Lappeenranta University of Technology
School of Engineering Science, Software Engineering
Degree Program in PERCCOM

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VIRTUAL LEARNING CENTRE - SLIPPS

Shared Learning from Practice to improve Patient Safety

ABSTRACT

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Virtual Learning Centre - SLIPPS
Shared Learning Experience from Practice to improve Patient Safety
Project Report

43 pages, 21 figures, 3 tables, 3 appendix

Keywords: software project, project report, elastic search, medical experience, learning events, python, Django, Reactjs/Redux, PostgreSQL

The goal of the project was to create a platform for healthcare students and professionals to share their experiences. The project was aligned with Learning Event Recording Tool (LERT), the primary source of practical experiences. The main constraint was to preserve confidentiality of reported experiences. The project was also required to provide multilingual support. The work resulted in a web platform with search functionality and new learning experiences document upload. The databases of learning events and keywords were made to be managed by admin user. Technologies learned by team members during the project allowed to fulfill necessary requirements and practice their software skills.

ACKNOWLEDGEMENTS

The team would like to express appreciation to the Running a Software Project course leaders, Prof. Jari Porras and Victoria Palacin Silva, for providing project topics, maintaining frequent contact with project owners and guiding the course teams through the design, implementation and testing stages of the project. The team would also like to acknowledge the LERT system developer, Jaakko Tuuri, LUT Bachelor's Degree Student, for insight on integration format of LERT reports to SLIPPS platform. A special gratitude for project owner meetings is again given to Prof. Porras.

TABLE OF CONTENTS

LIST OF SYMBOLS, ABBREVIATIONS AND NOTATIONS

Categories	Field of study to which keywords respond
Keyword	Medical terms used for referring to learning events
Learning event	Practical experiences of medical students and/or professors in the form of fixed questionnaire
LERT	Learning Event Recording Tool
SLIPPS	Shared Learning Experience from Practice to improve Patient Safety
VLC	Virtual Learning Centre

1. INTRODUCTION

1.1. Background

SLIPPS (Shared Learning from Practice to improve Patient Safety) is a platform developed to improve patient safety by enabling students and professionals in healthcare to share learning experiences. It is a part of an Erasmus+ funded Patient Safety project with the same name. The platform supports basic functionality of a search engine allowing users to discover various cases with the help of medical terms identified as 'keywords'. The primary source of these experiences are the practices conducted by healthcare students. Upon completion of practical tasks, students fill in questionnaires about their experience as part of a survey. This survey is then reviewed and uploaded to the platform through LERT, Learning Event Reporting Tool. LERT is a separate piece of software aimed at managing students' questionnaires by medical professors.

The uploaded experiences are stored in the system as 'learning events'. Users can register to upload new learning events and search for them by various criteria. The learning events and keywords databases are extended after user suggestions, which are necessarily followed by administrator revision. Thus, the platform is developed to allow users to share their own experiences in an effort to develop a virtual learning center, which can become a source of information intended to provide patient safety across borders.

1.2. Goals and delimitations

The main goal of the project was to create a virtual learning platform for healthcare students and professionals. This platform is aimed at providing access of accredited users to learning materials created by other users or medical students to exclude similar mistakes in practice. The most important goals were to:

- ***Guarantee confidentiality of reported learning events***

  Providing that medical experiences might concern patient sensitive data, confidentiality must be guaranteed to protect patient rights.

- ***Provide multilingual platform***

  Given that the EU SLIPPS project covers institutions from different countries, multilingual support is recommended to be in place.

- ***Implement search functionality***

  Search function will allow users to learn from learning events which correlates with their interest.

- ***Create an extendable platform, where keywords, other criteria are crowdsourced***

  Users involvement in sharing and learning activities correlates with the main goal and is beneficial to the project itself, since their help will allow to extend initial databases.

- ***Perform data analysis, which tracks user searching activity***

  Data analysis is important for extending the platform's content.

- ***Allow admin to manipulate users accreditation and databases***

  Sensitive data must be approved by verified user who should act as an administrator to keep reliability of the platform.

1.3. Structure of the report

The present section provides the vision of the project. Section 2 focuses on the stakeholder analysis and requirements elicitation. It is followed by designing stage reported in Section 3. Section 4 is dedicated to the system architecture which satisfies the requirements of Section 2. The next reported stage is platform testing which is represented in Section 5. The report is concluded with the group's learning outcomes and challenges which it faced during the project work.

2. PROJECT

2.1. Project Theme

The principal theme of the project was Virtual Learning Centre (VLC) development. The SLIPPS learning centre was designed as a platform for discovering and sharing learning events. These main features of the learning centre are included to allow users share and gain knowledge through the platform.

The project was divided into stages corresponding to the current report outline. The stakeholder analysis helped the team identify users and influential parties, design steps were used to model use cases and foresee essential functionalities as well as analyze representativeness of the mockups. The development stage was crucial for actual creation of the system and also for team members' to learn new technologies and documentation process. The testing event allowed the team to engage real target users and analyze their expert feedback to improve the development solutions.

The SLIPPS platform is a valuable project for the following reasons. Firstly, it serves the educational purpose for medical (future) professionals and allows them to learn distantly using peer experiences. Moreover, distant learning reduces the carbon footprint, since it can reduce traveling of medical students and professors for personal meetings. Secondly, the project applicability is motivated by the real customer, the EU SLIPPS team, which approved that the project met their requirements and expectations during a video-conference meeting and testing event trials. Considering these arguments, the project theme is relevant and each project step serves its particular purpose.

2.2. Stakeholder analysis

The team performed stakeholder analysis in the form of corresponding matrix, which is available via the link:
https://github.com/rahafrouz/SLIPPS/blob/master/requirements/SLIPPS%20Stakeholder%20Analysis%20Matrix.pdf.

The matrix is organized to show primary stakeholders before secondary and tertiary ones. Their influence on the project is proportional to their primary/secondary/tertiary role and vary from frequent use and imposing strict requirements to occasional use and low-priority requirements.

The majority of the project stakeholders have strong connection with the medical field of study and work. The system, thus, should be adapted to their use with regard to the language and user flow which should be understandable for average user of technologies.

2.2.1. Customer

Primary stakeholders are composed from the EU SLIPPS project team and LERT developer. The EU project is described in the Background Subsection 1.1. This customer needs two systems: open knowledge sharing platform SLIPPS of international level and questionnaire-based students feedback collecting tool LERT of local use on the university level. The customer is a group of medical professors and researchers. This group does not have a stable headquarter, for this reason the contact person connecting the team and the EU project has been Professor Jari Porras, who has explained the project vision and platform main features.

2.2.2. Users

Other primary stakeholders are primary users, namely medical students and professors, as well as doctors and researchers. They influence the project the most, implicitly or explicitly imposing functional and system requirements. They use the system for educational purposes and information acquisition.

Secondary stakeholders are represented by nurses, healthcare institutions, universities' medicine faculties and governmental healthcare organizations. They are also secondary users of the system. Their interest in the platform use is assumed to be lower than that of primary users, because they use it for non-educational purposes (except nurses and faculties), but for the regular check of fault reports. This group included medical translators in the initial step of the project, who were further omitted from the list of current project stakeholders, because functionality of the platform made their prospected engagement lower than that of other stakeholders. Tertiary users are patients and medical equipment producers who might use the system to discover bad practices and misuse of their instruments correspondingly.

2.3. Requirements

Initial list of requirements was wider than the final one. The initial requirements were agreed upon during first meeting with the customer representative. These requirements focused mainly on the search functionality, anonymity and multilingual support. Also, data analysis was one of the recommended requirements. After a month of working on those requirements,

additional requirements appeared in the same manner. They involved administrator functionalities of the system, user credentials check, up-/downloading of learning events and data collection from the search.

The detailed description of requirements is available in the full requirements document here.

The list of requirements self-descriptive titles is provided here.

