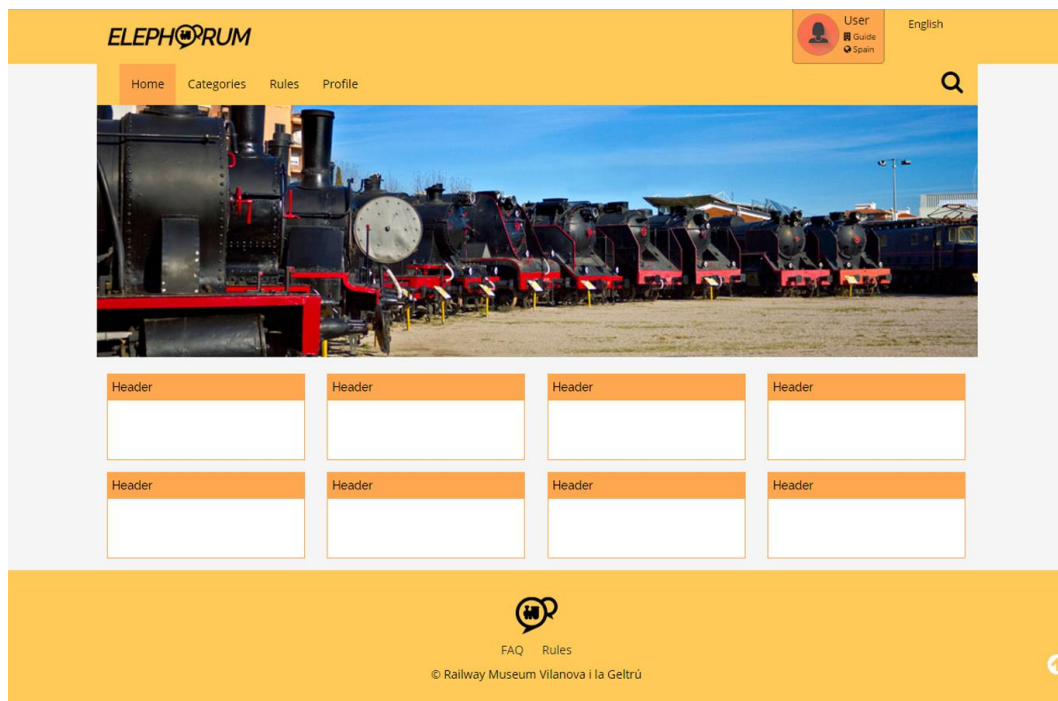


Figure 11. Final and actual design

During the early stages of development, that is, until the time of the mid-term it had been decided to use the logo of the Catalonia Railway Museum in the header, but this showed problems to be positioned correctly in the space provided. Additionally, using a specific museum's logo might undermine the global aspect of the web tool. This led to a serious problem for the team, but because an official name hadn't been decided yet, the team decided to create an independent brand for the web tool, naming it "Elephorum".

4.2.3 The new logo

Developing brand. The Elephorum web tool seeks to become a useful worldwide tool to connect different railway museums around the globe. The characteristics that define the main concept of the brand are communication, seriousness and society.

Numerous sketches and ideas were developed to reach at the final result, the steps in this creative process of development of the Elephorum's brand can be reviewed in the appendix 4.

The morphology of the brand consists of Two parts:

Isotype. This consists of two text balloons, which by its shape and proximity represents the closeness created by communication. It uses circular shapes because they transmit a sense of community. A silhouette of a locomotive is included to indicate that the central theme of the website is railway museums, and that the topics and content of the forum

should be related to this theme. The isotype can either be combined with the logo or used separately. The two speech bubbles are of a different size, overlapping and monochrome. The larger bubble includes the silhouette of a locomotive.

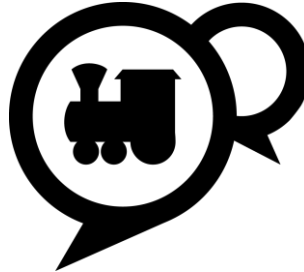


Figure 12. Isotype logo of Elephorum

Logotype. This part is the text on the image. The font family used in the brand of the web tool from the Catalonia Railroad Museum is called “*Raleway*”. This is a sans-serif font, to denote the seriousness of the institution, with a *SemiBold Italic* format to giving an aspect of speed. This typography is distinguished by its simplicity, sobriety and professionalism, which allows the customer to read it easily. Is possible to replace the “O” with the isotype.

ELEPHORUM

Figure 13. Logotype of Elephorum without the isotype as “O”

ELEPHORUM

Figure 14. Final logotype of Elephorum with additional shadow

4.2.4 Color-blindness simulation

Because a lot of people are going to be using the webtool, from all over the world, it is important that everybody is able to properly use it. People with a certain handicap, like blindness, often have a special computer which can read every page to them. People who are color blind do not have this. This is why every website should check if their content is visible for people with color blindness.

Paletton offers ways to simulate an example website with different types of color blindness, they also state the rareness of the type of color blindness. One can fill in the desired color and a simulation can be automatically generated [17]. The color of the webtool is "Pantone 123".

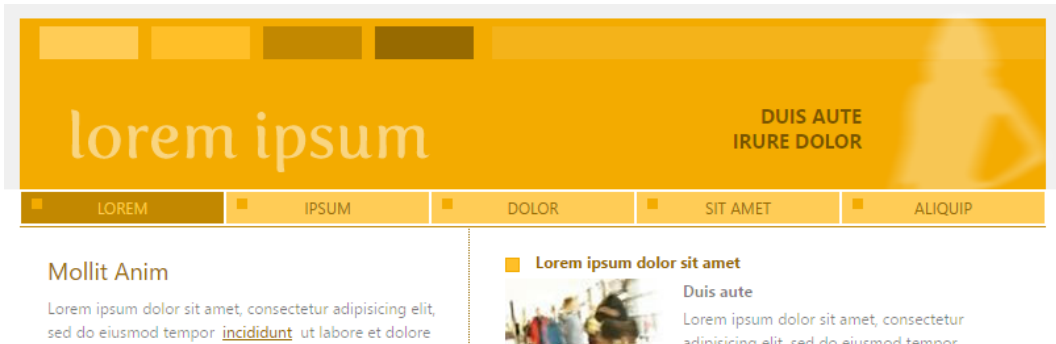


Figure 15. Regular view [17]

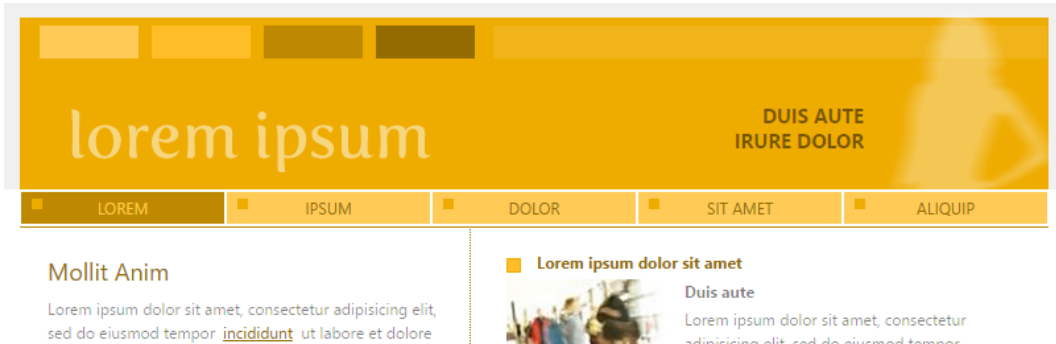


Figure 16. Users with Deuteranomaly (5% of men, 0,4% of women) [17]

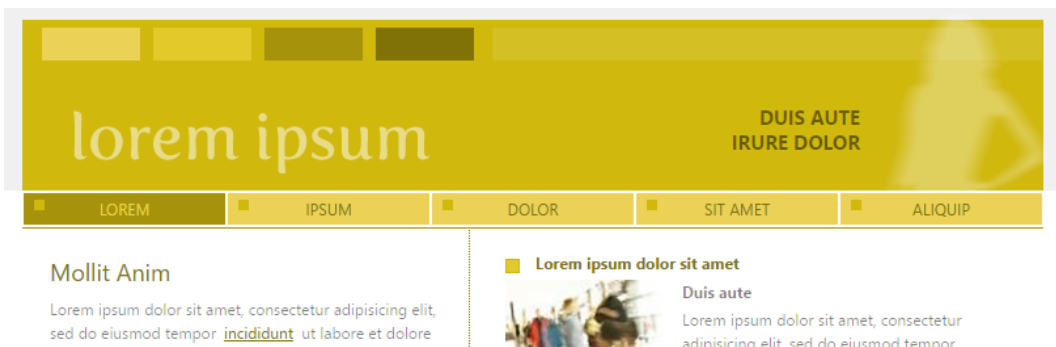


Figure 17. Users with Protanopia (1% of men) [17]



Figure 18. Users with Deuteranopia (1% of men) [17]

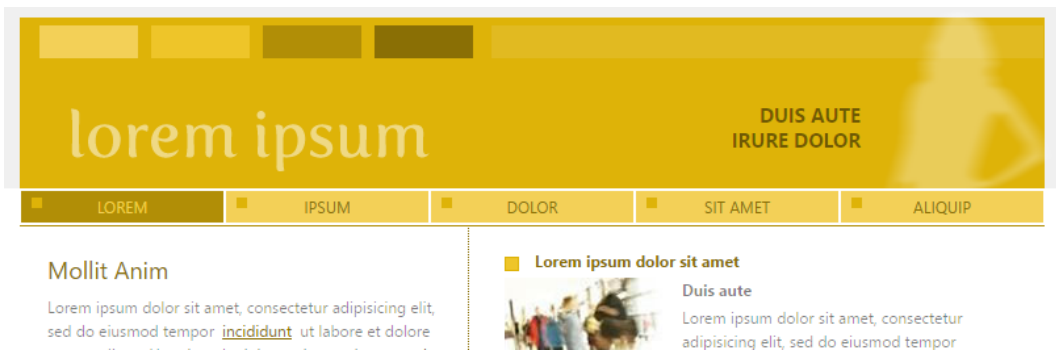


Figure 19. Users with Protanomaly (1% of men) [17]

