–B. Sc. Thesis Proposal[*]–

Evaluation of requirements and implementation of a modern UI Editor

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Summary

The goal of the proposed thesis is to conceptualize and develop an UI Editor to create and configure Apps and Web-Apps for digital publishers. These Apps are based on an existing domain specific web framework, developed by `https://sprylab.com`. Apps are configured via dynamic resources, which contain all the styles, scripts and configs needed to render the customer's app on client devices. To enable the targeted user groups like internal developers, customer support and the customers (news and magazine publishers) to work more productive, I want to collect their current painponts and ideas for improvement through various HCI methods and develop a new web-app to fulfill their requirements better.

As a baseline, this means a fast and easy to use interface which prevents user errors from happening or gives feedback on their actions, while also giving more advanced users the abilities they need to do their changes. The editor to configure the Apps UI should be proceduraly generated from the source files of the framework and be performant enough to handle large configurations.

Contents

1 Introduction

The company Sprylab provides an software platform to publishers to provide their print- and digital content to their users. The user-facing part of that platform is an web framework based on Angular, which is rendered in Apps or as a Website and provides the customers components and data sources usually required by apps in this domain.

The app specific data is stored on ”dynamic resources”, which utilize a specific folder structure and contain common files used by web-apps, like static images, CSS and Javascript files, and the configuration files that declare the UI rendered by the app.

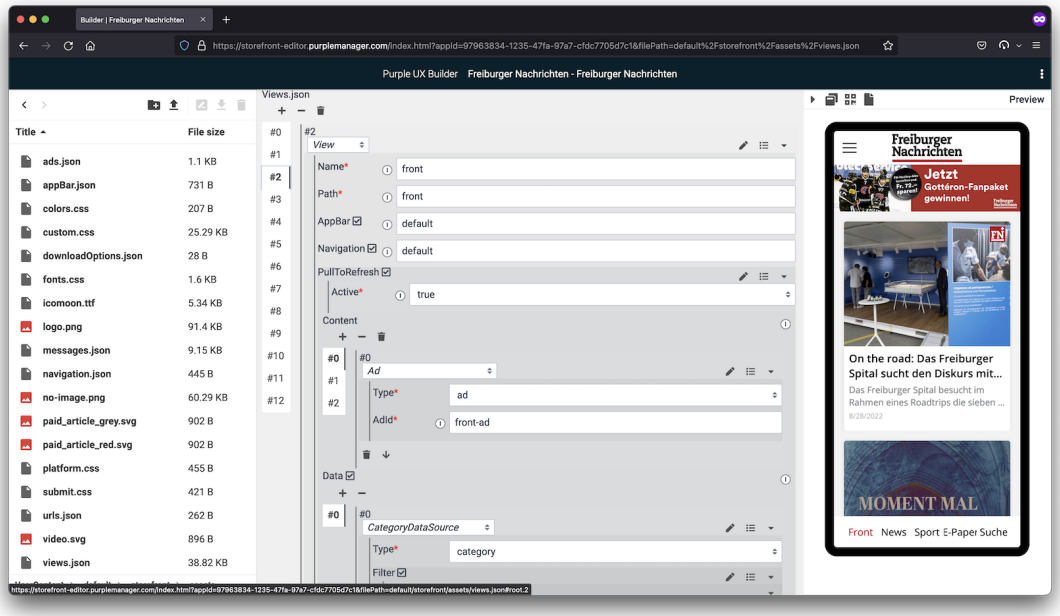
1.1 Motivation

Editing these dynamic resources by hand is tedious and error-prone, as the manual workflow consists of downloading a ZIP file, editing the contents and uploading without any validation before the resources are deployed to the app.

This requires a deep knowledge of the setup, what files and keys to put where, and still experienced users of the framework can easily introduce errors by misspelling a filename or putting a wrong component name inside the UI declaration files.