2.3.1. Functional requirements

Function	Description	User role
Search by keyword	Accessible from front page, search by any single keyword user enters.	All users
Advanced search	Allow users to search by more criteria: - Country - Language - Date range (date when the event is created) - Combination of keywords	All users
View search result details		different display based on user role
Register an account		Guest users
Login		Guest users
Logout		Registered users
View/Edit account details		Registered users
Upload a learning event		Registered users
Providing statistics of search activities	High level data collected from user's search history	Admin
Manage users	Create/Edit/Delete user accounts.	Admin
Manage data	Create/Edit/Delete data stored in system.	Admin

Table 1. SLIPPS Project Functional Requirements

2.3.2. Non-functional requirements

Safety: Backup of external services

Security: Double anonymity check, User credentials check and User authorization.

2.4. Project plan

The project plan was prepared after the design stage according to the course plan. The team was divided into two parts: three people were main developers, three others helped in searching for the technologies. The team had two weekly meetings or two pair meetings. In the end of each group meetings the group checked that everyone clearly understood their tasks. Each team member had one major and one minor tasks for each week. He/she was the main responsible person for the major task and worked as advisory party in the minor task revising it and giving suggestions. Initial timeline was planned as followed:

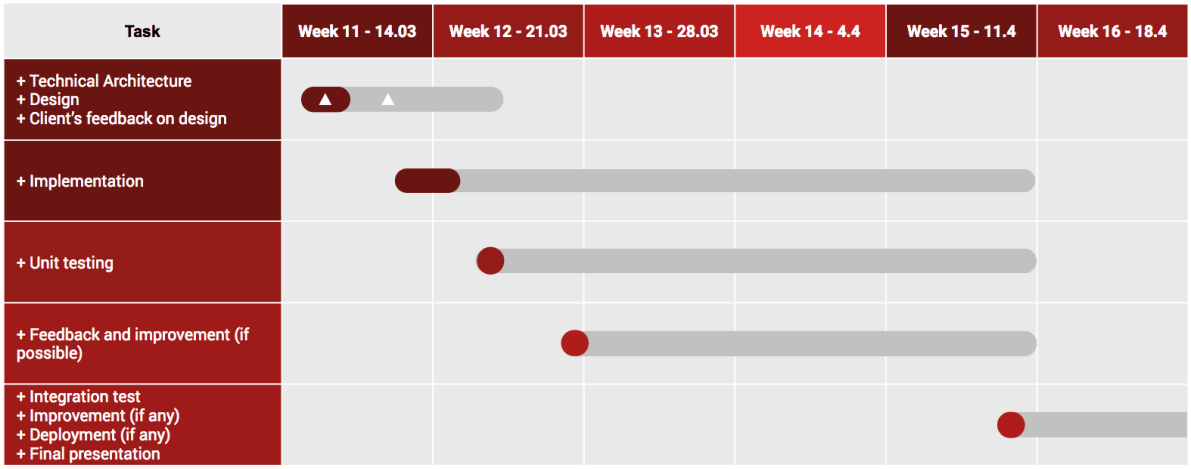

Table 2. SLIPPS Project Initial Timeline

The final project plan which included all the stages is shown below. Its analysis helped the team analyze that development part should start as early as possible, whereas on practice the team dedicated half the the project time in weeks to design and requirements analysis and only another half for time-consuming development. Nevertheless, weekly check-ups of the project progress in class and during the open testing event helped team adjust the design and functionalities to the absolute necessary requirements. The retrospective timeline is given below.

Task	Week 4 (17.01 - 24.01)	Week 5 (24.01 - 31.01)	Week 6 (01.02 - 07.02)	Week 7 (07.02 - 14.02)	Week 8 (14.02 - 21.02)	Week 9 (21.02 - 28.02)	Week 10 (28.02 - 07.03)	Week 11 (07.03 - 14.03)	Week 12 (14.03 - 21.03)	Week 13 (21.03 - 28.03)	Week 14 (28.03 - 05.04)	Week 15 (05.04 - 12.04)	Week 16 (12.04 - 18.04)
Project Initiation, Stakeholder Analysis, Personas, Scenarios, Journey Maps													
Requirements Specification													
Prototyping													
Project Planning & Choice of Technologies													
Suporting Documentation (Terms of Use, Questionnaires)													
Frontend													
Backend													
Testing Plan													
Testing													
Integration Testing													
Improvements on Layout, Search and Admin Functionalities													

Table 3. SLIPPS Project Retrospective Timeline

3. USER EXPERIENCE DESIGN

The initial stage in project development is the user experience design. It is very important to understand the needs and requirements of the users before moving on to the design of the solution and the technical details.

User experience design is not just about identifying the requirements of the users. It is much more about understanding the users and to develop a solution tailor made for them. There are multiple stages to this process and in the first few weeks of this course we went through all of these stages respectively. The first stage was the development of the personas. We analyzed our primary, secondary and tertiary users and built personas according to their personalities and preferences in relation to our system. This helped us think of our platform in the specific way to which our users would utilize it and how we can develop it according to the users. The second stage was developing the scenarios in which the users would utilize the system. It gave us important insight to the development of the platform according to mainly important use cases. The next stages were storyboards and journey maps. Building on the scenarios, the journey maps helped us better visualize and understand the use of our platform by users. And finally we developed a journey map which helped us visualize the feelings and emotions of the user while using our platform and how well it completed the necessary requirements and achieved the goals.

The whole user experience design phase was very important for us to understand how the users would react to our platform and it helped us to cultivate ideas towards the functionality of our system and how we could develop it to provide better usability for the users.

The following are the various design elements that we developed throughout the user experience design phase:

2.5. Personas

There are three types of users for our project:

- **Primary Users**: Medical Students/Doctors
- **Secondary Users**: Medical Translators/Healthcare Personnel
- **Tertiary Users**: Patients

Personas were developed for each individual user type. Following are the personas for the primary users, the rest of the personas and details can be found in our wiki page.

