

## Development of a tool for projects of biorefineries on the web (module 3: web tool development)

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### Abstract

The project intended to create an online, cross-platform, trustworthy tool, for conducting the preliminary planning for kraft biorefineries and its possible sub-products in a simple way, offering different levels of abstraction, and the possibility of users customizing their own modules which could be (if the creator so desires) uploaded to a database that other users could access and use the created modules.

### Key words:

Process Planning Tool, Kraft Biorefineries, Web Application Design

### Introduction

Often, when companies consider investing on the biorefinery field, engineers need to make a quick prospect of a new biorefinery plant. However, such a prospect is not so easily achieved, requiring the use of software involving a level of detail undesirable, or even requiring most work to be done manually.

This project comes to fill in this gap, offering a quick way to getting estimates of investment, return, maintenance values, and possibilities for harnessing sub-products in a modularized way, making use of block diagrams representing machinery of a Biorefinery, initially for cellulose and ethanol plants.

### Results and Discussion

The development of this project required extensive research for organizing all the ideas and expectations for the upcoming tool, in addition to how it should be developed and what features to focus on. Initially, said research was conducted exclusively with the development team and researchers at the faculty of chemical engineering, who also idealized the tool. The focus was to find out exactly what were their expectations, to get a better idea of the project scope, and to unify all the demands from different stakeholders. To this end, several techniques for project design were used, for example, brain-drawing.

The initial activities resulted in a clearer idea of the expected tool, but still required refining in order for the team to actually start the development. Subsequently several mock-ups and wireframes were developed so the team could choose which one fitted best their ideas, or even picking individual elements to combine. Based on various iterations of discussing alternative wireframes and mock-ups, the research and development team converged on a the mock-up seen in Figure 1, This mock-up was the basis for further development

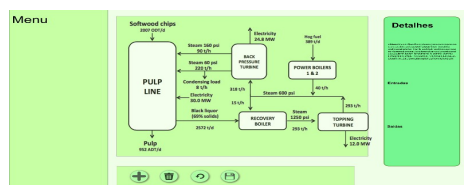


Image 1. Basis mock-up for further development

The creation of mock-ups, prototypes, and every ensuing design activity followed a cyclic design process<sup>1</sup>, inspired by participative design<sup>2</sup>, and making use of methods for clarifying the problem by Organizational semiotic<sup>3</sup>. This implied of a design process that consisted of several iterations of design and evaluation before reaching a final version

The next step was to develop prototypes that would better simulate the interaction of the user with the tool, so it was necessary to transform the static mock-ups into interactive prototypes. The developed prototypes underwent informal participatory evaluations in order uncovering new issues, giving ideas for new features for the web tool, as well as giving the first impressions of what shape the tool could take.

Various iterations of problem clarification and prototyping activities were conducted. However, there was not enough time to conclude the project. Its development should continue the next semester, entering into the actual development stage, since the most essential information and ideas were collected during this first part of the project.

### Conclusions

The project is still ongoing, it may require some more time to offer all intended functionalities. However, there is now vast knowledge of what exactly it is, and how it must be developed in order for it to fulfill all the expectations, while remaining highly extensible for future updates.

<sup>1</sup> Preece, Jennifer; Rogers, Yvonne; Sharp, Helen, *Interaction design : beyond human-computer interaction*. John Wiley & Sons, New York, USA. 2002.

<sup>2</sup> Muller, M. J., Haslwanter, J. H., Dayton, T. (1997). *Participatory Practices in the Software Lifecycle*. In *Handbook of Human-Computer Interaction (2nd Ed.)*, North-Holland, pp. 255-297.

<sup>3</sup> Baranauskas, M. C. C., Schimiguel, J., Simoni, C. A. C. e Medeiros, C. B. (2005). *Guiding the Process of Requirements Elicitation with a Semiotic Approach – A Case Study*. Proc. HCI International - HCI2005, 2005, 100-110.