

Development of a new PS IRRAD Facility website

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Abstract

Repeated requests for information to the IRRAD team revealed a need for a new website for the CERN IRRAD Facility. The old website was analyzed to find out what can be improved. Users' requirements were also collected using questionnaire and interviews. Several paper, wire-frame and interactive prototypes were created to decide on the design of the website. The website was developed using mainly Semantic UI framework and some PHP for the server-side. It was deployed on CERN DFS and can be accessed at ps-irrad.web.cern.ch. The final result has design and content improvements and satisfies most of the user requirements.

1 Introduction

The IRRAD proton facility is located on the T8 beam-line at the CERN PS East Hall where the primary proton beam with a momentum of 24GeV/c is extracted from the PS ring. The facility is mainly devoted to radiation hardness studies for the High Energy Physics (HEP) experiments [1]. Several hundreds irradiations are done yearly at the facility (more than 800 objects were irradiated in 2017). The users community is relatively diverse including physicists and engineers from different departments at CERN and from partner institutions outside of CERN (CERN users).

To provide an efficient experience to its users IRRAD facility has been using software solutions in many parts of its infrastructure. One of these solutions is PS-IRRAD website that serves as the main source of information for the users and a means for the facility to communicate with its current and potential users. Making sure to have a well designed website would create a more pleasant experience on performing an irradiation experiment and would decrease the facility team members' time spent on communicating with users on a one-by-one basis.

2 Problem definition

There is certain procedure that the IRRAD facility users have to follow to carry out their irradiation experiments. They are supposed to be able to get most of the information about the procedure from the PS-IRRAD website. However, IRRAD team noticed that users are asking questions that have answers on the website. This means that the information on the website was not clear enough

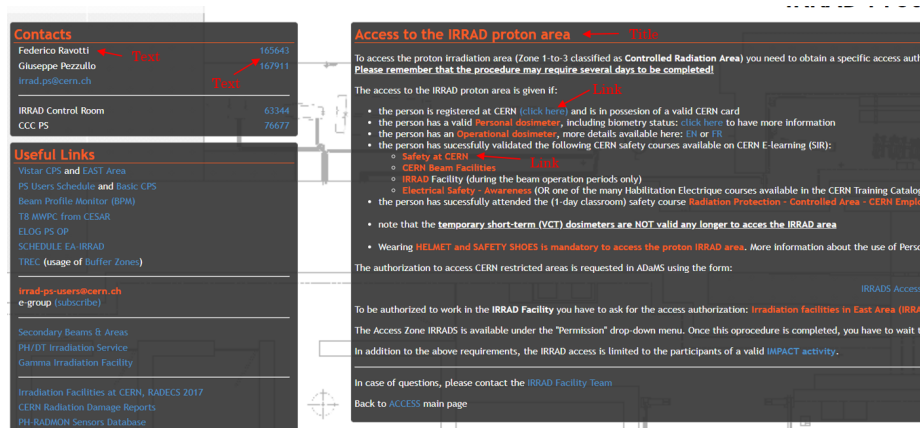


Figure 1: Inconsistency problems with the old website.

or not well presented. Since repeatedly answering similar questions was a time loss for both the users and the IRRAD team, a need for a new website arose.

3 Method

3.1 Analysis

3.1.1 Evaluation of the old website

To improve the user experience with a new website, it was necessary to first understand what was wrong with the old website.

To begin with, the old website was analyzed from the user experience (UX) design perspective. Heuristic evaluation of the website revealed that there were certain inconsistency problems like using styles for links, titles and body of the text interchangeably as shown in Figure 1. Also, font sizes were used not rationally so that the implying meaning behind the choice of size was unable to be perceived by the user.

Another problem was related to the "visibility of status", meaning the user had no means of identifying the page they were visiting. This is because when navigating to a page neither the URL nor the page title on the web browser changed. Some pages did not even have a title inside the content as in the example in Figure 2. This would cause confusion, especially for the new users who are just "learning" what menu item contains which information.

Moreover, some navigation problems were also present because navigating through pages did not change the URL. So the user couldn't use refresh, back and forward buttons as they would expect.

