

FAF.PCAIT21.1 Fall 2023

PBL Project Guideline

Handed out: September 8, 2023

Preliminaries

According to Startup Genome, 90% of all tech startups fail. Some of the more prevailing reasons for a startup to fail are: no market need caused by insufficient market research, being out-competed because of improper competitor analysis or having an outright flawed business model. While not guaranteeing success, a proper Conceptual Design of an IT Application (PCAIT) can greatly increase the chances of success by understanding whether the project is viable, even before actually implementing it. [1][2]

The Problem-Based Learning model (PBL) is often used for gaining knowledge about problems ranging from ones felt by a single human being to those influencing whole societies. This model is based on several essential design elements. It is important to always challenge the problem or solution that is being analyzed, as it helps teams detect when their project takes on a wrong turn. Critique and revision aims at enhancing the learning process, striving to always find the right problem definition or solution for their target groups. Reflections represent a tool to analyze data and make decisions based on how one feels about the project, the learning process or the solution itself. Many goals of PBL align well and are quite similar to the goals one has in the early stages of developing a startup. [3]

As such, this project aims at providing the students with an opportunity to learn in a PBL environment, while also developing skills needed to methodically approach any type of IT project such that it will (most likely) succeed.

Getting Started

The project will kick-start with a pitching and team creation session. You will go through a process of initial idea validation to find groups of peers interested in a similar topic / idea.

Next time you meet with your team after the pitching, you'll learn about who is your university mentor. It is important to connect with your mentor because no one will do that for you. Their task will be to provide guidance and help you with your questions. A good idea for the team leader is to interface with the team's mentor and create a favourable working environment. Also, the team leader should define communication channels between team members and *de* mentor as well as find tools to manage the team's tasks. Be proactive and try to include every team member in the work process. Base any communication between yourselves, or the mentor, on respect.

After connecting with your mentor, your team will need to formulate a Project Proposal. You'll need to describe your Idea Background and why this topic is important for you. Continuing, you should define your Research Question / Statement – a short one sentence description

of the problem you will be working on. If you are aware of any Existing Solutions, these should also be mentioned in the proposal. Finally, cover the Purpose of the Project – what values your findings will provide.

The project proposal is meant for your mentor to help you validate your idea. It can be found [here](#) and needs to be filled in before you can start working on the project itself.

The Task: Midterm 1

For the first midterm you'll be working on:

1. Crystallising a Problem Description and performing Problem Analysis;
2. Proposing a Solution;
3. Defining a Target Group and carrying-out Customer Validation;
4. Performing Comparative Analysis.

Before anything else, you'll need to develop the problem statement from project proposal into a more complete Problem Description. A good problem description should mention who is this problem for, why is it a problem, which stakeholders are involved, why is this problem relevant and why is there a need to investigate this.

When doing Problem Analysis, you should consider all aspects of your problem. An important part of problem analysis is the influence of the problem on the domain it belongs to. As such, start by performing Domain Analysis then write about the effect your problem has on it. Finally, you should end up with a Problem Statement – a one-sentence definition the problem you've analyzed.

After defining the problem statement, you should work on proposing a Solution. This should represent an initial vision of a system that solves the previously defined problem. Write about how your solution solves the problem and which scenarios / parts of the problem it solves. Provide a scenario / user story which describes how a potential user will interact with your system.

Continuing, you'll need to create a Value Proposition canvas – a tool that will help you understand whether your proposed solution is positioned well around your user's values and needs. Similarly to a problem statement, this chapter should conclude with a Value Proposition one-sentence-formula which describes the solution. Such a sentence should be understood by someone familiar with the problem but hearing about the solution for the first time. [4][5]

Coming next, analyze potential Target Groups to which you will be tailoring your system. A target group represents a collection of people united by a common problem your solution promises to solve. Imagine User Personas – fictional characters that would be more than happy to use your solution. They are archetypal users and are representing your target groups. [6]

Define hypotheses (i.e. assumptions / guesses) about your solution's features and about your target groups. Your hypotheses should be related to the problem you are trying to solve. To find

out if a hypothesis is correct, you'll need to validate it with real users (but that comes later). As such, prepare Questions for potential customers that would help you better understand them. You may want to incorporate details about your Business Model or Funding Strategy to provide a more comprehensive understanding of how your venture aligns with market needs and financial sustainability.

After completion, your project would not exist in a vacuum. Other companies might provide similar solutions or serve similar target groups and, as such, might heavily influence the success of your project. A Comparative Analysis aims to juxtapose your proposed solution with those that already exist and are your competitors. You should create a Comparative Table analyzing features of your solution versus the solutions of your competitors.

SWOT analysis is the go-to tool for placing your solution in the context of others. You should conclude this chapter by creating a SWOT table and analyzing your solution's strengths and weaknesses, as well as the opportunities it provides and possible threats.

The Task: Midterm 2

For the second midterm, you'll be working on:

1. Validating your Idea;
2. Rethinking and Pivoting;
3. Modelling your system;
4. Visually representing your solution.

To Validate your Idea, start by better understanding the people that will use your system. Ask the questions you've prepared to potential users and see whether your hypotheses are good or not. Record videos and make photos of these interviews to refer to them when documenting your findings. Then, analyze your results.

Concluding on the results of the validation, you'll either confirm all, some or none of your hypotheses. If some of your hypotheses were not validated, you'll need to adapt your current understanding of the problem or solution features and re-validate them. If none of your hypothesis passed validation, your team will need to Pivot. Rethink your problem definitions, solution or target groups based on the feedback you've received, then re-validate. It is perfectly normal (and even expected) for teams to pivot at this stage.