An existing attempt to have a web-based editor were not pursued with much ambition or proper requirements analysis to provide a pleasant user experience to users besides the original framework developers. Thus, current ”non-power-users” often struggle with slow performance, missing explainations or cryptic error messages.

Besides the often unpleasant user experience, it also suffered from bad developer experience, like non-optimal project setups and the limits of existing libraries that were used, e.g. to edit the UI declarations based on specific schemata.



An example of the current editor UI

1.2 Goal

The goal is to give the diffrent identified possible user groups an editor which enables them to work more productive, make less errors and get more interactive feedback from the system, so that there is less support needed by other entities like the framework developers.

This includes evaluating diffrent HCI methods to evaluate the current state as well as the diffrent needs of the users, and then using an agile development process to build an web based editor for the Purple Experience framework. The core of this will be an editor to edit the JSON files describing the App's UI, respecting JSON schema definitions and fitting the users diffrent knowledge and skill levels.

The contributions I aim to produce with this bachelor thesis are:

software — an web app and backend that serves and present the editor to clients, possibly contributions to open source libraries if required to fulfill the needs of the editor.

HCI discoveries — documentation to the diffrent methods and approaches used to gain the insight into the users, as well as evaluation of the results of these methods and how effective they proved.

user base knowledge better knowledge about what the diffrent user groups of the propsed editor are and can be, as well as their diffrent habits, knowledge levels, common mistakes and more.

Research question (proposals)

How does an editor for dynamic resources for users with different levels of expertise look like?

- What pain points can be solved by existing libraries and tools, which require new development or enhancement.

- How can we improve the user experience for all groups.

2 Background

Please add a sentence that summarizes what this section is about and what the reader can expect.

2.1 Context of the Project and Problem Description

Explain all the surroundings that are necessary to understand the broader context of your work. If necessary, give a brief introduction to non-HCI research literature as background knowledge. It is best to include a specific scenario[1]. If you are designing a piece of software or graphical user interface, please specify your users and the tasks the users want to perform with your software.

2.2 Related Work

This section consists of a literature review to situate your thesis in the scientific context. Which academic articles exist in your problem area, and how are they related to your work? When placing your thesis in the context of others, you need to consider other work, which uses a similar methodology or articles, who try to answer similar research questions.

The related work can be split into two (or even three) parts.

2.2.1 JSON Editor - generative UI

- Adamant: a JSON schema-based metadata editor for research data management workflows
- Understanding JSON Schema
- Interactive model driven graphical user interface generation
- JSON-GUI

Example Implementations which should get evaluated or taken as reference

- `https://github.com/json-editor/json-editor`
- `https://jsonforms.io/`

[1] Scenarios are defined as an *"informal narrative description". "It describes human activities or tasks in a story that allows exploration and discussion of contexts, needs, and requirements. It does not necessarily describe the use of software or other technological support used to achieve a goal. Using the vocabulary and phrasing of users means that scenarios can be understood by stakeholders, and they are able to participate fully in development."* [2].

2.2.2 Sources for HCI methods and UI design

- Methods and Qualities of a Good User Interface Design
- Book: Lern human computer interaction, Christopher Reid Becker
- Book: Interaction Design: Beyond Human-Computer Interaction

2.3 Research Questions

In this section, you should name your research questions. Your research question should be based on the observation that prior research has a gap and some misconception. You can use words such as *but* or *however* to indicate this. Make sure that your emphasize the significance of your research.

3 Methodology

Specify the overall methodology you want to apply in order to reach your goals and answer your research questions. We often apply the HCD process (cf. **??**): 1. Vision, 2. Analyze, 3. Design for Usability, 4. Construct and Deploy (Implementation), 5. Evaluate in Context, 6. Feedback. There is no predefined ready-to-use HCD process. You need to adapt the general process presented to your project. This means you need to think of specific methods in each step of the process. Please link your planned procedure to your goals. If your thesis follows a data science workflow, please adapt your methodology accordingly. It is not necessary to go through all the phases of the design process in detail, it is also possible to limit the number of iterations or focus on one particular phase. This depends on your project.