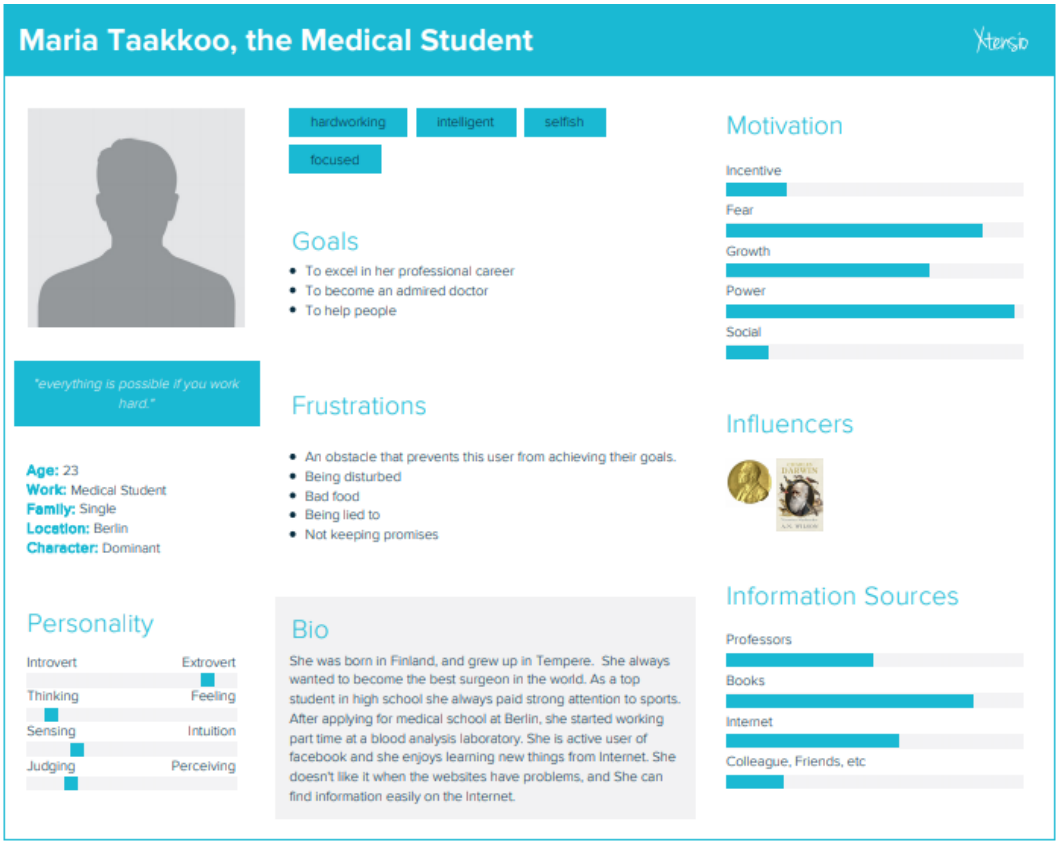

Figure 1. Medical Student Persona

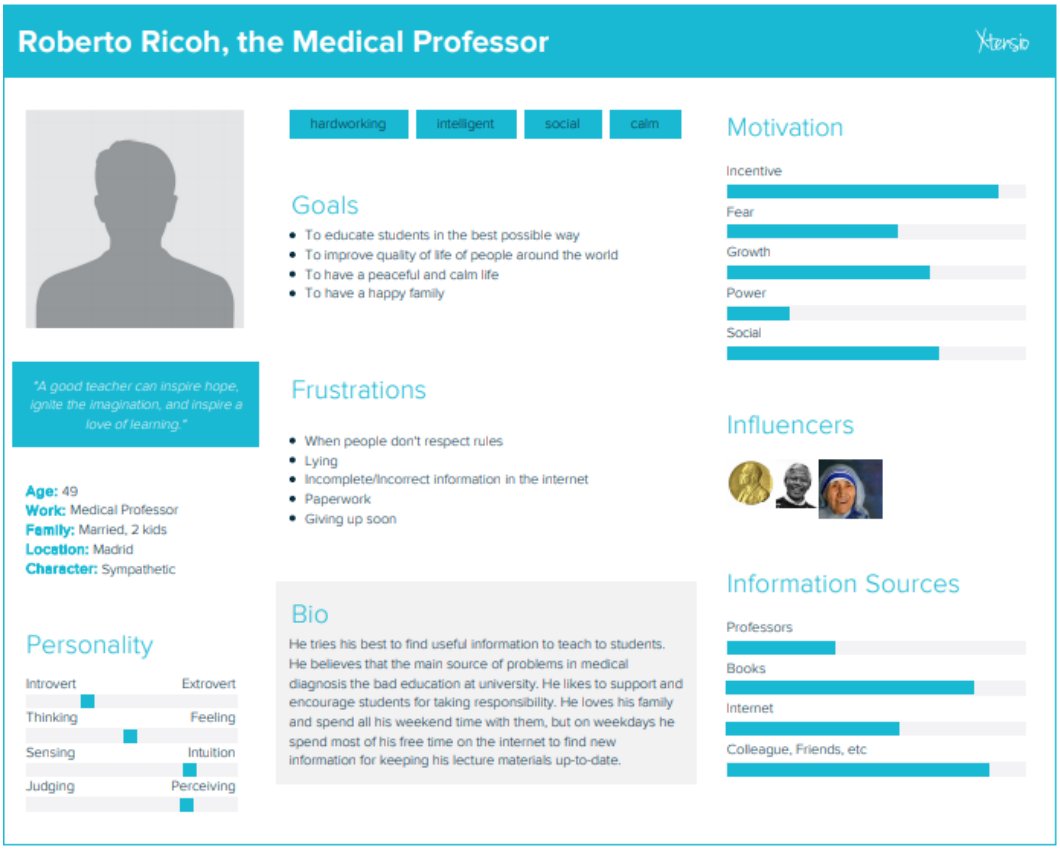

Figure 2. Medical Professor Persona

2.2. Scenarios

The next step after the development of personas was building scenarios. As in the case of personas, multiple scenarios were developed for the various user classes. Following is a scenario for a student (primary user):

Scenario Definition

One day of her internship one of the patients had an unexpected reaction to anesthesia and everyone was shocked. They find out the problem with other doctors and nurses. She wanted to share her experience about this situation to help other who might face same issues. She tries to find an effective way to share her experience on the internet.

Needs

- Sharing experience with others

Feature

- Sharing part of platform

Behavior

She writes a description about the problem they faced and adds some pictures (or/and video).

The remaining detailed scenarios for all user types are available on the repository.

2.3. Storyboard

After coming up with the scenarios for the use of the platform by the users identified in the personas, a storyboard was developed. The storyboard gives the visual presentation of the scenario and helps to understand how the users interact with the system and their emotions and reflections. Following is the storyboard created for one of the scenarios:

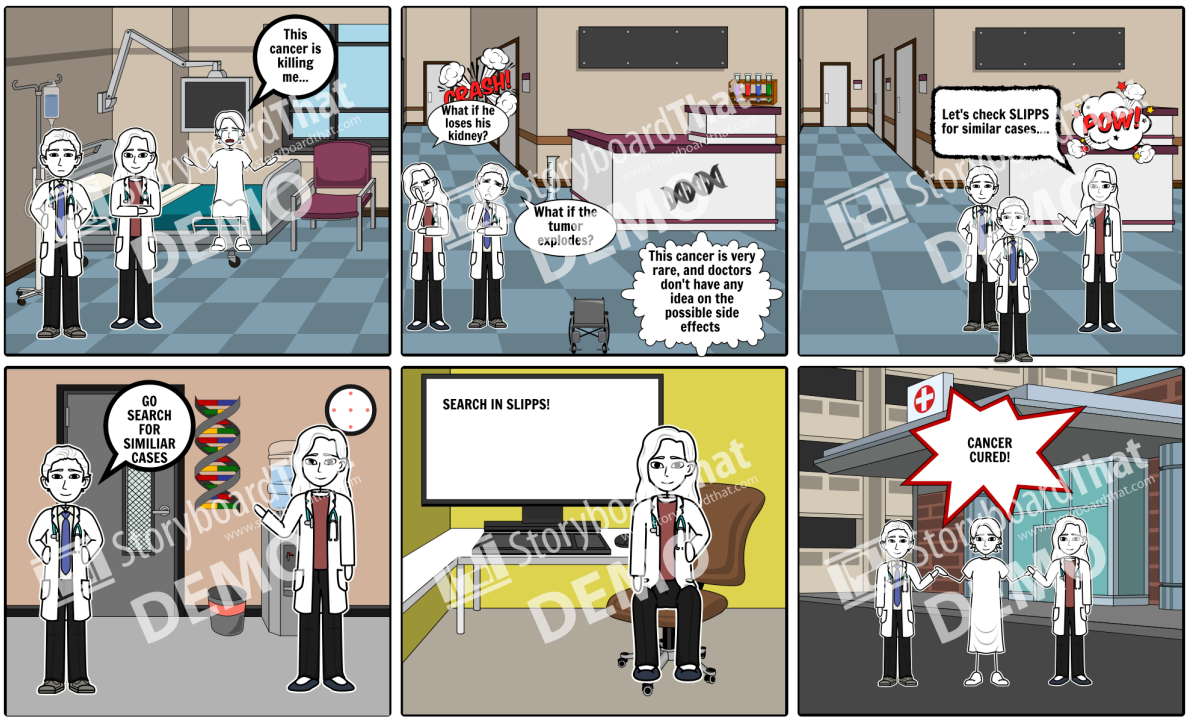

Figure 3. Story board

2.4. Journey Map

After identifying user personas and developing scenarios for them, a journey map for the product was developed. The journey map identifies goals for the project to achieve at each step of its use, the way in which the product is used and the user's emotions towards it. Following is an image of the journey map developed for the SLIPPS platform:

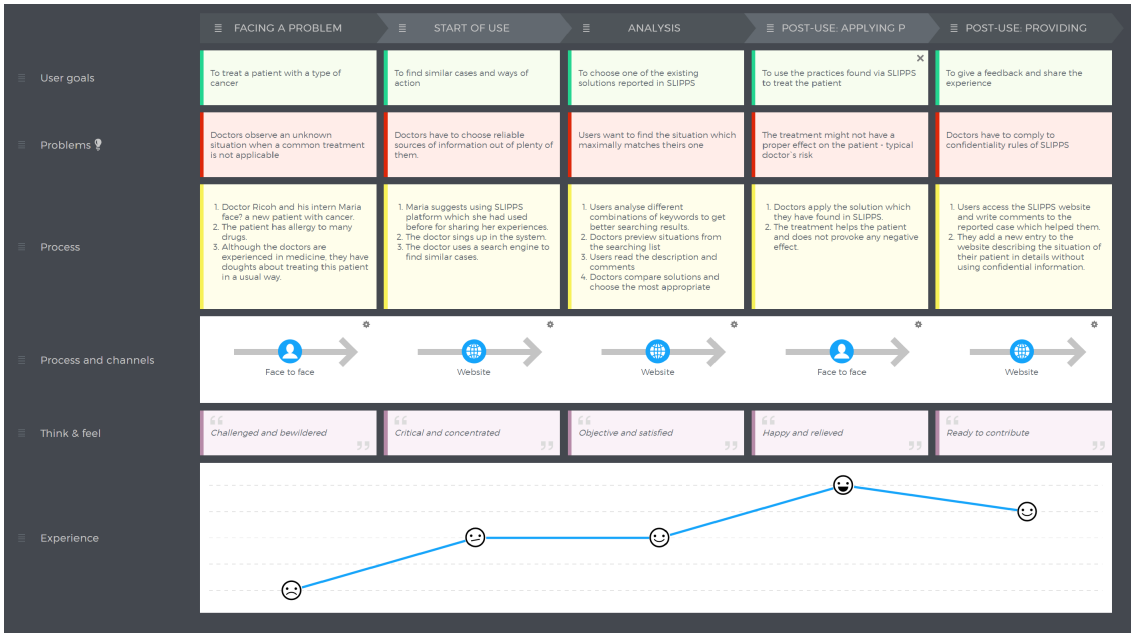

Figure 4. Journey map

2.5. Mockups

After sequentially developing all the user experience design elements the final step was to develop mockups for the platform using information from the previous steps. Initially a paper mockup of a website was created with the main functionality of searching medical terms and presenting information. These paper mockups were tested with our colleagues and feedback was collected. This feedback is available at the repository. In the next step, a high fidelity prototype was designed. This prototype included the functionality of advanced search and user login. This prototype is an interactive initial version of the website and this was presented to the customers in the first meeting. Some images of this prototype are included below, access to full mockups here.