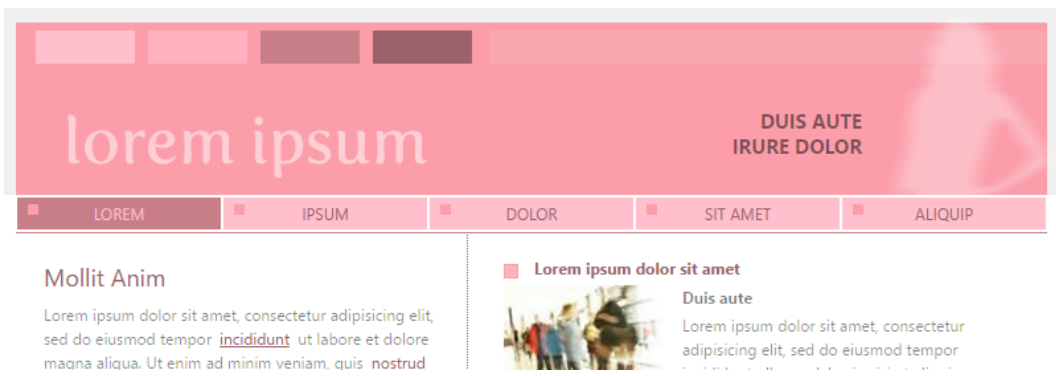


Figure 20. Users with Tritanopia (rare, ca 0,003% of population) [17]

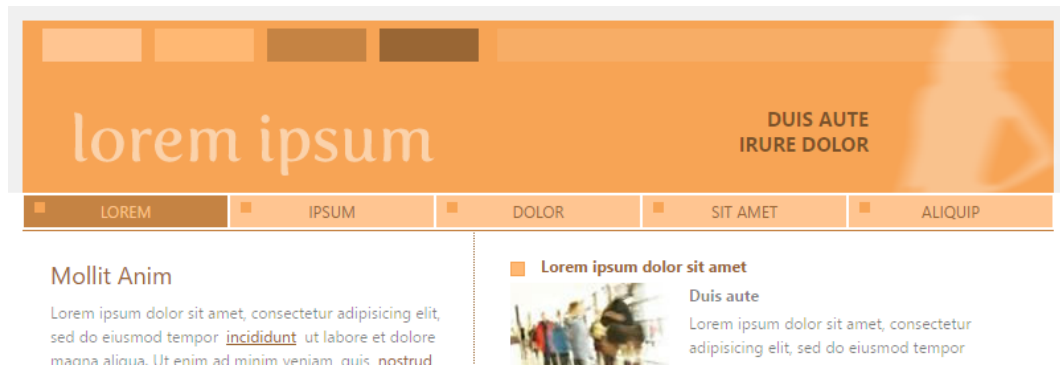


Figure 21. Users with Tritanomaly (very rare, no data available) [17]



Figure 22. Users with Dischromatopsia (incomplete achromatopsia) [17]



Figure 23. Users with full Achromatopsia (unable to see colour) [17]

The simulations show that there might be people who are going to see the web tool in (slightly) different colors. However, in every simulation the original color can still be easily distinguished from black and white. The Elephorum web tool only uses black and white in contrast with the color in the original simulation. So all the simulations above prove that the colors of the web tool won't cause visibility issues for anybody, no matter the type of color blindness.

5 Programming

5.1 Introduction

Git. The use of git makes it easy to review every change and makes it possible to work with more people at the same time on the same code. Git is basically just a tool, which tracks every change in the code. The backend and the frontend always have the latest code changes on Github. GitHub is a web tool which uses git in the core and offers a visualization of the code and all its changes. To make the web tool invisible for the public the settings of the GitHubs repository are set to private [18].

Documentation of the code. In case there are some other developers maintaining the code, it is really important to explain what happens in the railways web tool. Therefore it is easier to see what happens without review the code and understand what is happening [19].

Best practices. In order to create a good reusable and easy to maintain web tool, best practices are used to achieve the best result [20].

Framework. For the frontend and the backend there are frameworks in use. A framework is in simple words a structure to use the programming language more easily and do things quicker than without frameworks [21].

5.2 Backend

The backend is in other words the part of the programming where the data gets processed and maintained. The user is not allowed to interact directly with the backend, due to security reasons. All the information is stored on a server, and this is called the backend. For the backend there are a couple of programming languages, such as Hypertext Preprocessor (PHP), Ruby, NodeJS and many more [22].

5.2.1 Research

REST API. A Representational State Transfer (REST or RESTful) Application Programming Interface (API) is a style of a web architecture to combine the backend with the frontend but can be also used differently and in other combinations.

"A REST API defines a set of functions which developers can perform requests and receive responses via HTTP protocol such as GET and POST." [23]

Lumen. For the backend the team decided to use a PHP framework, since the Railway Museum only has the ability to run PHP on their server. The PHP framework is called Lumen, which is a micro-framework from Laravel. Micro-framework means that is a simplified version of the main framework. Compared to other API frameworks it is a quick and powerful framework, with the minimum amount of code [24], [25].

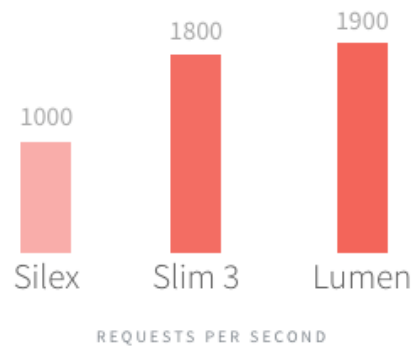


Figure 24. Lumen compared to other frameworks [24]

The big advantage of lumen is, that it is optimized for a REST API and is therefore the best choice for the railway web tool. Laravel in general, which includes Lumen, has a clean syntax and is well documented by the inventor Taylor Otwell. All the basics, such as simple authentication or a queuing library is available out of the box and make this framework powerful.

5.2.2 Documentation

Since the API is just about the functionality and is unrelated to the design, the programmers were able to start while the details and design were being discussed within the group and the company. Before the programmers were able to start, they discussed what routes are needed and documented everything on Swagger. Swagger is an easy tool for representing and documenting an API [26].

The REST API has a lot of different GET and POST request which could become confusing at some point. To maintain an overview of the entire REST API everything is documented on Swagger. The documentation is written in "YAML Ain't Markup Language" (YAML, originally "Yet Another Markup Language") which is a human friendly data serialization standard for all programming languages.

Category Show/Hide | List Operations | Expand Operations

GET /category Category data

Implementation Notes
Get all categories

Response Class (Status 200) !
An array with all the category information and subcategories

Model | **Example Value**

```
[
  {
    "id": 0,
    "subcategory": [
      {
        "id": 0,
        "name": "string"
      }
    ]
  }
]
```

Response Content Type

Response Messages

HTTP Status Code	Reason	Response Model	Headers
404	No categories found		

POST /category Add category

DELETE /category/{id_category} delete category

POST /category/{id_category} change category

Figure 25. The documentation of Swagger

```
/user/{id_user}:
  get:
    summary: Users data
    description: |
      List of array for a specific user
    security:
      - Bearer: []
    tags:
      - User
    responses:
      '200':
        description: An array of the users data
        schema:
          $ref: '#/definitions/User'
      '404':
        description: User not found
  post:
    summary: Update a specific user
    security:
      - Bearer: []
    tags:
      - User
    parameters:
      - $ref: '#/parameters/user'
```

```
responses:
  '200':
    description: An
  '404':
    description: User does not exist
delete:
  summary: Delete a specific user
  security:
    - Bearer: []
  tags:
    - User
  responses:
    '200':
      description: Deleted
```

Listing 1. A code snippet of the Swagger YAML documentation

After creating and documenting the entire API on Swagger the programmers started with the API integration into Lumen.

5.2.3 Security with JWT

For a secure backend and login the programmers agreed to use an industry standard method, called JavaScript Object Notation (JSON) Web Tokens (JWT).

"JSON Web Token (JWT) is an open standard (RFC 7519) that defines a compact and self-contained way for securely transmitting information between parties as a JSON object. This information can be verified and trusted because it is digitally signed. JWTs can be signed using a secret (with the HMAC algorithm) or a public/private key pair using RSA." [27]

In simpler words, JWT is very small and can be sent through the Uniform Resource Locator (URL) or the header of a request. Every information, which is needed, is contained in the payload of JWT, so there is no need for sending additional data. JWT itself has three different parts separated with dots [27]:

- Header
- Payload
- Signature

Encoded PASTE A TOKEN HERE

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdW
IiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG91I
iwiaWF0IjoiOnRydWV9.TJVA950rM7E2cBab30RMhrH
DcEfxjoYZgeFONFh7HgQ
```

Decoded EDIT THE PAYLOAD AND SECRET (ONLY HS256 SUPPORTED)

HEADER: ALGORITHM & TOKEN TYPE

```
{
  "alg": "HS256",
  "typ": "JWT"
}
```

PAYLOAD: DATA

```
{
  "sub": "1234567890",
  "name": "John Doe",
  "admin": true
}
```

VERIFY SIGNATURE

```
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  secret
)  secret base64 encoded
```

Figure 26. The encoded JWT (left) and the decoded JWT with all information (right) [27]

The secret signature token is stored in the `.env` file on the server in the web tool root.

5.2.4 Routes

The routes have three different request types:

- GET. To get the data and return it to the request origin.
- POST. To update or create a new requested object in the database.
- DELETE. To delete the requested object from the database.

The distribution of the routes is simple. The first word of the URL is for the main objective for the use. E.g.:

A GET request on the following example will return all jobs. Or with a POST request on the following example it will create a new job.

```
{baseUrl}/job
```

A GET request on the following example will return all categories with additional data or will create a new one with a POST request.