This chapter explains what method was chosen in the HCD process and why it helps to answer your research question.

Ref: "Learn Human computer interaction", 104 diagram

1st phase "discovery": assess currecnt situation through various User Research methods (taken from "Learn Human computer interaction", 132: Human Centered Methods for User Research)

- fly-on-the-wall method: observe without users knowing they are observed
- moderated observation: Create scenario for user and note the way(s) the users do the task
- user interviews: prepare questions on workflows, what they are missing, what takes most time
- Quantitative survey

2nd phase "development": build deployable prototype using agile development methods

- Evaluate methods from 1st phase on effectiveness and continue using them with test circle of persons
- Use SCRUM to plan work
- use CI/CD to allow fast iterations after changed requirements
- Build in Analytics / Tracking service for automatic user data evaluation
- A/B testing?

Briefly describe the relevant planned steps of your HCD process in the following sections.

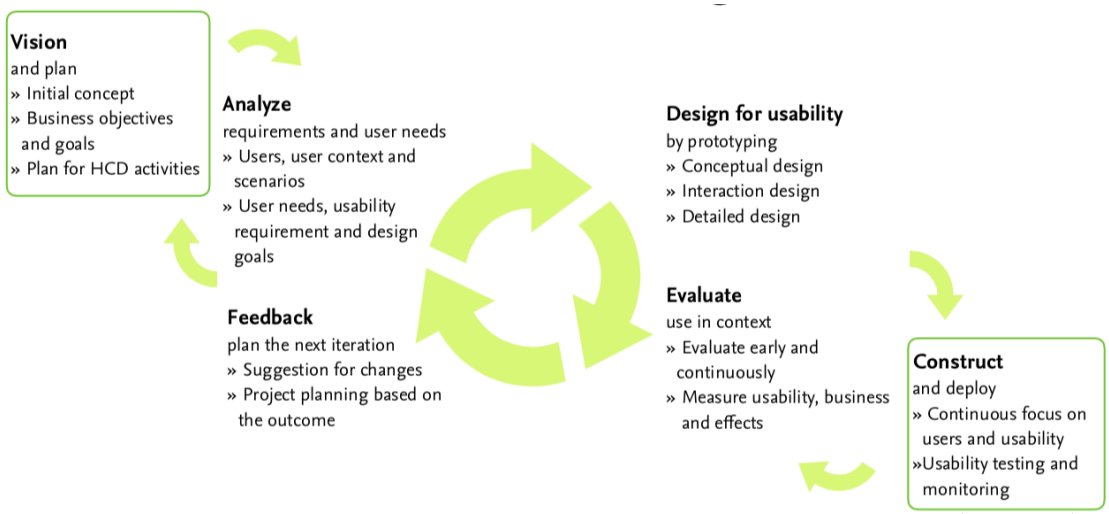


Figure 1: User-centered System Design process by [1]

	Distinction between Bachelor and Master Thesis
B. Sc. Thesis	The implementation phase is mandatory.
M. Sc. Thesis	The evaluation phase is mandatory.

3.1 Analyze

3.2 Design for Usability

3.3 Construct (Implementation)

Especially in a B. Sc. thesis, an important part is the description of the technical concept. Even though in the proposal, this cannot be done in detail, the main libraries and the general architecture of the application should be outlined. Please use diagram types from the Unified Modeling Language (UML)[2] for these details.

3.4 Evaluation

[2]For further information, please check `https://en.wikipedia.org/wiki/Unified_Modeling_Language`.

4 Project Plan

It is useful to understand a Bachelor and Master thesis as a project. Projects are based on a plan, and each plan needs milestones[3] and a timeline. Thus, in this section, you will break down your thesis project into manageable and specific milestones to realistically estimate the time you need. Especially if you use methods for the first time, we recommend to discuss this timeline with your supervisor. Please describe each milestone, what do you exactly do in that phase, in what order, what is the result or outcome of each step, and how does it contribute towards the goal of your thesis. As a result, you will outline a detailed timeline for your upcoming research.