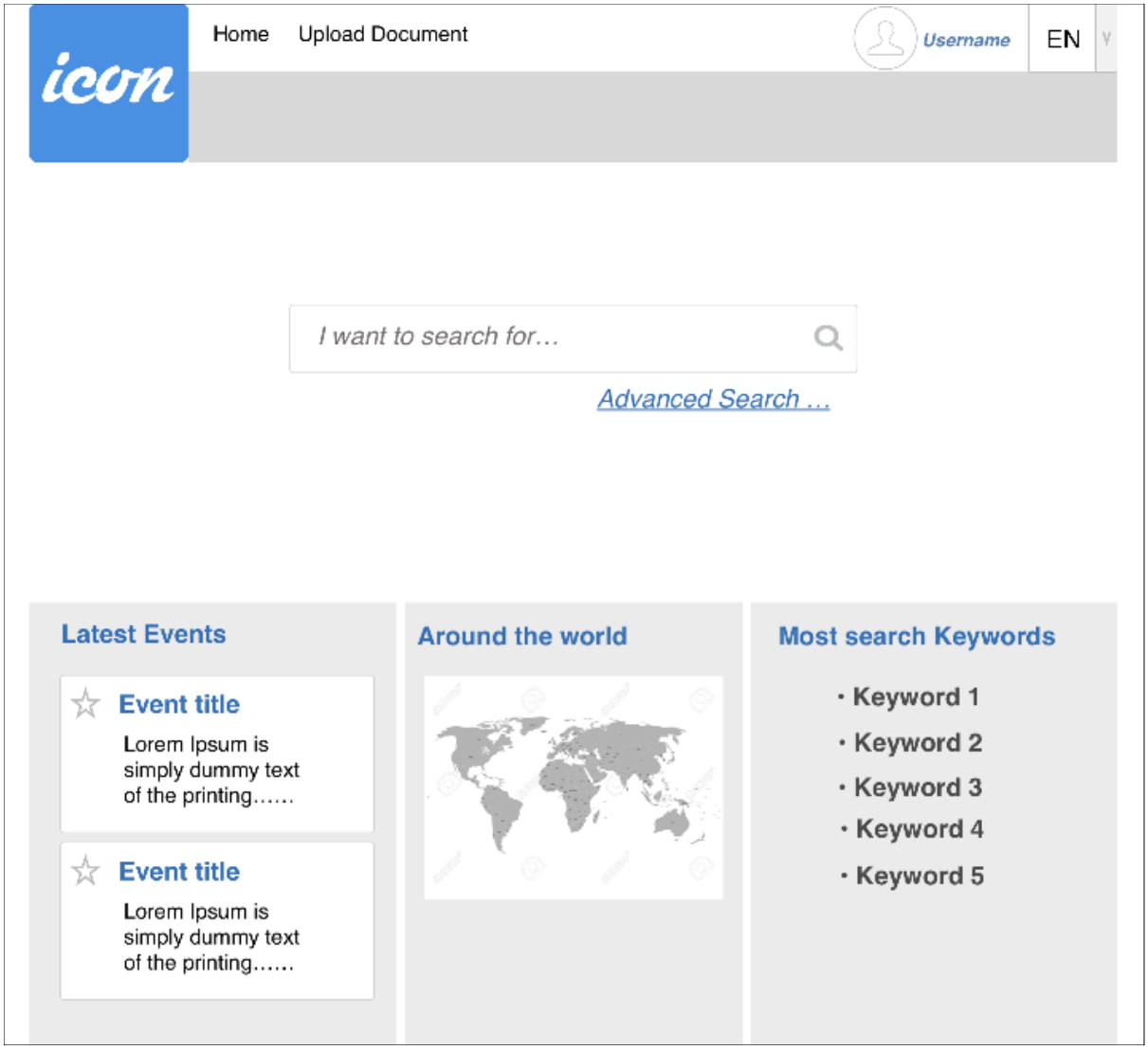

Figure 5. Home page mockup

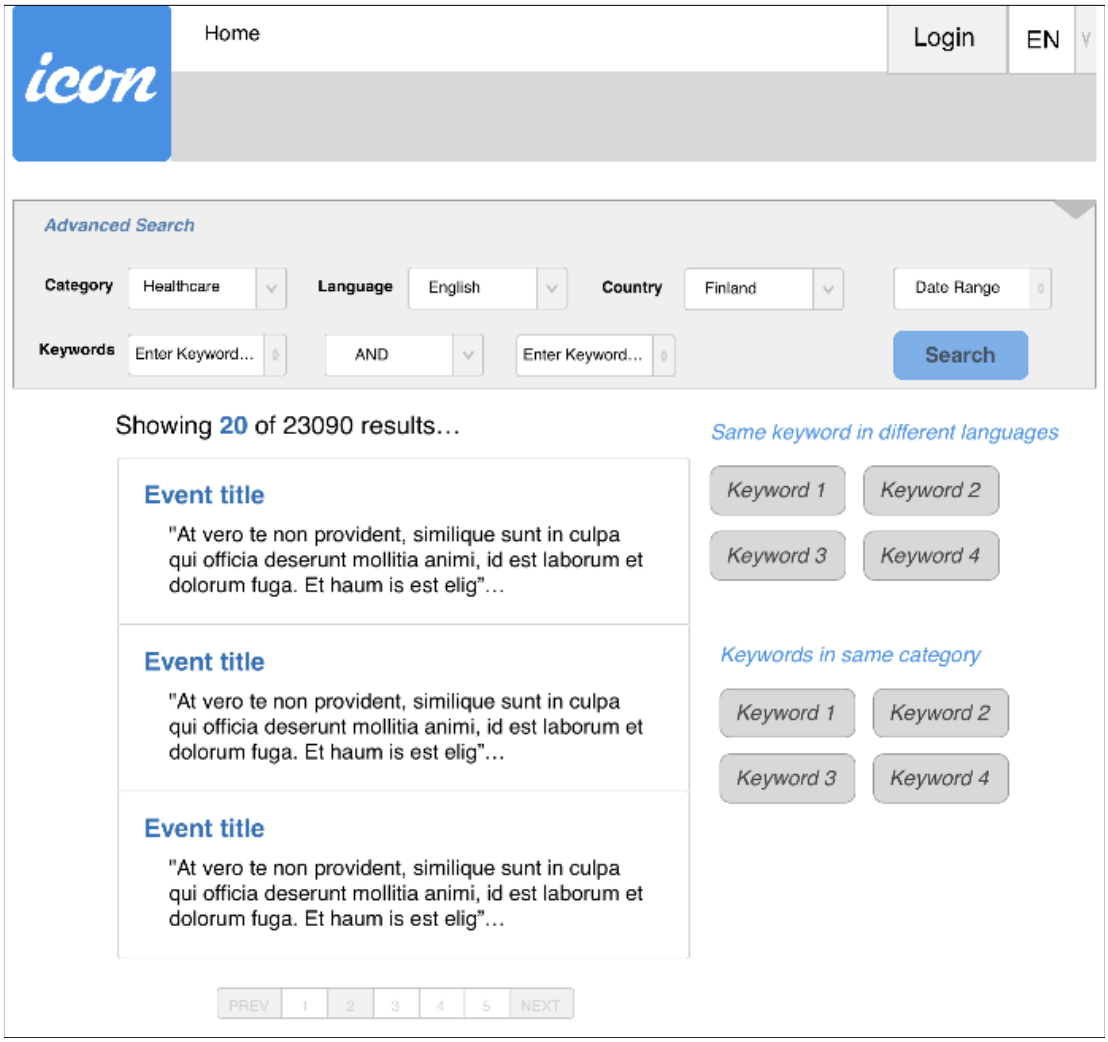

Figure 6. Search page mockup

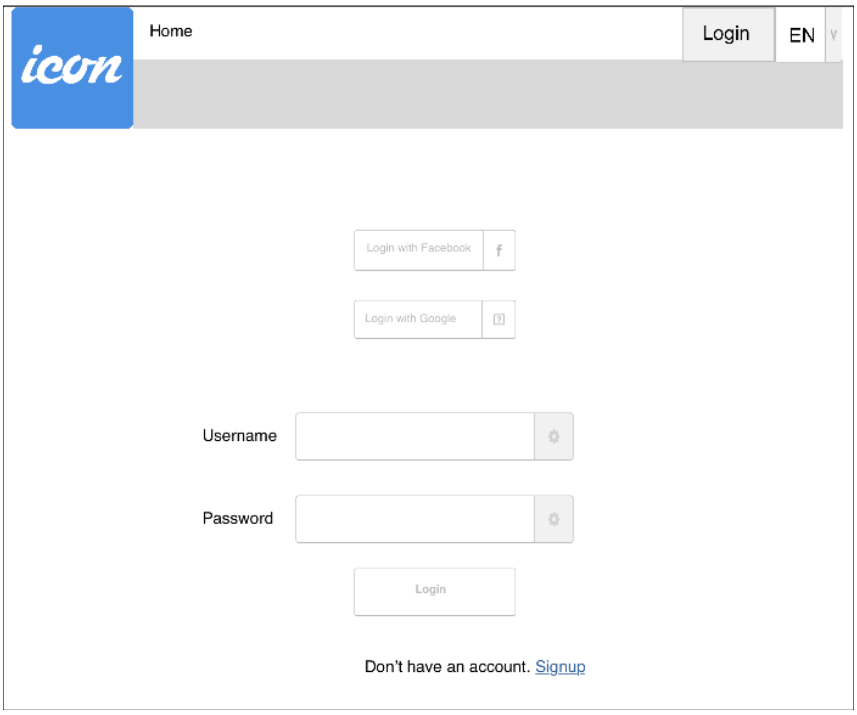

Figure 7. Login page mockup

4. DEVELOPMENT

We follow Agile development process with a sprint of 1 week. Unit testing is implemented during development be develop team. There are 2 releases. First one went before the open testing with basic functionality (main search) and we applied usability testing method. The second release came by the final presentation with almost all main functionalities described in requirements sections, including: simple search, advance search, account management (register, login, view profile and logout), upload documents and administration functions (mange user accounts, manage data, manage document uploaded and publish data to search engine).

4.1. Application overview

SLIPPS is a platform developed to improve patient safety by enabling students and professionals in healthcare to share learning experiences. It is a part of an Erasmus+ funded Patient Safety project with the same name. The platform supports basic functionality of a search engine allowing users to discover various cases with the help of medical terms identified as ‘keywords’. The primary source of these experiences are the practices conducted by healthcare students. Upon completion of practical tasks, students fill in questionnaires about their experience as part of a survey. This survey is then reviewed and uploaded to the platform. These uploaded experiences are stored in the system as learning events. Users can register to upload new learning events and search for them by various criteria. This platform is developed to allow users to share their own experiences in an effort to develop a virtual learning center which can become a source of information intended to provide patient safety across borders.