```
{baseUrl}/category
```

These were the basics of the routes and there are many more documented on Swagger.

Two weeks before the midterm presentation, the first alpha version was released. Some features, such as sending emails, were not fully completed.

5.3 Frontend

The frontend is a layer where the user is able to interact with functions, design and content. A synonym for frontend is “client-side development” and is also common in use [22], [28].

” To many people, client-side development might be perceived as 'making things pretty' and, while it is a valid comment since we do make things look good, as good-looking things sell better, [...]” [28]

5.3.1 Research of frameworks

The research of the frontend was a long way through different frameworks. According to Uri Shaked there are three different options for the frameworks: AngularJS, BackboneJS and EmberJS. Every single framework has advantages as well as disadvantages.

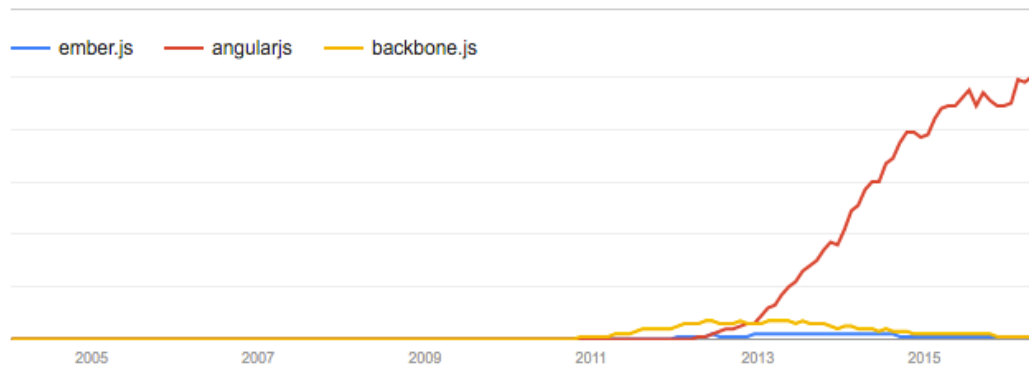


Figure 27. Comparison of three popular JavaScript frameworks [29]

To make a choice the speed and the available add-ons of these frameworks were compared. Speed and add-ons are really important to realize such a web tool in a very short amount of time. BackboneJS was the most used framework when it was first invented, furthermore it was the only really existing and stable frontend framework [29].

At the end the programmers decided to choose angular.js, since angular.js also has more third-party modules, stars on Github, YouTube results and much more [29].

Metric	AngularJS	Backbone.js	Ember.js
Stars on Github	40.2k	18.8k	14.1k

Metric	AngularJS	Backbone.js	Ember.js
Third-Party Modules	1488 ngmodules	256 backplugins	1155 emberaddons
StackOverflow Questions	104k	18.2k	15.7k
YouTube Results	~93k	~10.6k	~9.1k
GitHub Contributors	96	265	501

Table 1. Comparison of popularity on different platforms [29]

5.3.1.1 Chosen framework (AngularJS)

AngularJS was chosen as the framework after some research. The choice of this specific framework was based on different factors:

Speed. If AngularJS is used the right way, it can be really fast. Two-way data binding makes it possible to change the entire app without having to do any reloading. This advantage has the effect that the use of the app seems smooth and therefore has a nice usability.

Community. AngularJS is developed by Google and brings a big community with it. There are also statistics that AngularJS has the biggest community compared with BackboneJS and EmberJS.

Many add-ons. Due to a big community there are also lots of different useful add-ons, also known as modules, to prevent the reinvention of already existing thoughts and solutions. So with those different modules it is easy and fast to create a powerful web tool [29], [30].

Components. To get a good result in little time, there is a need to plan all steps beforehand. For a well structured and easy to configure app, it is important to have different single components. Every single component can be used like a Lego brick, therefore many single components make one page, as the profile page [20]. The first setup and the planning is done before the midterm presentation and the plan, after the presentation, is to finalize the frontend within a month to remove bugs as soon as possible.

5.3.2 Error messages

Input fields. On every form where the user is able to write new content, manipulate data or can login, there are several error messages and notes, so that the user is always informed about the current situation. Wrong passwords, wrong input types or required input fields are highlighted if the user made the mistake.

404 page. If the user is not allowed to see a page (security) or the page does not exist, the web tool will redirect to an own 404 page. 404 stands for the HTTP error code "Not found". "The server has not found anything matching the Request-URI. No indication is given of whether the condition is temporary or permanent." [31]

5.3.3 Translation of the page

i18n. First internationalization (i18n, the number is for the 18 letters between "i" and "n") was used to translate the web tool to provide the best experience. The advantage of i18n is that it controls what is going to be translated, because it is using constants to translate everything needed. The biggest advantage of i18n is that you can be confident that the user sees the right translation. But there also is a huge disadvantage to i18n. There is a need for manual translations, which means that every single translation of every constant in every language has to be written manually. This requires the help of multiple people who speak the languages you wish to translate the site to. Additionally this means that all the content, which is written by the user, cannot be translated [32].

Google translate. With Google translate there is the opportunity to translate the entire page, including the categories, topics and comments, without effort. Google translate offers 103 different languages, whereby i18n just offers as many as there are added manually [33]. The biggest disadvantage to the google translate plugin is that it may make mistakes or produce translations that seem unnatural. At the end Google translate is the easiest way for the railway museum, because at this point it is the only way to provide translations of the of the whole page, including the content added by users, to many languages and there is no need to manually add new languages.

5.3.4 Mobile version

The mobile version is made using the flex-grid system by Foundation 6, which is a open source developed framework made by Zurb. Foundation offers a lot of benefits, for example the easy customization of colors or the size of columns. Foundation is already used by big companies, such as "Washington Post", "Amazon", "Disney" and many more [34].

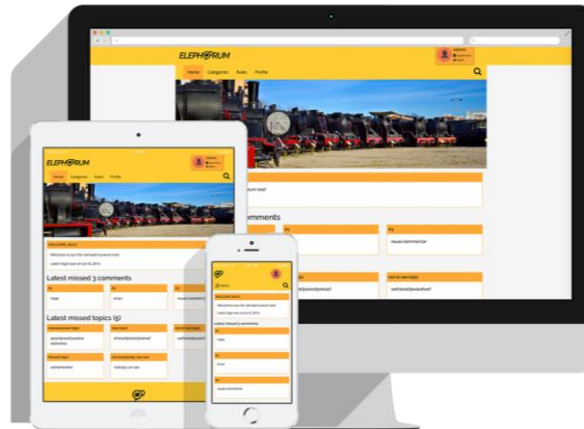


Figure 28. Responsive showcase

5.3.5 Documentation

The documentation of AngularJS is very important, in case another developer has to maintain the site and wants to develop new things. The fact that Grunt is used to maintain the code and optimize it for the web, it is easy to implement a visualization of the code. Grunt is a build tool to do automatic tasks, such as correcting the code, minifying or testing, of course there are others such as GulpJS or BroccoliJS. Without such build tools it is really hard to maintain all the code for such a big web tool. Ngdocs, which is the documentation standard of AngularJS, was used to get the a clean documentation for the entire web tool [35]–[37].