Further evaluation using the UX design principles revealed problems with alignment of page sections and images, as well as problems of legibility as light text on a dark background is not the best choice for content-heavy websites like IRRAD's. Another issue was the lack of progressive disclosure as too much information was given at once (instead information could be displayed on user prompt).

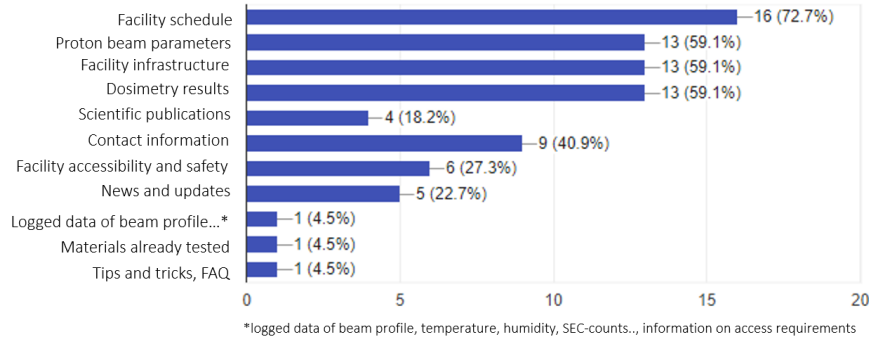


Figure 2: Which information the users are looking for on the PS-IRRAD website.

3.1.2 Requirements elicitation from the users

Along with the guidance of UX design rules, users' experience and needs are important parameters in defining the requirements for the website. It was necessary to understand common work-flows in the PS-IRRAD website (what exactly are the users using the website for?), learn more about users' experiences with the current website (what they want to stay and what to change?) and find out their further needs in terms of design and content (what to add?). To achieve these goals a questionnaire was prepared and sent out to a list of over 100 users consisting of people who used the facility in the last 5 years. The questionnaire received 22 answers over a week. Furthermore, some of the users were chosen to be interviewed based on their prior experience with irradiation experiments to obtain more detailed feedback. The interviews mostly took place in the users' offices and were carried out throughout a week.

Figure 2 shows what users think they usually look for on the website according to the questionnaire. Not surprisingly, people listed **Facility schedule**, **Dosimetry results** and **Proton beam parameters** as the most necessary information in the interviews as well.

According to the questionnaire and interview results, the users would like to see menu and navigation changes in the new website. For example, they reported that menu bar on top of the page was not very effective to navigate and that "Grey color gives the appearance of being inactive". They also had suggestions about content organization. They would like to see different topics divided more clearly and/or see the content organized like a step-by-step procedure. Moreover, they were dissatisfied with the text size and amount. They suggested to use less text and more visuals.

The users believe adding more information about previous experiments and having a help page would also be useful.

3.2 Design

After having a clear idea what are the requirements for the new website, the design process could start. Firstly, a few wire-frame mock-ups were drawn on paper. This helped to brainstorm and come up with different ideas for the design. The reason behind using wire-frames is that it makes sure that the