According to the exam regulations: a Bachelor thesis[4] takes about 360 hours (12 LP) and a Master thesis[5] is calculated with 900 hours (30 LP).

- ☐ Calculate the hours you can effectively work on your thesis per week.
- ☐ Write down the planned date of handing in your thesis.
- ☐ Include up to 40 % buffer in case of unforeseen problems (e.g., sickness, vacation).
- ☐ Include a Gantt-Chart.

4.1 Milestones

Specify the milestones of your upcoming project. Please describe when you plan to achieve which milestone and what artifact(s) or outcome will result from each milestone. Also, keep in mind what the goal of each milestone is.

[3] By milestone we mean a collection of tasks, which need to be finished by a specific date. You can also call it a work package.

[4] Please read § 10 of the Study and Examination regulations for the bachelor's degree program: `https://www.imp.fu-berlin.de/fbv/pruefungsbuero/Studien--und-Pruefungsordnungen/StOPO_BSc_Inf_-2014.pdf`, accessed May 16, 2021

[5] Please read § 9 of the Study and Examination regulations for the master's degree program: `https://www.imp.fu-berlin.de/fbv/pruefungsbuero/Studien--und-Pruefungsordnungen/STOPO_MSc_-Inf_-2014.pdf`, accessed May 16, 2021

M1	**Milestone — Literature Review**
Due date	2021-05-26 (Week 2)
Tasks	Identifying and read other studies/thesis/papers evaluating the usability of chatbots in a medical context
Outcome	A list of relevant papers (e.g. folder in Zotero). A written summary for each paper. A final text summarizing the main findings and approaches, which might be useful for my project.
Goal	General understanding of methods to evaluate the usability of chatbots in the medical context. Having a good foundation for discussing my results in the context of other people's work.

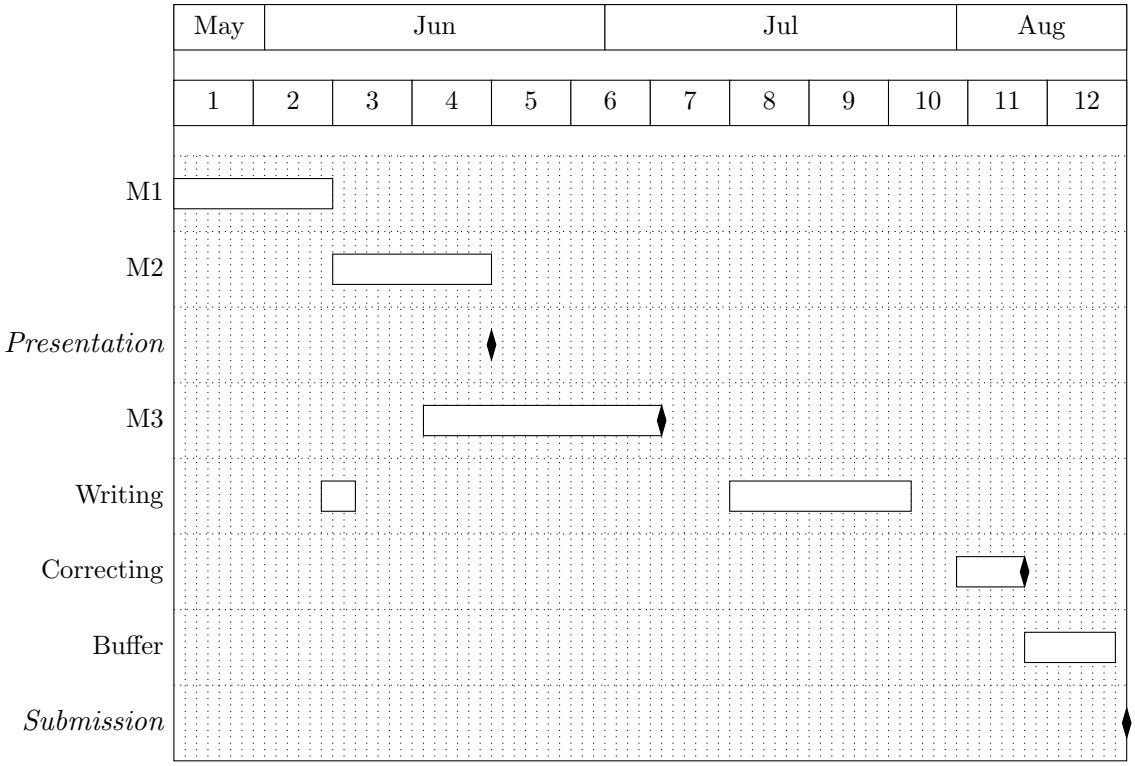
M2	**Milestone — Evaluate Wikipedia's Advanced Search Interface**
Due date	2021-06-15 (Week 4)
Tasks	Prepare, conduct, and evaluate a remote usability test with four participants.
Outcome	Moderator script for conducting the usability test. Affinity diagram with thematic clusters and headlines. A list of usability issues sorted by severity.
Goal	Understanding the drawbacks of the current Wikipedia advanced search in order to (re)design a new interface.