railroad API Documentation

search the docs API Documentation / service / auth

auth [View source](#) [Improve this doc](#)

service in module **service**

Dependencies

- \$rootScope
- Restangular
- \$state
- \$window
- \$cookies
- COOKIE
- \$httpParamSerializer

Methods

check ()

Checks if the user is authorized to see a specific page Get the cookie and validate the JWT token

Returns

Boolean same value as `_authenticated`

isAuthorized ()

Just return the stored `_authenticated` value.

Returns

Boolean `_authenticated`

login (formData)

Request a token and saves into `$cookies` if the token is valid Redirect on successfully login to home

cmpps **module**

directive

- addJob
- adminNavbar
- adminUserRequest
- companyManagement
- inviteUser
- jobManagement
- addComment
- addTopic
- category
- comment
- subcategory
- topic
- languageChooser
- login
- navbar
- news
- search
- signUp
- slider
- tooltip
- userbar
- editProfile

controller

- AddJobCtrl
- AdminNavbarCtrl
- AdminUserRequestCtrl
- CompanyManagementCtrl
- InviteUserCtrl
- JobManagementCtrl
- AddCommentCtrl
- AddTopicCtrl
- CategoryCtrl
- CommentCtrl
- SubcategoryCmpsCtrl
- TopicCmpsCtrl
- LanguageChooserCtrl
- LoginCtrl

Figure 29. Sample of the documentation of the auth service and the available methods.

5.4 User roles

There are different user roles on the web tool to create a hierarchy that not everybody is able to manage e.g. users or jobs. Every role has the same functions as the one above.

User.

- If a topic is filtered, the user is only able to view this topic if their job and/or company is present in the filter.
- Create topics and share it with everyone or with chosen jobs and/or companies
- Write comments on the allowed topics

Companyadmin.

- All rights from "User"
- Can invite and accept people from their own company

Admin.

- All rights from "Companyadmin"
- Can see every topic, including the filtered ones
- Can invite and accept new people

Superadmin.

- All rights from "Admin"
- Can change the user roles
- Can delete invited and pending users

5.5 Deployment

The deployment will be made by the railway museum itself. The documentation and the guide on how to deploy it comes with the backend and the frontend package, written in MARKDOWN (README.md), as well as in the appendix 5 and 6.

6 Final product

6.1 Landing Page

On the landing page, the user can choose to log in if they already have an account and have been accepted, or they can navigate to the signup page to register. After the user registers, the admins will be able to accept or deny his request to join the web tool. When accepted, the user will receive an email and from that moment he will be able to enter the web tool.

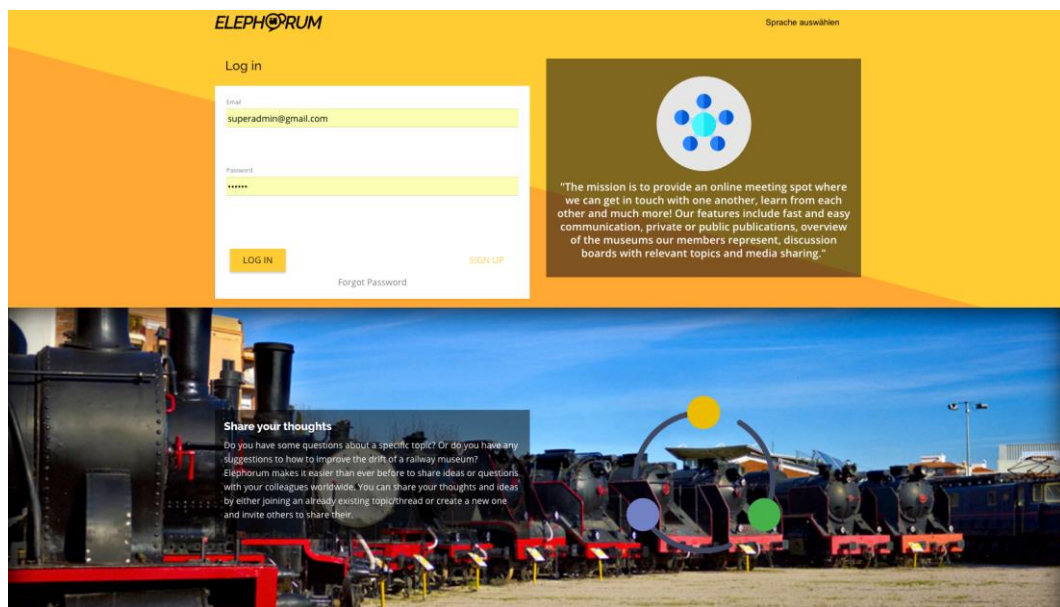


Figure 30. Landing page of Elephorum

6.2 Home page

The home page is always showing the latest missed comments and topics, so the user is able to follow up what is missed by the last login. When clicking on the magnifying glass icon a search bar will appear where the user can find people and companies, and go to their profile page.

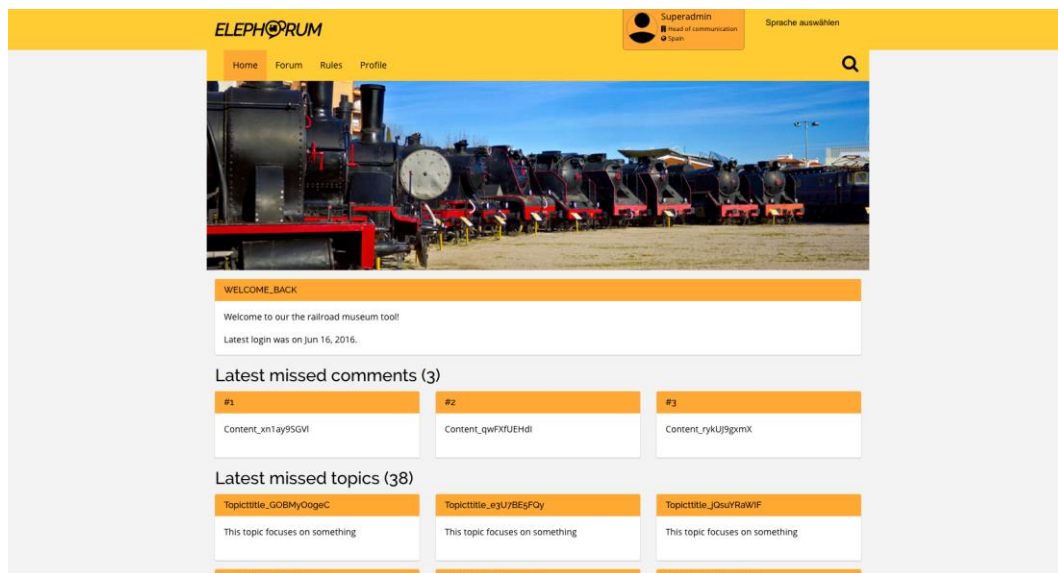


Figure 31. Home page

6.3 Forum

The forum is accessible from the “Forum” button in the navigation bar in the header of the page. Here, the user is able to browse through the different categories and subcategories. In each subcategory, a normal user will only see the topics visible for everyone or the ones for his job or company. Admins and superadmins on the other hand are always able to view all the topics. The user can also add a new topic and choose whether they want the topic to be visible for everyone or select jobs and/or companies they want the topic to be visible for. When commenting on a topic, it is possible to add images or documents, although the amount and size of the attachments is limited.

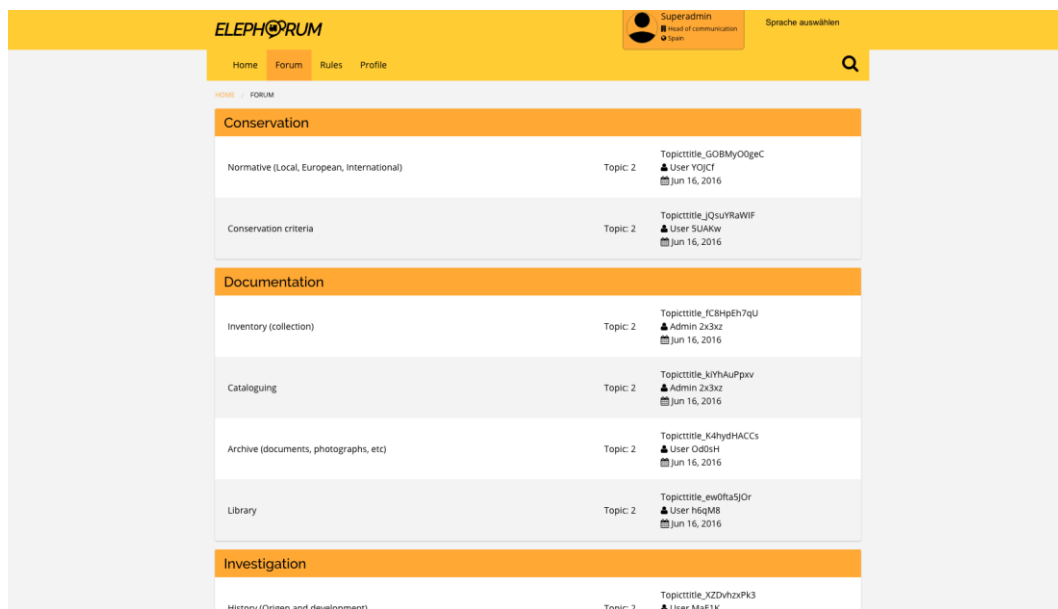


Figure 32. The forum with all categories in Elephorum

6.4 Admins

By clicking on their profile picture in the header, admins can navigate to the admin control panel where they can manage and add new jobs, companies, and users. Company admins are only able to invite people to their company, while admins and superadmins are able to invite anyone regardless of their company. Superadmins also have the possibility to change the user roles and make other people admins.

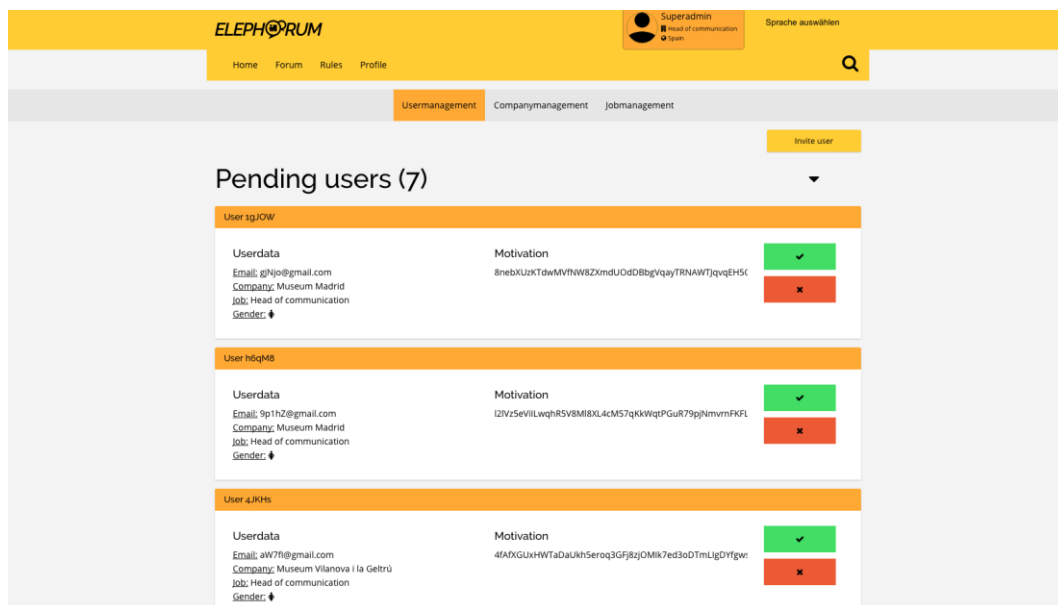


Figure 33. Adminpanel to edit the users

7 Conclusion

Another successful semester of collaboration between EPSEVG's EPS-students and the railway museum of Vilanova i la Geltrú is over. Previous years focus has been on helping the museum to improve the visitor's experience and the museums visibility both inside the museum's locals and on the web. After achieving satisfying results, the museum turned their focus on reaching out to the thousands of national and international colleagues. This was to be done by creating a web tool, in the form of a forum, to gather as many railway museums as possible in one and same spot on the World Wide Web. Facebook and other social media sites were an option, but in the end the conclusion was that an own web tool would be the most attractive and professional way to go.

One of the main requirements while creating the web tool was to make the user experience as satisfactory as possible. This because of the assumption that not all of us are born "web surfers", some people struggle to find their way around the web. To meet the requirement, questionnaires and testing of prototypes were completed by different railway museum employees, professionals within different fields, other students and family and friends. Results from the research gave the opportunity to continuously improve the web tool until it was completed and launched. The last part was to land on a catchy name for the web tool, and at the end the entire team got the last word and decided for "Elephorum".

The end conclusion of this project is simply the word "success". The team and the museum worked very well together without any complications at all. Both were flexible and understandable, one of the key success factors for working in groups. The team managed to complete all tasks and finish the project in time.