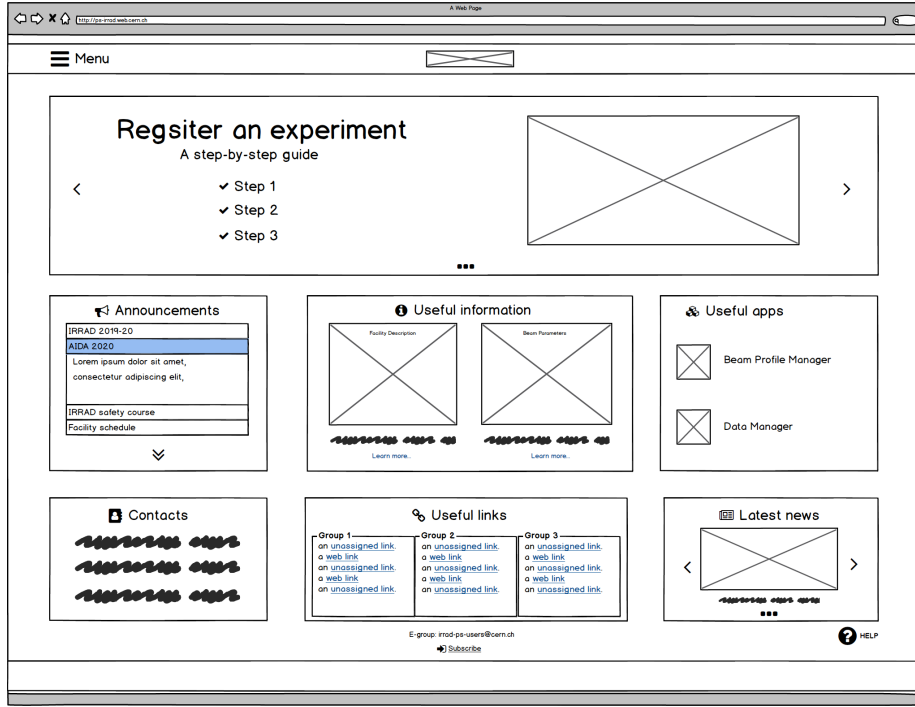


Figure 3: Wire-frame prototype of the website.

most important things on a website is highlighted even when the website is in black and white. The next step was moving these wire-frame prototypes to digital version. *Balsamiq Mockups 3* [2] was used as the tool for building the wire-frame prototypes because of its comprehensive functionalities and good tutorials. Since design is an iterative process, several versions of wire-frame mock-ups were created. Figure 3 shows one of the wire-frame prototypes.

After deciding on the "skeleton" of the website, an advanced prototype was created. There were several options like Marvel, Moqups, Proto.io and Framer in terms of the prototyping tool to use. Proto.io [3] was selected as it had a relatively flat learning curve and came with many ready-made components that would be useful in the design of IRRAD's website. Figure 4 gives an overview of the final prototype for the home page of PS-IRRAD website.

3.3 Implementation and testing

Before starting the implementation, it was necessary to decide which technologies to use. Because the website had minimal to no back-end side implementation, back-end language choice was PHP as it is easy to use and deploy. When it comes to front-end, a UI framework was necessary for efficiency and a better design. Semantic UI [4] was the choice since it is a light-weight and easy-to-use framework with human-friendly language that also has many out of the box components. To style elements using Semantic UI classes are added to the respective elements. Since the class names are intuitive, it is easy to learn, to remember and to understand the written code. For example for a list that aligns

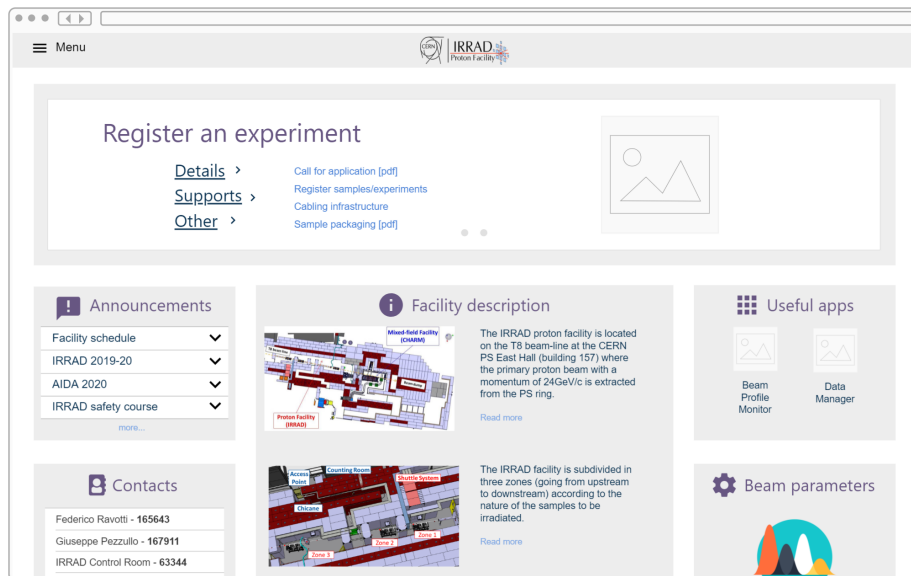


Figure 4: Interactive prototype of the website made with Proto.io.

its content to the middle and has divisions between its items you would write:

```
<div class="ui middle aligned divided list">
```

Semantic UI also has a good documentation and a considerably large user community because it has become one of the most popular front-end frameworks.