M...	**Milestone — ...**
Due date	
Tasks	
Outcome	
Goal	

M5	**Milestone — High-Fidelity Prototype**
Due date	2021-08-15 (Week 15)
Tasks	Implement the final design and the main features with HTML and CSS.
Outcome	Repository with code and data on GitLab. Deployed on Heroy and public link.
Goal	Interactive prototype, which is deployed and ready for testing.

4.2 Timeline

Now you need to transfer the milestones into a timeline. The time for your thesis will help you to set realistic time goals and maybe reconsider milestones. Use a Gantt chart[6] for visualization. Please consider what tasks you can do in parallel. Also indicate how you will handle the writing process within your timeline.



[6]Check out Wikipedia for an extended overview of project management software that fits your needs: `https://en.wikipedia.org/wiki/Comparison_of_project_management_software`. For example Ganttproject is free of charge and open source: `https://www.ganttproject.biz/`, accessed: May 26, 2021

5 Preliminary Outline

Make the first proposal for an outline of your thesis. You can adapt the following example to your needs and the type of thesis you are writing. If your thesis focuses, for example, on data science (e.g., machine learning), you should include a separate section for *(Model) Performance Analysis* and a separate *Results* section. The theoretical background should consist of definitions of significant concepts and terms and introduces your methods, approaches, and theories. The Discussion Section must include a reflection on your main results in the light of related work and your research goal and questions.

1 Introduction

1.1 Motivation

1.2 Research goal and question

1.3 Research approach and methodology

2 Theoretical Background

3 Related Work

3.1 Related software

3.2 Related studies in this field

4 Analysis

4.1 Define the data collection methods (e.g., observation)

4.2 Specify conceptual models

4.3 Derive requirements

5 Design Process

5.1 Low-fidelity prototype

5.2 High-fidelity prototype or final design concept

6 Implementation

6.1 System architecture

6.2 Technical implementation

7 Evaluation

7.1 Set up the study design

7.2 Present study results

8 Discussion

9 Conclusion

9.1 Limitations

9.2 Future Work

References

[1] J. Gulliksen, B. Göransson, I. Boivie, S. Blomkvist, J. Persson, and Å. Cajander. Key principles for user-centred systems design. *Behaviour & Information Technology*, 22(6):397–409, Nov. 2003.

[2] J. Preece, Y. Rogers, and H. Sharp. *Interaction Design: Beyond Human-Computer Interaction*. Wiley, Chichester, fourth edition edition, 2015.