4.1.1 Promo poster

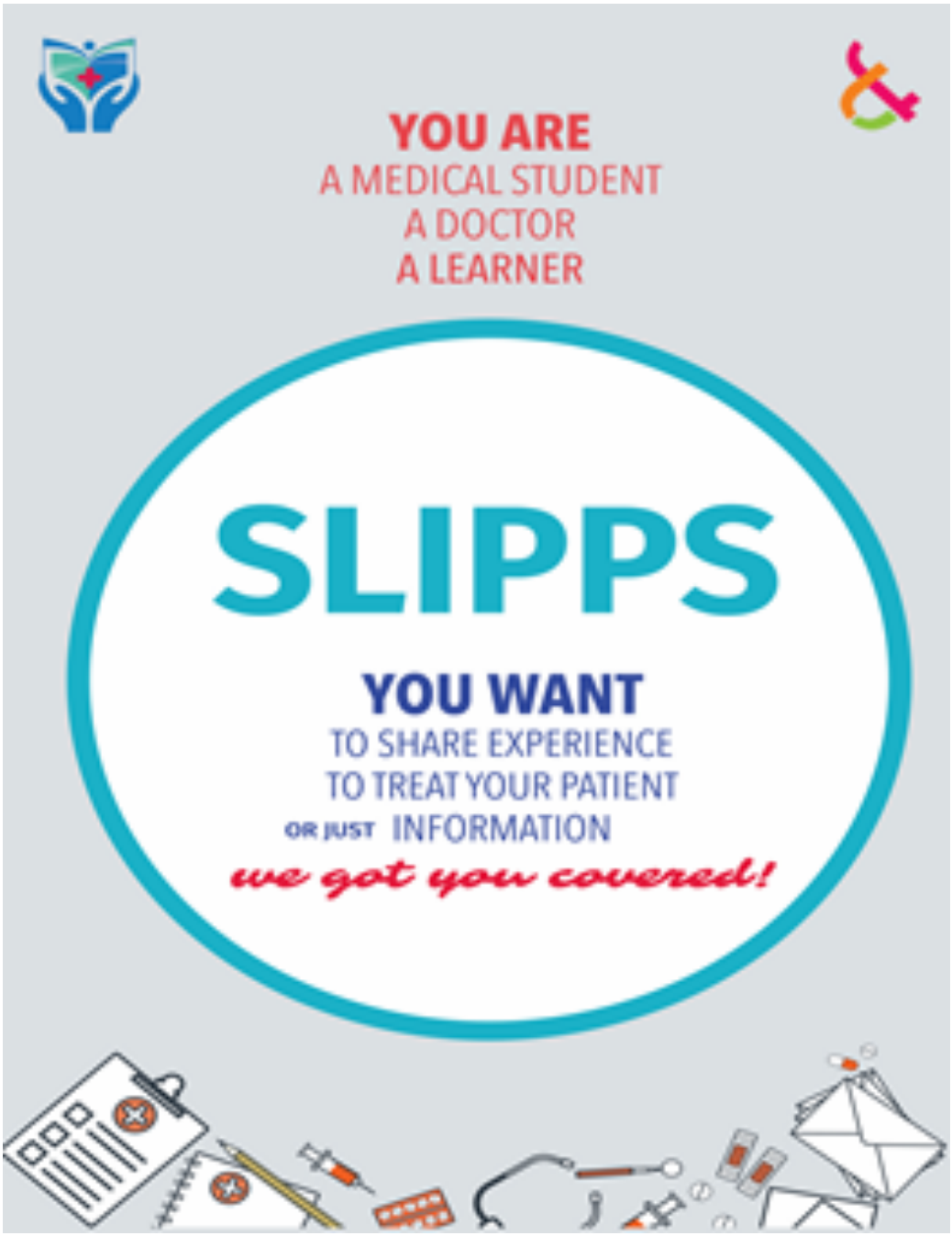

Figure 8. Promo poster

4.1.2 Architecture

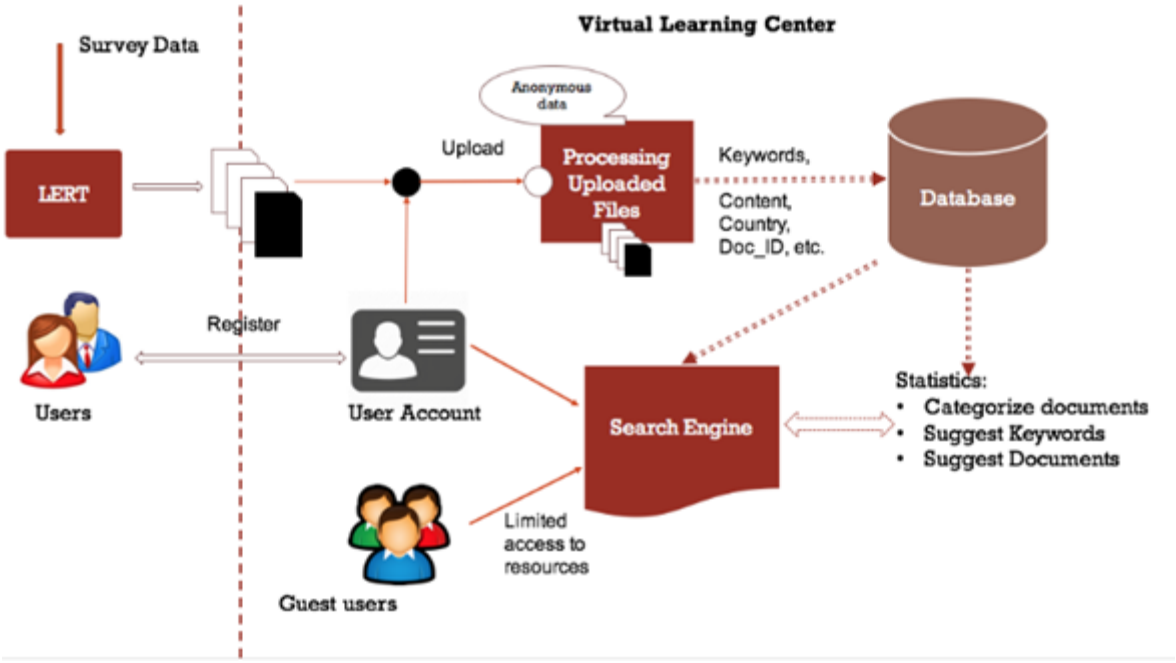

Figure 9. System Architecture

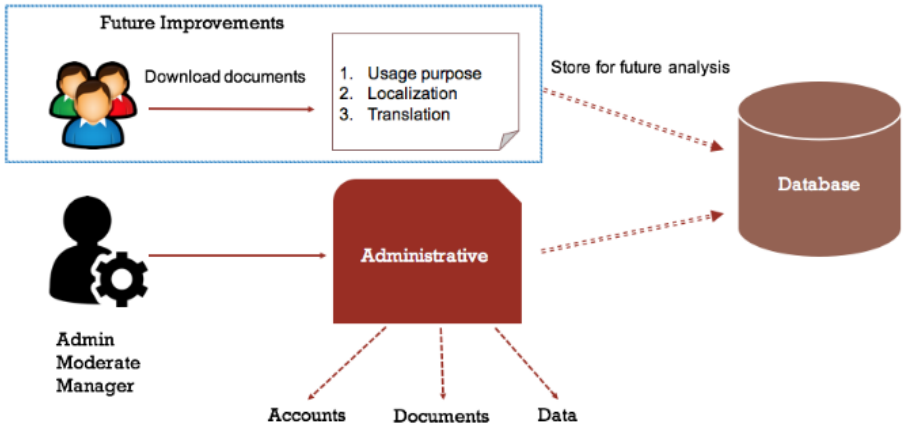

Figure 10. Admin Architecture

We divide our platform into 3 main modules: search engine, data storage and administration (as illustrated in Figure 9 and Figure 10). Data flow is as followed:

- Registered user uploads learning events (in csv format) as input for the shared data through a web interface.
- Data will then be verified and published to be available for searching by other users of the system by admin.

- Public data is synced to Elastic Search (search engine middleware) and will then be searchable.
- Other users come to website, search for their information using either search or advanced search interface and skim through matched results.
- Some statistics are collected from user search history: keywords, number of hits, keyword histogram (number of times a keyword has been entered) and handle by administration.
- All data is managed through administration interface by authorized admin only.

Search engine is built as a **web application**, from which user can interact (search and viewing learning events) as well as input their data (create account and upload learning event). In order to build search engine, we're using **Elastic Search** for its advantages in indexing and handling search query. Elastic Search store a mapping of our data, which will then be accessible through search functions. All query builders, ranking mechanism and indexing are handling by elastic search, which saved us time and effort from building everything from scratch.

For frontend, we chose Reactjs and Redux for its suitable features in developing single page application. Layouts are well structured into components which is easy for us to handle parallel work - several developers can work almost independently on each component.

For backend, main programming language that has been used is Python, we decided to go with Python for its great support in web development as well as data analyzing, which is a part of our project, especially for handling csv input file and extract data from it. PostgreSql would then be selected for easy integration.

Administration system is built with support of Django Admin, providing main functionalities in managing data, such as: creating and editing user accounts; create/edit/delete data used for website: country, language; see uploaded documents; etc. Some data has been grouped to provide a better visualized data management interfaces.

Technologies that has been used in the project:

- **Frontend**: Reactjs and Redux
- **Backend**: Python, Django, PostgreSQL and Elastic Search.