The project directory structure setup for the PS-IRRAD website is the following:

/admin - contains files that should be accessed with an administrative privilege only (protected with CERN SSO)

/add_news.php - the PHP file for the administrators to add news items

/advanced_tools.php - the PHP file for the administrators to access cameras

eras

...

/assets

/doc - contains all the documents and papers included in the website. It has sub-folders named after menu headers. For example, since results page is under "After irradiation" menu header, its files is in **.../doc/after/results/...**

/img - contains all the images used on the website

/node_modules - contains project dependencies

/semantic - contains files required by the Semantic UI framework, including files containing custom changes to the styling. **/semantic/src/site/globals/site.overrides** is for custom CSS and **/semantic/src/site/globals/site.variables** is for adjusting variables defined by Semantic UI like font size, color hex values etc.). After changing these files it is necessary to run **"gulp build"** command to build the files in **dist** folder which are referenced in each of the pages.

The implementation started with the **/index.php** page which is the home page, as it is arguably the most important part of the website. Then, the parts that are present in all of the pages like header, menu and footer was created.

Since the same code is repeated across the website for the repetitive parts, separate *menu.php* and *footer.php* was created. The banner in the home page, displays last three news announcement entries. They are read from a JSON file called */all_news.json* that stores the news items and dynamically added to the page using PHP. The JSON file contains an array of JSON-encoded *News* objects which have *id*, *title*, *date*, *text* and *image* properties defined in */news.php* file. News class also has *get_news(\$num)* and *get_all()* member functions used to retrieve last \$num number of news items and all news items respectively.

All the other pages has the same basic structure. Menu and the footer are imported from *menu.php* and *footer.php* using PHP's *require_once* function. For example:

```
<?php require_once ("menu.php"); ?>
```

All the pages is structured as a grid of 16 columns divided in 2-12-2 manner. 12 wide column has a header inside and a segment containing all the main content of the page.

In some of the pages, because of small amount of content, the footer was above the bottom line of the browser window. To fix this issue several classes were defined to change the footer position to fixed (*fixed_down_900*, *fixed_down_1024*, *fixed_down_1201*). Since fixing it in all page sizes would overlap with the content in the devices with a small screen size, it is applied based on the screen width (apply if it is more than 900, 1024 or 1201).

The content of the website is mostly based on the old PS-IRRAD website with additions and modifications. Moreover, the archive of the irradiation experiments carried out from 2001 to 2012 that needed to be available for the users was also recovered in the new website.

3.4 Deployment

First, the website was deployed to a test folder in CERN DFS (*DFS/Websites/t/test-ps-irrad/*) for checking that everything functions as expected in an environment identical to production environment. After everything worked fine, the website was deployed to (*DFS/Websites/p/ps-irrad/*). The */admin* folder was configured to have SSO protection and the administrative privileges was given to *irrad-ps-staff* e-group. The website is in production since August 10th 2018.

4 Results

The final code (as well as all the previous versions) was uploaded to the GitLab repository *ps-irrad-website* that can be accessed at <https://gitlab.cern.ch/kgurban1/ps-irrad-website>. The repository is maintained by "irrad" group on GitLab. The final website can be accessed at <https://ps-irrad.web.cern.ch>.

5 Conclusion

The new website had design and interaction improvements as well as updated and more detailed content presented in a more organized way. Still, some pages on the website are to be added more information and some content is to be

updated in the future. Also, a bug was noticed in the news adding page for the administrator which is planned to be fixed.

Generally, most of the users' requirements collected in the beginning of the project were fulfilled. Plus, the technologies used are supposed to make it easier to maintain the website in the future and it should be relatively easier to add new content because of improved code organization.

References

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