It is now time to actually model your application. Start by extracting the main and secondary Processes of your system from your solution description and model them via the use of UML Activity Diagrams. Then, continue by performing Requirements Analysis to determine the functional and non-functional requirements of your system. Analyse the way your users can interact with the system and encode this into UML Use Case diagrams. Finally, document any exchange of messages via the use of UML Sequence Diagrams.

You should conclude this chapter by creating Mockups of your application. Design how screens in you app would look like. Then, connect these mockups into User Flow Diagrams. These represent networks through which a user moves when navigating your application. [7]

The Task: Exam

For the exam you'll be working on:

1. Redacting / Typesetting your Project Report;
2. Preparing each other for the exam.

After receiving feedback from the second Midterm, it is now time to finalize your Project. Make sure to follow your mentor's instructions on how to enhance your Report, what needs to be added and what needs to be re-done. After applying all the changes, you will upload the final version of the report on ELSE, print it out and bring it with you to the exam.

For the exam itself, expect an individual interview with your mentors. Brush up on theoretical concepts learned during the project and make sure that every team member knows about what other team members did in the project. The fact that a student did only part of the Project does not exempt them from needing to answer any question about any part of the Project.

Reporting

Because much of the work done in this project is hard to track (e.g. meetings, research etc.), the ability to efficiently record and report your work is very important. In this project, reporting your work should be done via so called deliverables – things written and submitted for mentors to review. Your deliverables in this project are the Project Report, Midterm Presentations and Meeting Notes.

The report is the bread and butter of this project. It represents your team's whole semester of work, organised and easy to read. A Report Template can be found [here](#) and should provide everything you'd need to just start filling it in with text and info. The report's main part is the text you write there. You are required to use L^AT_EX for text editing (a safe choice is [Overleaf](#)). Also, consider using [Grammarly](#) – it's a free tool that will help you fix not only spelling but also bad grammar and awkward sentence formulations.

The aim of the midterm presentations is to familiarize the audience (your peers and the mentors committee) with the work presented in the report. During presentations, try to explain what did you do, how did you do it and why did you choose to do it like you did. Bring arguments, cover only the important stuff and keep your presentations interesting and visually appealing. Presentations should mimic your report structure.

Meeting notes are an integral part of this project. These should be done after each team meeting, with or without your mentor. Meeting notes aren't necessarily graded but can be used to determine the efficiency of teamwork, which is an important factor in grading the whole team.

The Meeting Notes form can be found [here](#). Remember that any effort that is not documented cannot be appreciated / graded, so report diligently.

Evaluation

The final grade for this project will be calculated as follows:

$$\begin{aligned} final_grade &= 20\% \times individual_midterm1_grade \\ &+ 20\% \times individual_midterm2_grade \\ &+ 20\% \times mentor_grade \\ &+ 40\% \times final_exam_grade \end{aligned}$$

Both the mentor grade and final exam grade are given to you individually. However midterm presentations are going to be team presentations for which you will receive a team grade. Individual midterm grades will then be calculated as follows:

$$individual_midterm_grade = team_midterm_grade + individual_correction$$

For both Midterm 1 and Midterm 2 presentations, each team must submit a list of corrections in which they appreciate each member's contribution to the project. Below are 2 examples of such a list:

Team 1

Andronic G. 0
Popova Z. 0
Zamfir I. 0

Team 2

Popa A. 0
Cusnir A. +1
Petrov O. +1
Ivanov I. -2

You will submit 1 list of corrections per team. The possible correction values are $[-2.5, -2, -1.5, -1, -0.5, 0, 0.5, 1, 1.5, 2, 2.5]$, and their sum should always be equal to 0. After the presentation, a student's individual midterm grade will be calculated by the formula above. If, for example, both Team 1 and Team 2 have received an 8 for their presentations, their individual marks will be as follows:

Team 1

Andronic G. $8 + (0) = 8$
Popova Z. $8 + (0) = 8$
Zamfir I. $8 + (0) = 8$

Team 2

Popa A. $8 + (0) = 8$
Cusnir A. $8 + (+1) = 9$
Petrov O. $8 + (+1) = 9$
Ivanov I. $8 + (-2) = 6$

As such, these corrections could be used to appreciate teammates that had a significant input to the project during the half-semester. Conversely, the corrections could be used to penalize teammates which did not prove helpful in the team during the project.

Good Luck!

References

- [1] Startup Genome. “The State of the Global Startup Economy”. <https://startupgenome.com/article/the-state-of-the-global-startup-economy>.
- [2] CB Insights. “The Top 12 Reasons Startups Fail”. <https://www.cbinsights.com/research/startup-failure-reasons-top>.
- [3] PBLWorks. “What is PBL”. <https://www.pblworks.org/what-is-pbl>.
- [4] Daniel Pereira. “What is the Value Proposition Canvas”. <https://businessmodelanalyst.com/value-proposition-canvas>.
- [5] Joe Weller. “Free Value Proposition and Business Positioning Statement Templates”. <https://www.smartsheet.com/value-proposition-positioning-templates>.
- [6] Patrick Faller. “Putting Personas to Work in UX Design: What They Are and Why They’re Important”. <https://xd.adobe.com/ideas/process/user-research/putting-personas-to-work-in-ux-design>.
- [7] Amanda Athuraliya. “How to Make a User Flow Diagram”. <https://creatly.com/blog/diagrams/user-flow-diagram/>.