One of the main goals of the EPS program is to improve students' communication skills with people from different cultures. The team did not just improve their communication skills across cultures but also (for some more important) made lifelong friends.

The web tool can be found on <http://railroad.jpeer.at> or via QR-code as shown in Figure 29. To have access to the web tool there are there are two different users and the password is in both cases "secret":

Superadmin.	superadmin@gmail.com
User.	user@gmail.com



Figure 34. QR-code
Elephorum

8 Further research

The purpose of the project was to develop and launch the web tool, but there is still a way to go before the true value of it will be known.

The technical work is completed and it would be natural to turn around and look at the web tool from an economical point of view. It is preferable to make a business and a marketing plan to map how to create value, find the right marketing strategies, and to find out how to manage the web tool when it grows bigger.

Since the museum is familiar with cooperating with students, they could contact a business university and ask if there is a group of students who could help them out with the economic aspects of the web tool.

The management of Catalonia Railway Museum also needs to evaluate the time spent managing "Elephorum". Should it keep them away from completing their daily tasks at the museum, a student of IT could be hired to manage it.

9 Acknowledgements

The team would like to thank all the people involved with this project. First, we would like to thank all the lecturers that have been with us through this year's EPS programme. A special thanks goes to Joseph Edward Barr and Nora Martinez who have supported and guided us through this semester. Further, we thank Neus Salleras and Delia Moonen from the international office for making this year's EPS programme possible.

Last but definitely not least, our greatest gratitude goes to our supervisors Ana Grande and Ariadna Llorens. Without their guidance, ideas and a surprisingly positive attitude, the end product would not be the same. Thank you for all your time and support. You really made a difference.

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Appendix

Appendix 1 (also on CD, survey.docx): the survey

Welcome at the User Feedback survey for the project creating an international railway communication tool, called ELEPHORUM.

NOTE: we are sorry, but this survey and prototype are in English. If that is a problem for you, try to get your browser to translate or just see how far you get and let us know there was a language barrier in the comments.

We are well on our way creating this forum, and now we have come to the stage where it is time to get some inside feedback from YOU, the user. Because if we are creating a communication tool for railway museums, who is more important than the employees that are going to use this tool?

We already have a prototype, in which we tried to make the user experience as easy and usable as possible, but it is a good possibility that we made some mistakes. That is why we want you to perform some tasks and answer some questions about the prototype. This way we are able to make it better usable for you and your colleagues.

Please follow these steps and when you are done, answer the questions ahead.

1. Open the prototype: http://yv16k.axshare.com/home_no_login.html
2. Sign up, make a request for an account
3. If you click 'SUBMIT', you will get back to the first page
4. Sign in (no e-mail or password needed because this is the prototype, just click 'LOG IN')
5. Go to the forum and add a topic in the 'Conservation/restoration > Normative' category. Come up with a title and description and make the topic only visible for Directors of European museums
6. Look around the prototype a bit if you want
7. Log Out

Done, Thanks! Now please answer these questions:

- On a 1-5 scale, how easy was step 2? (if you do not choose 5, please specify as clear as possible why)

Answer:

- On a 1-5 scale, how easy was step 5? (if you do not choose 5, please specify as clear as possible why)

Answer:

- On a 1-5 scale, how easy was step 7? (if you do not choose 5, please specify as clear as possible why)

Answer:

- Are there any aspects of the prototype that you like?

Answer:

- Are there any aspects of the prototype that you think are not clear?

Answer:

- Do you have any other comments that might help us understand this survey better or make the Web tool better?

Answer:

Completely done. I want to thank you for your cooperation and we hope that you will enjoy the use of our final product.

Kind regards,

-The Elephorum team

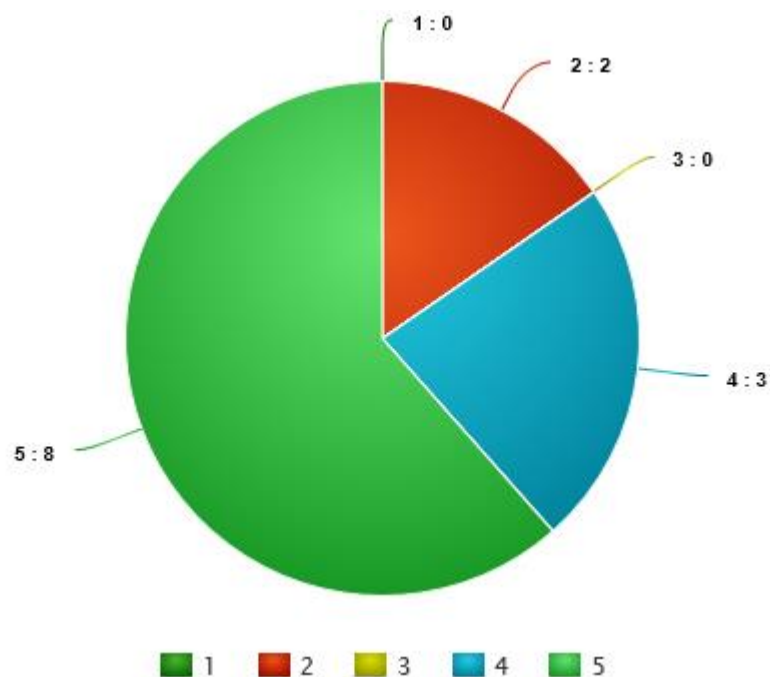
Appendix 2 (also on CD, survey_results.docx): survey results

Survey steps:

1. Open the prototype: http://ylv16k.axshare.com/home_no_login.html
2. Sign up, make a request for an account
3. If you click 'SUBMIT', you will get back to the first page
4. Sign in (no e-mail or password needed because this is the prototype, just click 'LOG IN')
5. Go to the forum and add a topic in the 'Conservation/restauration > Normative' category. Come up with a title and description and make the topic only visible for Directors of European museums
6. Look around the prototype a bit if you want
7. Log Out

Survey questions and results:

- On a 1-5 scale, how easy was step 2 (sign up)?

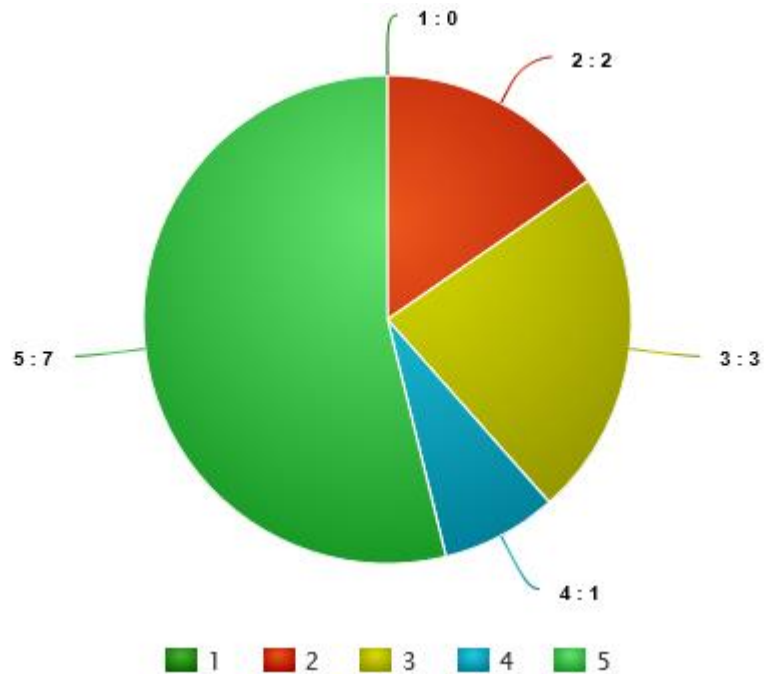


As shown in the survey, people were asked to specify their answer if they did not put in a 5, here are the comments:

- The text "or Sign in", I think it's too small and unattractive, could be introduced in a box so that the user can click on any part of it, I mean a button that could be bigger than just the word to click.

- After press 'submit', it returned to 'log in' window, could be better just go directly to the platform
- it's easy to fill up but it didn't work in my case, it didn't make an account
- After step 4, We go again to step 2 (Log in)?

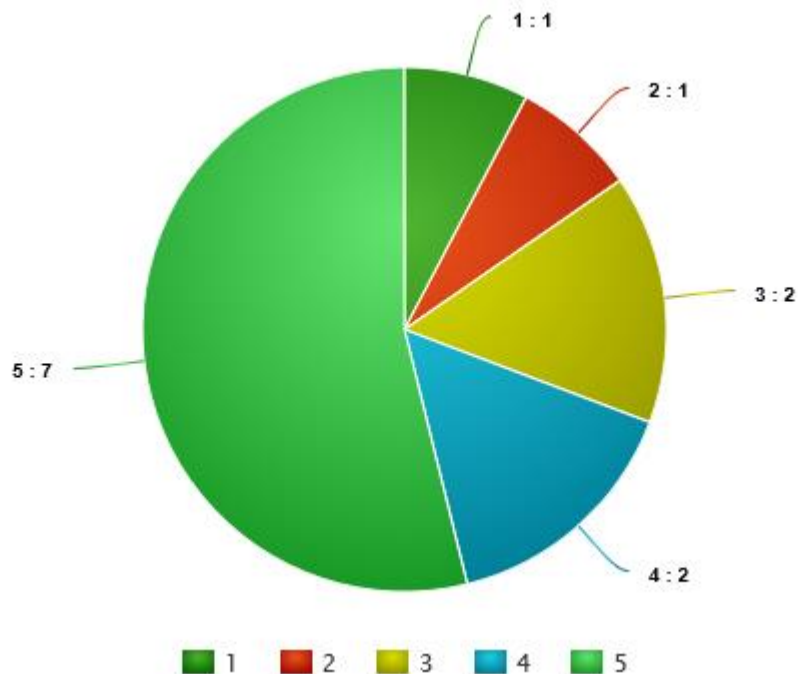
- **On a 1-5 scale, how easy was step 5? (add topic)**



As shown in the survey, people were asked to specify their answer if they did not put in a 5, here are the comments:

- Because if I can't see my topic I don't know if I have done well
- I've created a new topic, but I wasn't able to visualize it properly