4.1.3 Application screenshots

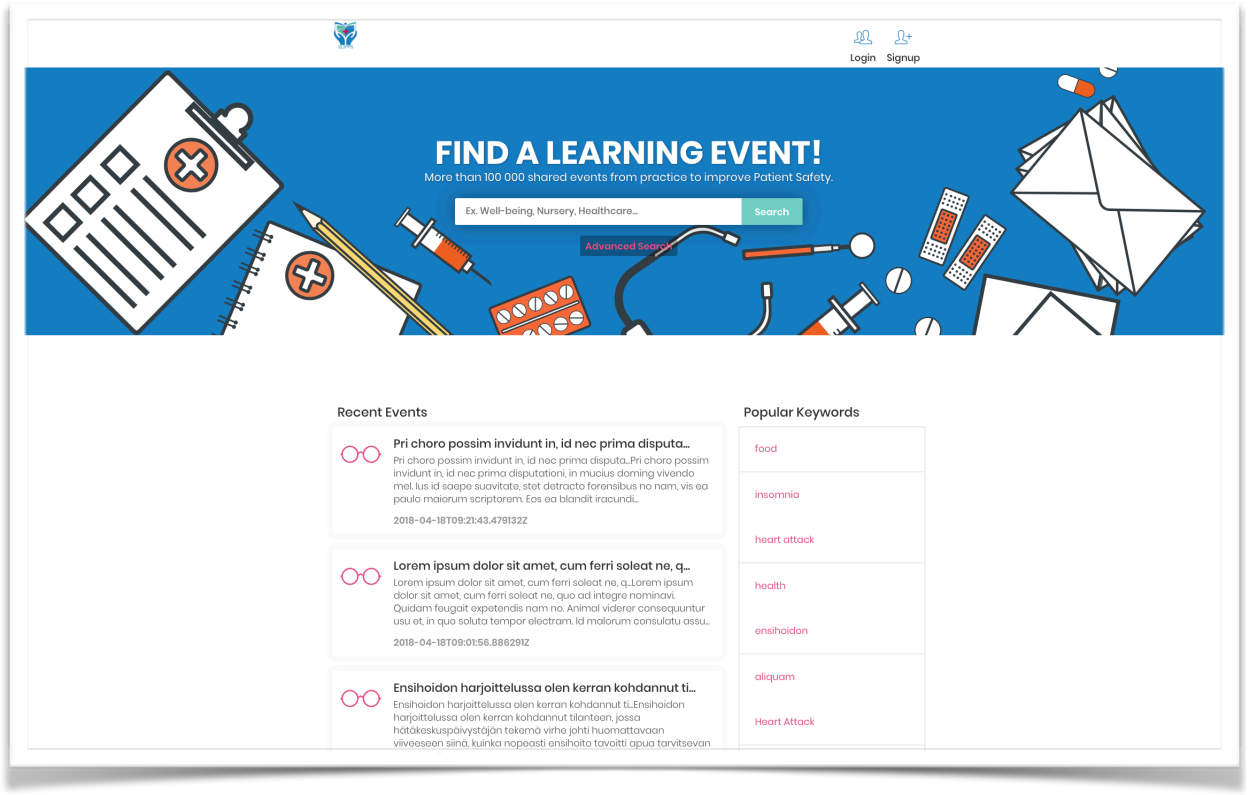

Figure 11. Main page of SLIPPS Website

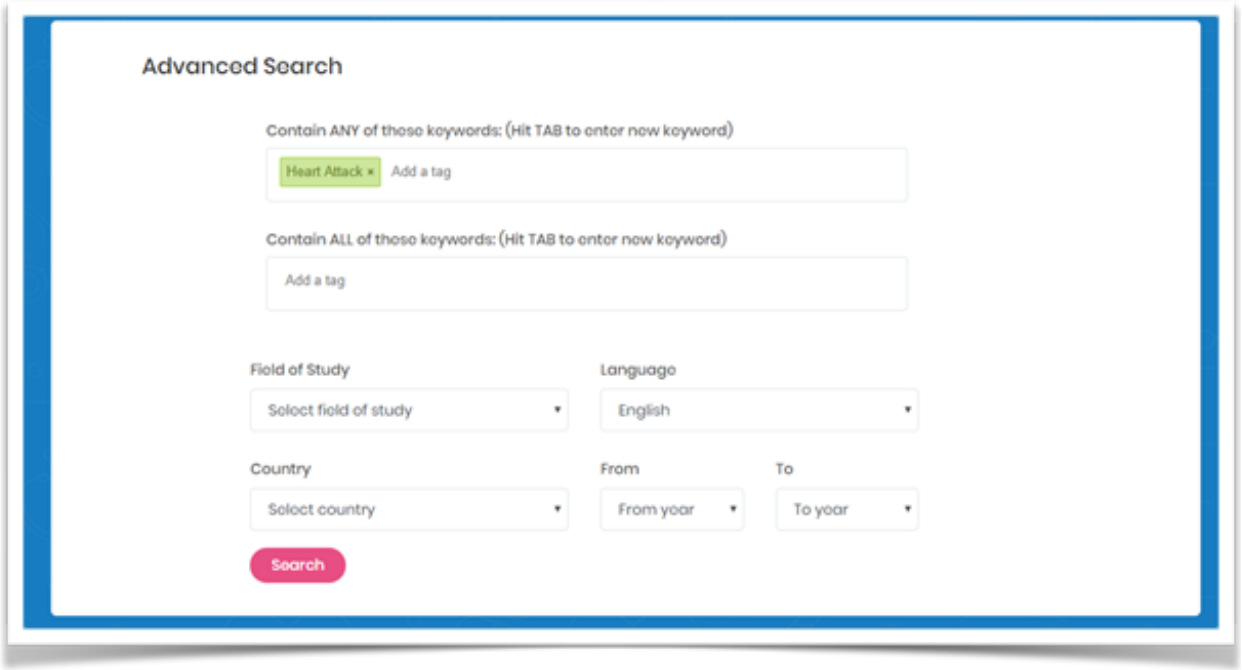

Figure 12. Advanced Search

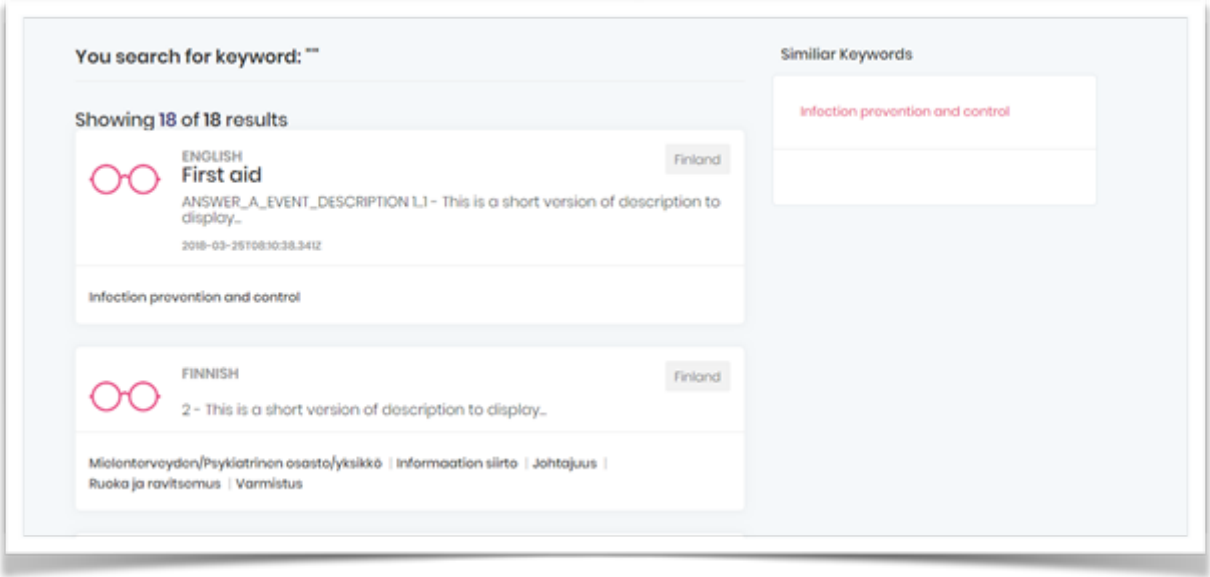

Figure 13. Search result view