- it's very easy to use but also in my case it didn't work. The topic was not added and I tried several times
- I repeated the operation twice but I have not been able to visualize the forum.
- I wasn't able to create the topic
- Good, it seemed very intuitive

- On a 1-5 scale, how easy was step 7? (log out)



As shown in the survey, people were asked to specify their answer if they did not put in a 5, here are the comments:

- It wasn't easy to find the log out, if you don't realize that is in the user profile
- very easy
- Mostly because I don't speak English
- I don't see where I can log out
- It's not clear to find out the 'log out' button
- The logout button may be hard to find for someone with a low IT-profile. However, I clicked on the profile page and found it. It seems fine as it is, in fact, most people don't even use the logout button but just close the browser

▪

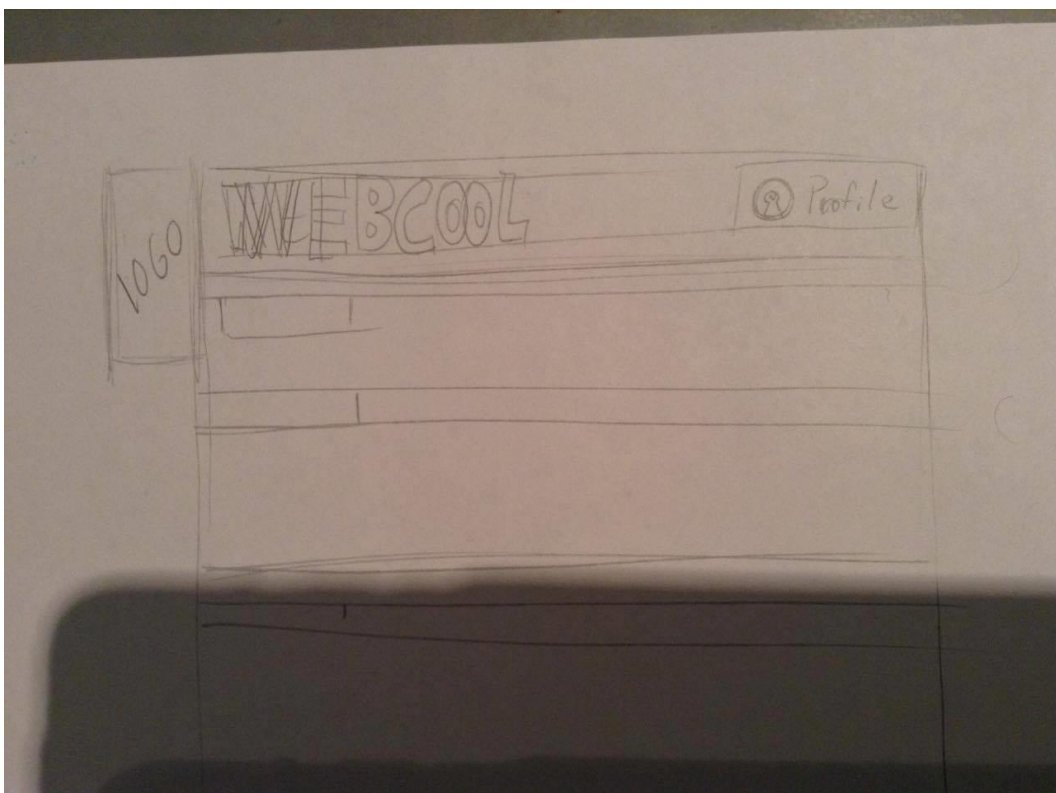
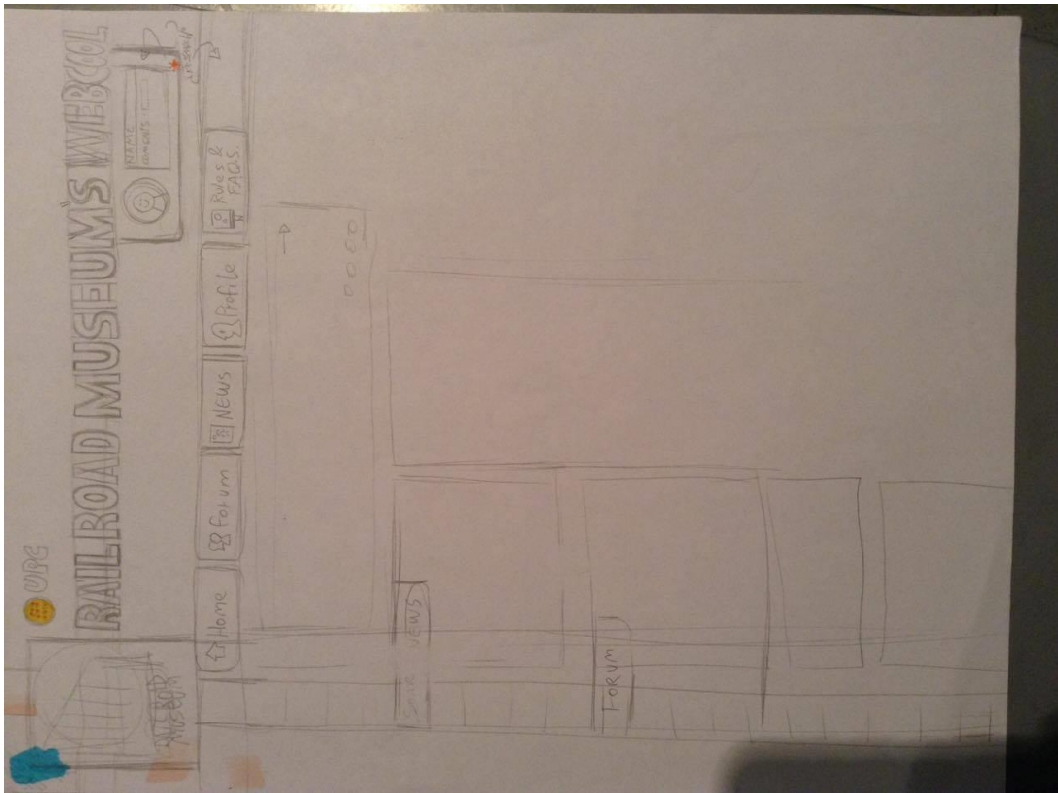
- **Are there any aspects of the prototype that you like?**

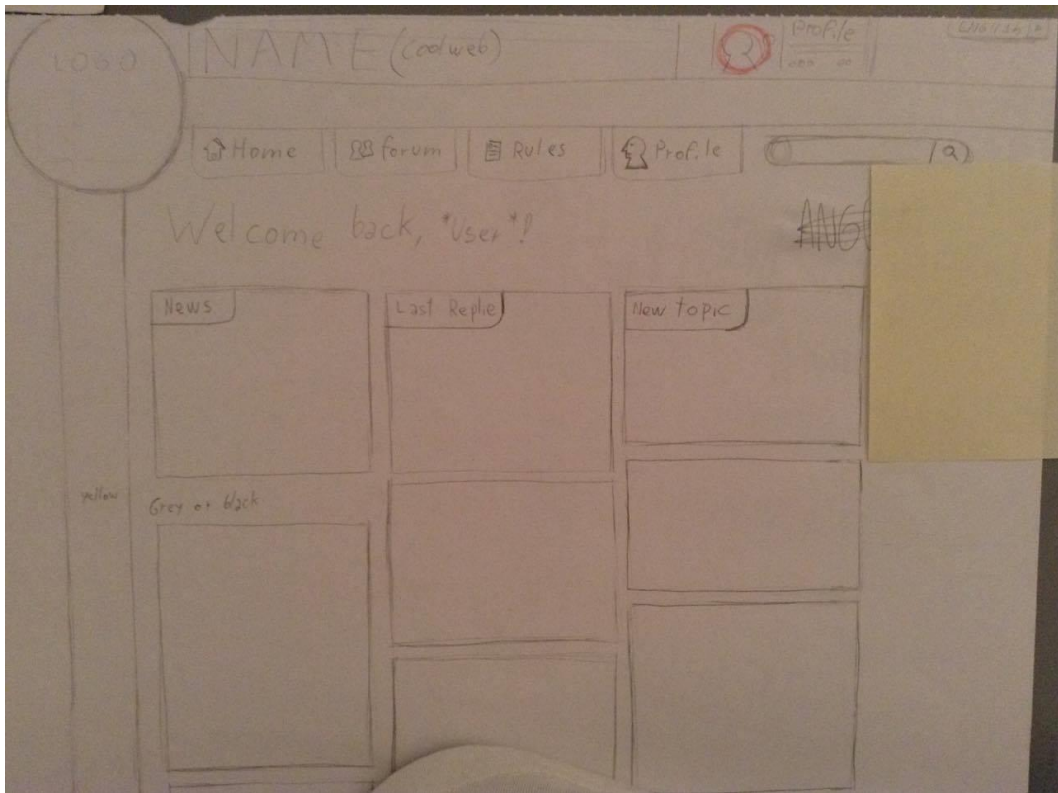
- It's intuitive and easy to handle
- I think it's a good collaborative tool to meet colleagues and share ideas.
- I think the design is still in process.
- The menu is so simple and easy to understand
- Architecture and navigation menu
- The overall aesthetic is attractive, the possibility to create forums interactivity between other museums and Railroad museum professionals.
- I like it that there aren't too many choices, less makes it easier to use I think.
- Visually, all I understand I find attractive

- The profiles, the possibility of conversations with other members and professionals of other Railway Museums
 - In general, it's a clear and intuitive page. It doesn't add unnecessary distractions (at least in the process we have done)
 - I could not see how the responses to topics work. Otherwise well
 - Clear, sensations of tidy area, soft colors, easy to understand the philosophy of the web
 - I find the interface simple and straightforward. It works similar to other forums; I think anyone who ever used a forum before will have no problem using this one
- **Are there any aspects of the prototype that you think are not clear?**
 - Add a new forum topic, I don't know where to develop my topic. There is little space to write
 - I'm not sure if 'profile' is just my profile or is for all the members on the list. And if so I guess it will work as a directory to contact other members.
 - I think you could improve graphic design and / or typography; font is too small for some people. Some Indications are necessary to know where you should click because it is only visible when you pass the cursor over and the "hand" appears.
 - It is quite simple and really intuitive
 - The design is not usable and there are tasks that are quite difficult to do
 - The comments in the forum will not be published. The name of the user who accesses does not appear. You cannot change the language of the site
 - Logos and identification of participants
 - I think all is clear, although with the pictures it uses now in first it seems like a website from the museum instead of a forum
 - I haven't a formed opinion because there isn't in my language, in fact I'm answering this questionnaire with a translator.
 - The design (but I know it will be improved)
 - No
 - Could not find the log out
 - Not sure
 - No
 - **Do you have any other comments that might help us understand this survey better or make the Web tool better?**
 - It's great, I guess the appearance will improve. This is a prototype
 - Since it's a documentation channel I think it would be good that also could function as a kind of repository in which we can upload documents of interest to the members on the list. So I think it would be good to include a tab or banner to give access to publications and also an area to upload documents and links
 - No

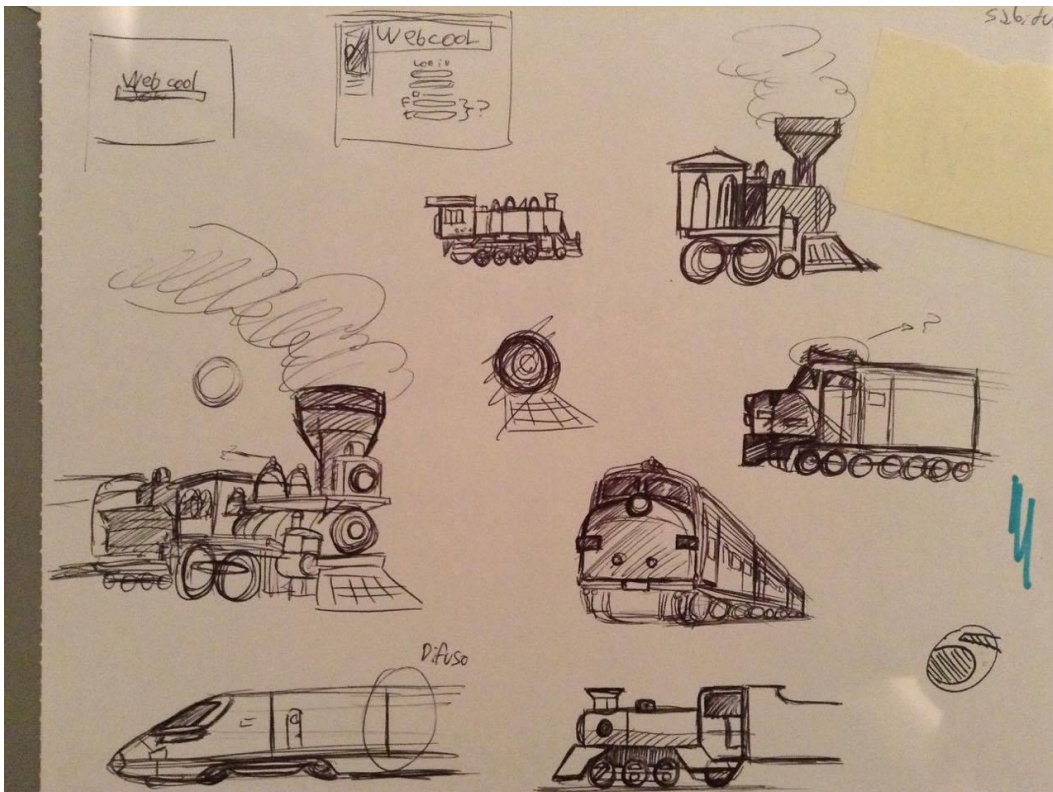
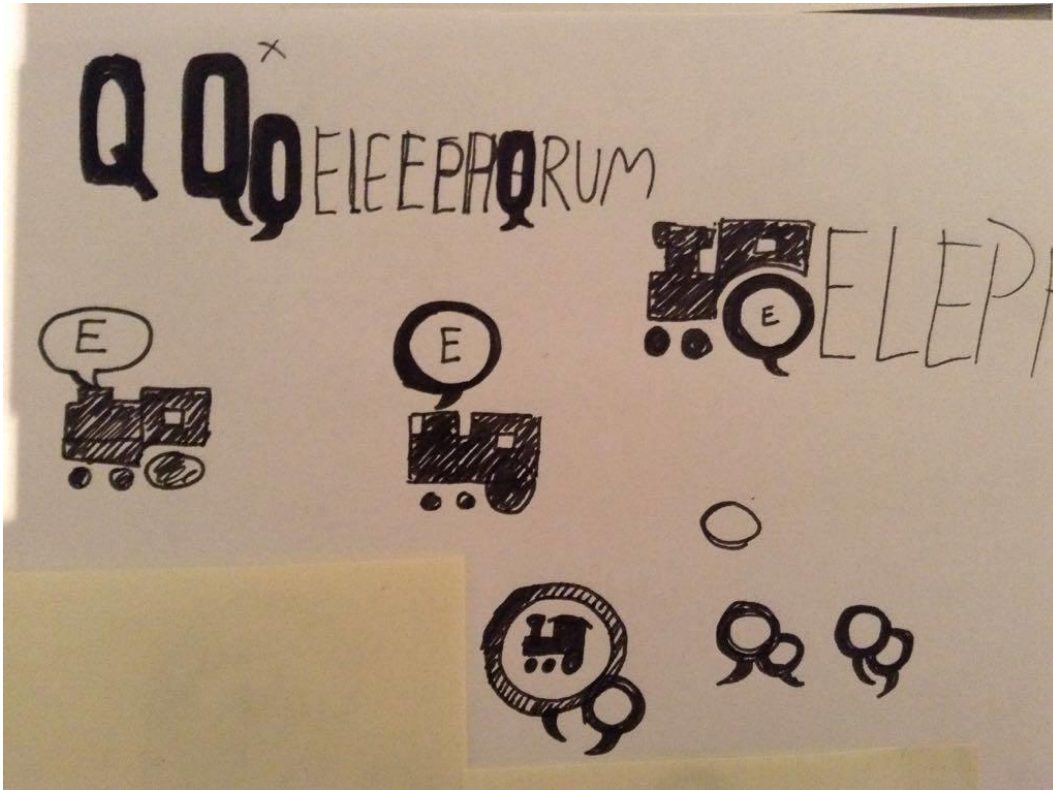
- maybe the social media buttons in every single page?
- Enhance functions of information sharing in social networks
- It's important to design a mobile devices version and able to see at any moment
- I would keep the windows underneath the photo as less as possible so you don't drown in a sea of information when you enter the forum. But personally I like it not to crowded. Nice work, I'm curious to see the end result!
- No
- The possibility for mobiles it would be nice because I tried this one and it's not good
- No
- No
- No
- A: The world 'highlighted' appears on active tabs, but that might just be something that's there because of an error or because of the fact that it's prototype
- B. I tried to add two new topics but they did not appear, but this also may be because it's a prototype

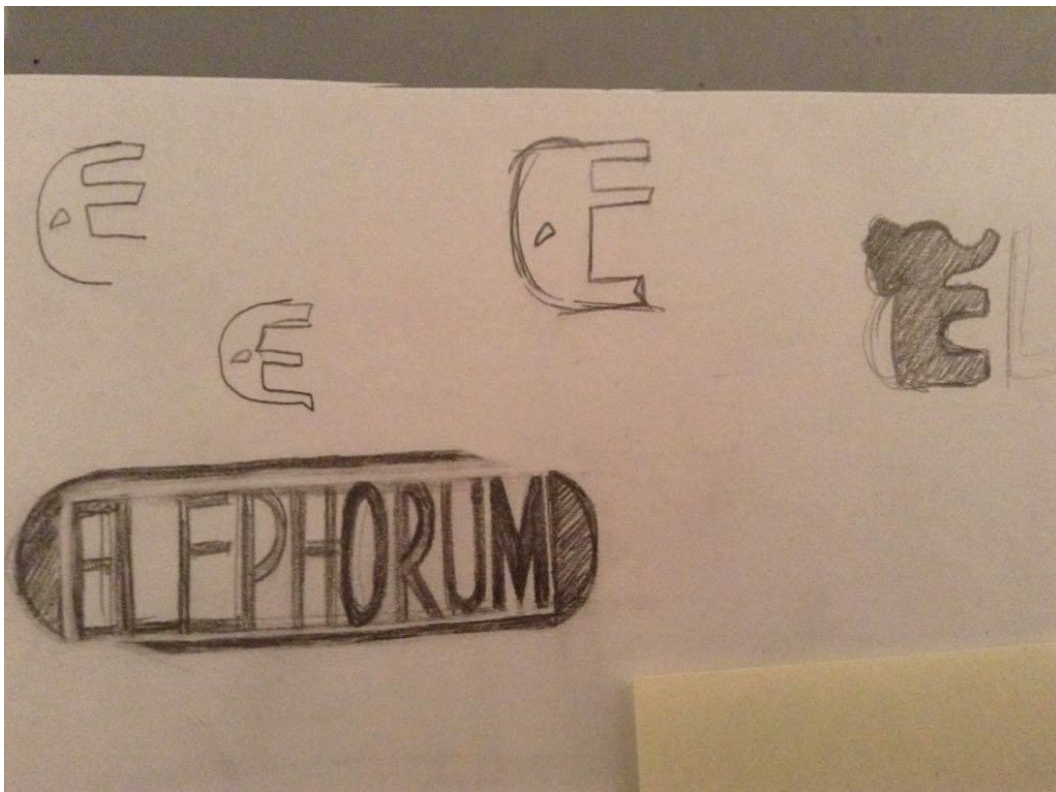
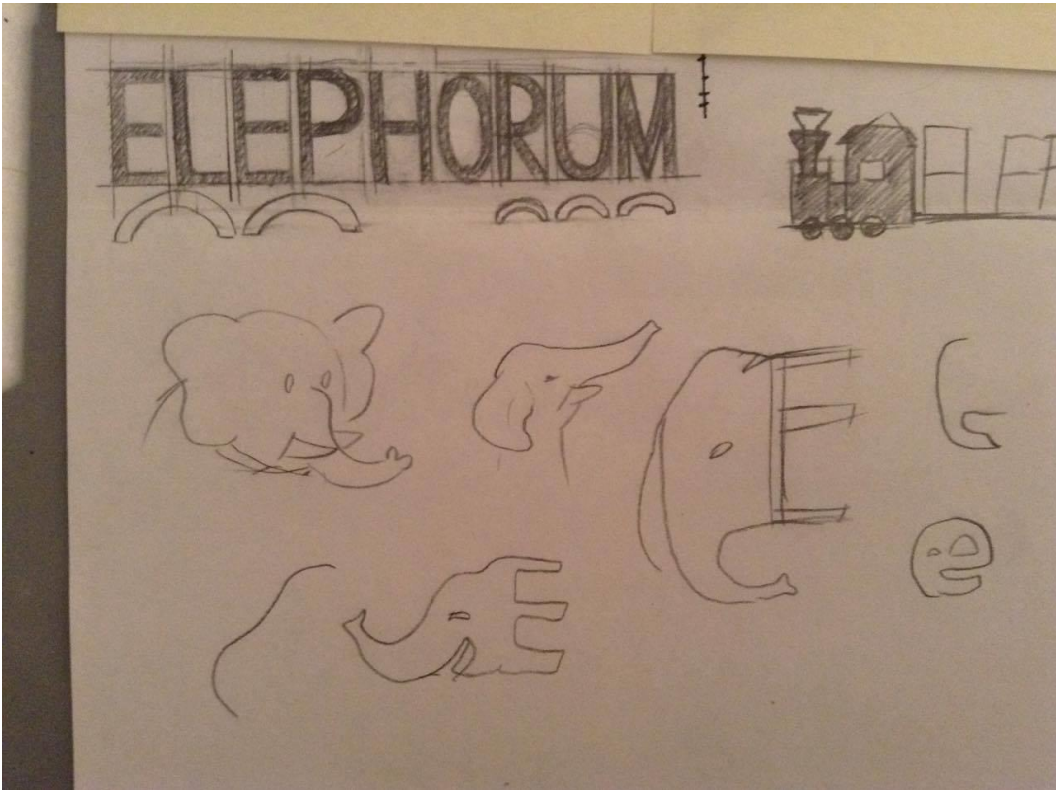
Appendix 3 (also on CD, sketches_design.docx): Sketches design

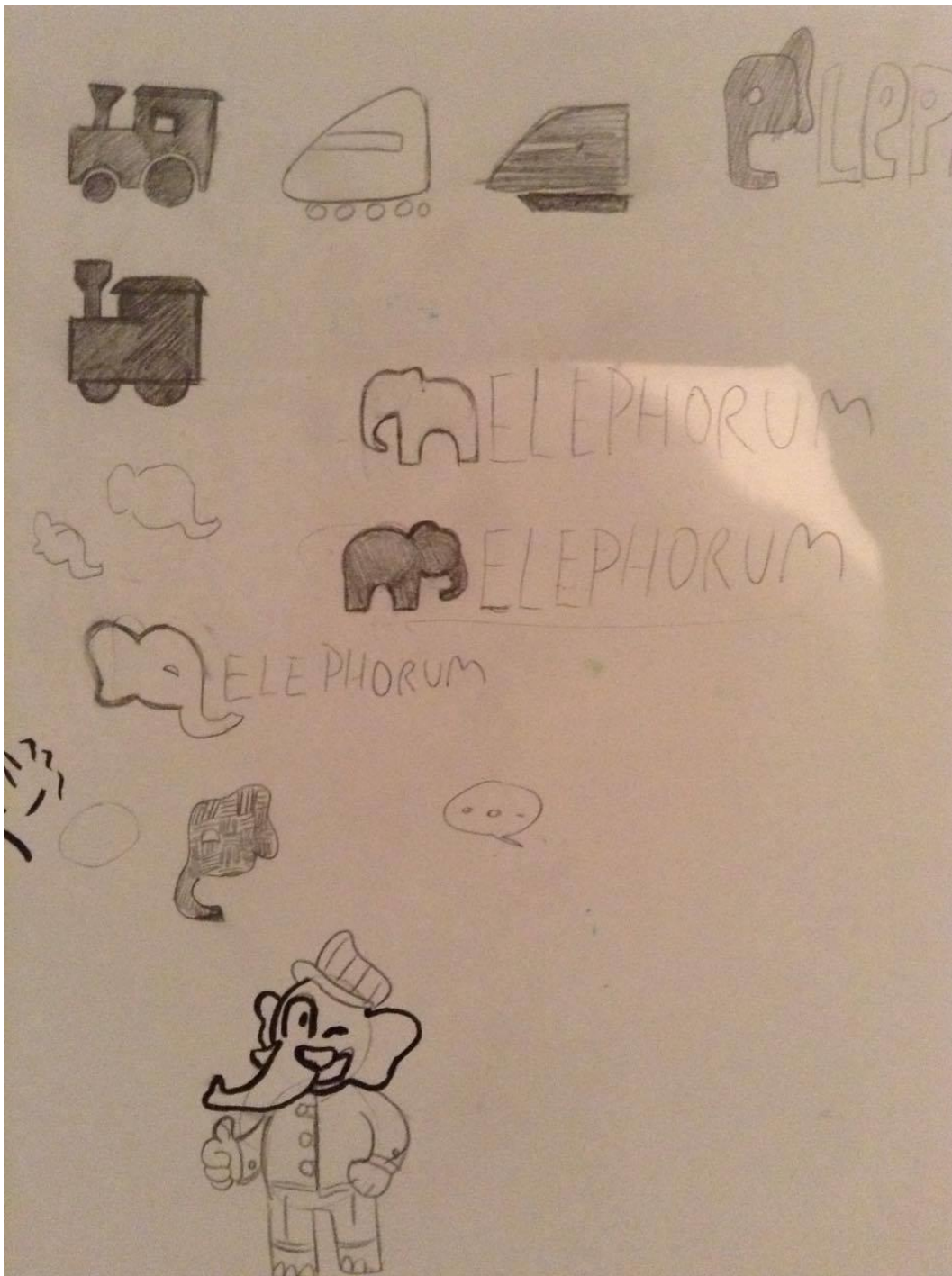




Appendix 4 (also on CD, sketches_logo.docx):
Sketches logo







Appendix 5 (also on CD, backend/README.md): Guide to deploy the backend

Note: make sure you have access to a terminal on your server

Step 1 - Prepare the server

Install composer

Automatic.

Install composer with the installation guide here on your server.
(<https://getcomposer.org/download/>)

After the successful installation composer is then available in the shell as: `composer`.

Manually.

Note: `composer` is just available as long as the file is in the project root

Download the `composer.phar` and move it into the project root of the backend. After the `composer.phar` is in the project root, composer is then available as `php composer.phar` in the terminal.

PHP version

Check if your PHP version is at least v5

Step 2 - Prepare the files

Note: you can still change it when it is uploaded to the server

TODO - - CORS to the frontend page

Step 3 - Upload the files

Upload now the backend, with or without `composer.phar`, to the folder on the server where it is accessible by the domain.

Example:

`api.elephorum.com` points to `/var/www/api.elephorum.com/`. So the backend should be uploaded to `/var/www/api.elephorum.com/`

Step 4 - Install vendor with composer

Note: if composer is installed manually, type `php composer.phar` instead of `composer`

Change the directory on the server terminal to the project root of the backend and execute following commands:

```
composer install
composer dumpautoload
```

Step 5 - Setup database and change .env

Database settings

Note: make sure that you have a MYSQL database installed on your sever, preferably accessible by `DOMAIN/phpmyadmin`

Make a new database and a new user on your MYSQL database. Make sure that the new user has full access to the new created database only.

In the `.env` file of the project root there are several options stored, also the database options. In this file you have to change couple of constants:

DB_HOST. should be `localhost` or `127.0.0.1` - depends on your settings

DB_DATABASE. to the name of the new created database

DB_USERNAME. to the name of the new created username

DB_PASSWORD. the password of the user of DB_USERNAME

Email settings

In the ``.env`` you can change the email settings at the section with the ``EMAIL_`` prefix.

Options:

MAIL_FROM. the mail where it comes from -> your email

MAIL_NAME. the username of the email

MAIL_PASSWORD. the password of the email

MAIL_HOST. the SMTP / POP3 host (Gmail standard: smtp.google.com)

MAIL_SUBJECT_INVITE. the subject if a person gets invited

MAIL_SUBJECT_FORGOT. the subject if a person forgot his password

Step 6 - Migrate database

After setting up the database connection we are ready for the final step - the database migration, that all the needed data will be stored to the database.

Change the directory in your terminal to the project root of the backend and execute following commands:

```
php artisan migrate
```

```
php artisan db:seed
```

Errors?

Server response with 500 code

If the server response with a 500 it could be that ``.app/storage`` of Lumen has not the right permission. To fix that go into the project root of the backend in the terminal and type following command:

```
sudo chmod -R 777 app/storage
```

No files are uploaded

You either have no ``.uploads`` folder in the project root or not the right permission. To fix that write following command in the project root:

```
sudo chmod -R 755 uploads
```

Appendix 6 (also on CD, frontend/README.md): Guide to deploy the frontend

IMPORTANT This installation guide requires specific components on the terminal. Please make sure that you are familiar with the terminal.

1. Installation

Note: make sure NodeJS and NPM (v3+) are installed. You can find further information [here](https://docs.npmjs.com/getting-started/installing-node)

Note: make sure `bower` is globally installed. You can find further information [here](http://bower.io/#install-bower)

Go in the terminal, navigate to the project root and run following command `npm install`, this will automatically execute `bower install`.

2. Prepare for publish

Change necessary variables

To make sure the frontend will get all the information from the right server, you have to change the first two variables in the `.src/assets/js/app.js` folder, called `SERVERPATH` and `APIPATH`.

SERVERPATH. The variable `SERVERPATH` is for the URL where the backend (Lumen) is placed. It will be used for getting the uploaded pictures or extending the variable `APIPATH`

APIPATH. The variable `APIPATH` is for the folder where the frontend has to make the API requests. With the used Lumen framework it is usually in the `public/api/v1` folder

Make the application production ready

Note: make sure `grunt-cli` is globally installed. You can find further information here (<https://www.npmjs.com/package/grunt-cli>)

In order to make the application production ready, you have to go in the terminal and navigate to the project root. In the project root execute following command: ``grunt build:prod``

This will generate new directives. The most important one is ``./dist``, where the optimized code is ready for production. Do not delete it... **yet**

3. Publish the frontend

STEP 1

Prepare your server that your domain will point to a folder of your choice.

Example:

Your domain ``www.elephorum.com`` point at the server on the folder ``/var/www/elephorum.com/``.

STEP 2

Copy/Upload the content of the ``./dist`` folder into the folder where the domain will point to.

Check if the folder structure looks like following:

YOUR_CHOSEN_DIR_ON_THE_SERVER

```
└─ index.html
  └─ assets/
    └─ js/
      └─ ...
  └─ i18n/
    └─ ...
```

Important: it should not look like this: ``/var/www/elephorum.com/dist/``

STEP 3

Congratulations your frontend is ready on your server.

Appendix 7 – the CD.

The CD contains:

- The frontend non-production-ready in ./frontend (read README first)
- The backend non-production-ready in ./backend (read README first)
- The API documentation from Swagger in ./documentation/swagger-api.yaml
 - More info how to use Swagger on <http://swagger.io/>
- Appendix 1-4 with the given file name in ./documentation
- Appendix 5 in ./backend/README.md
- Appendix 6 in ./frontend/README.md