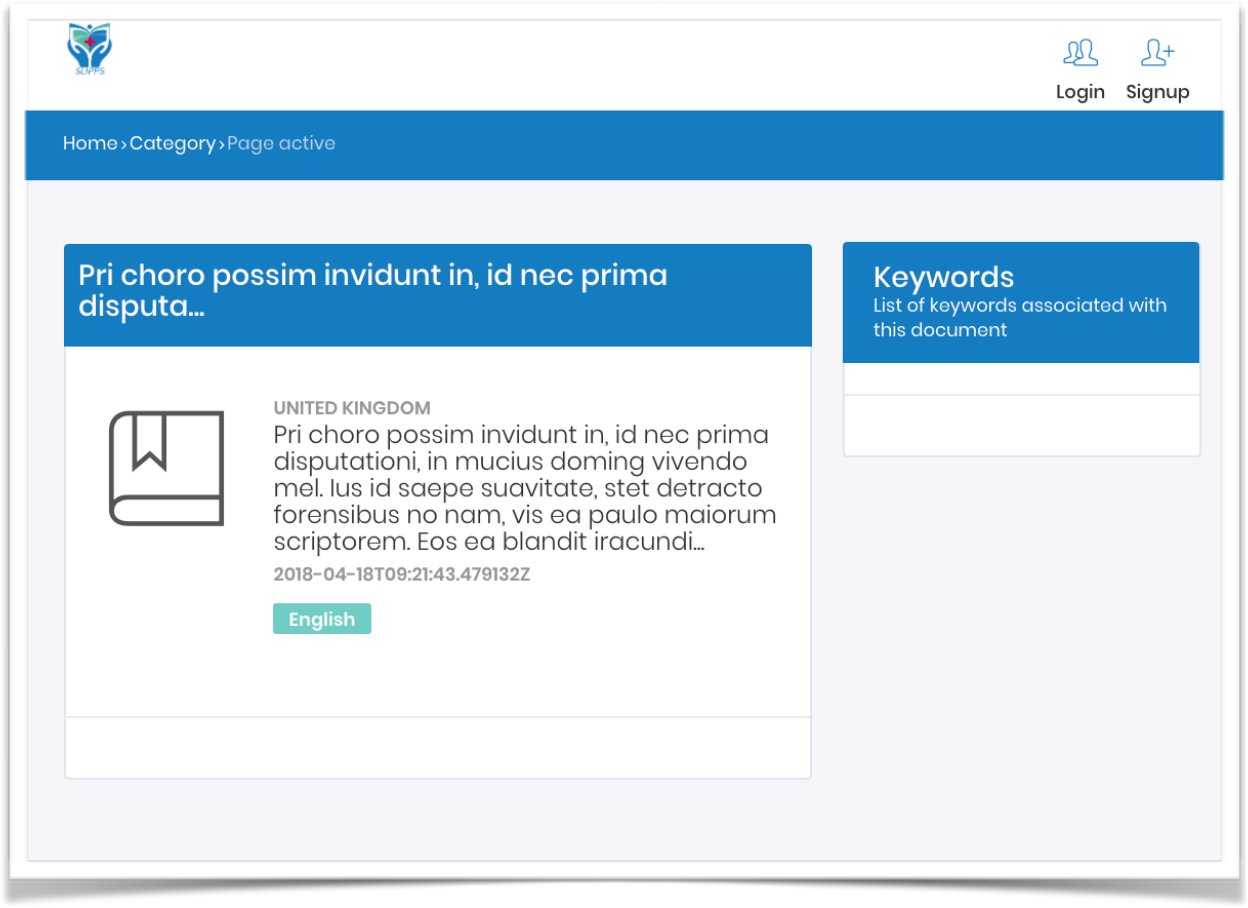

Figure 14. Detail view for guest users

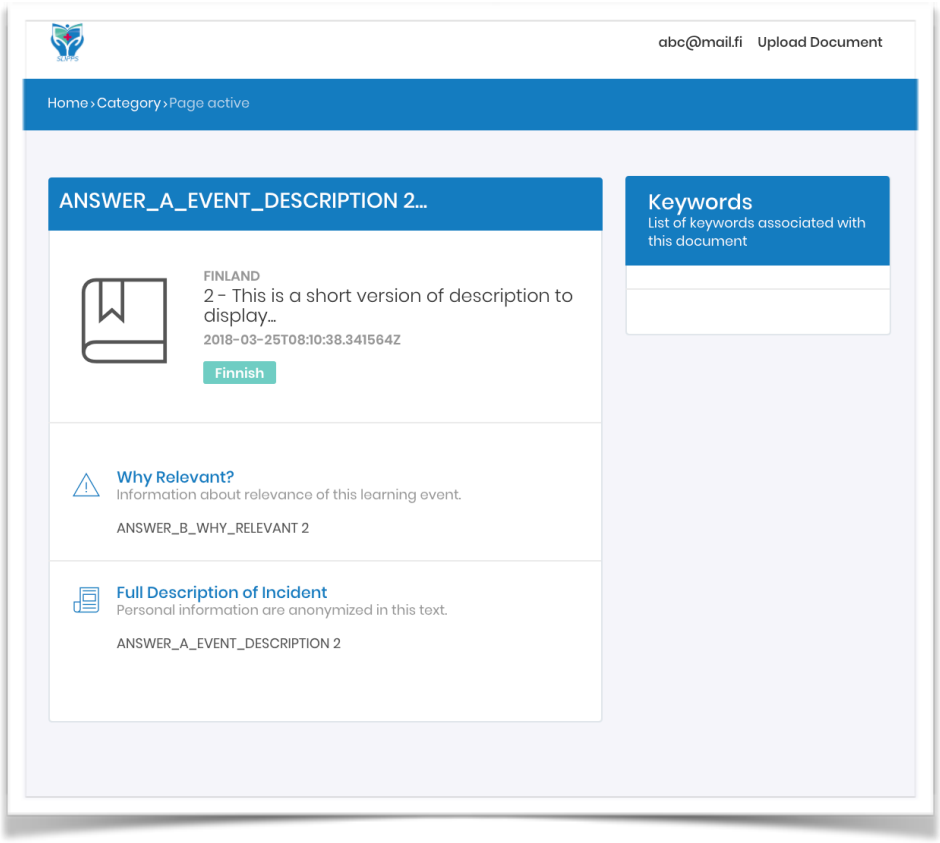

Figure 15. Full detail view for logged in user

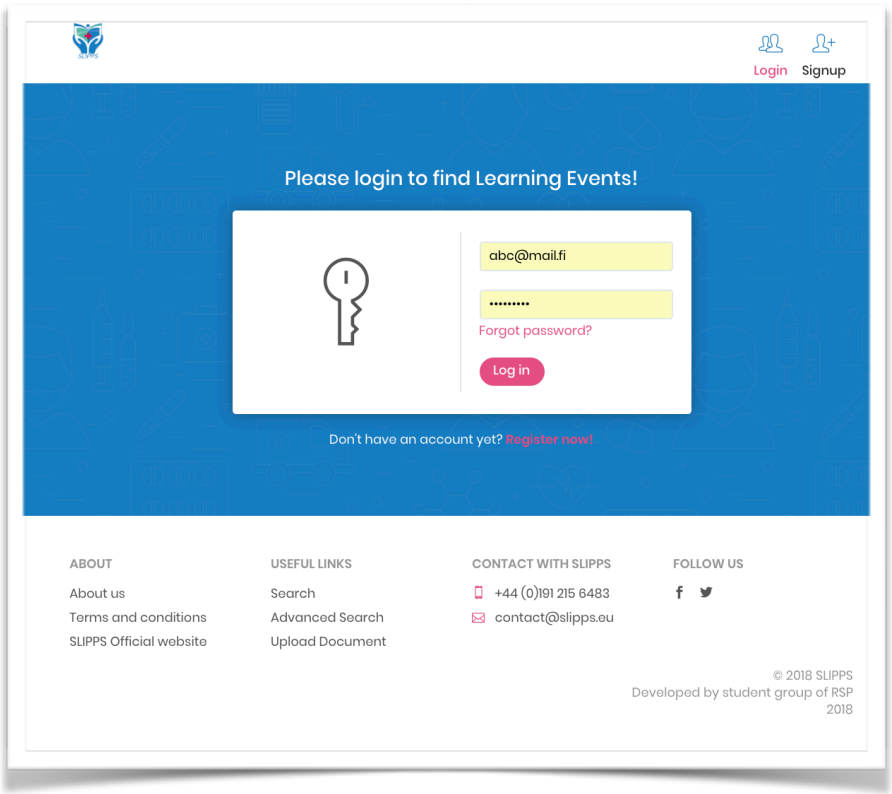

Figure 16. Login page

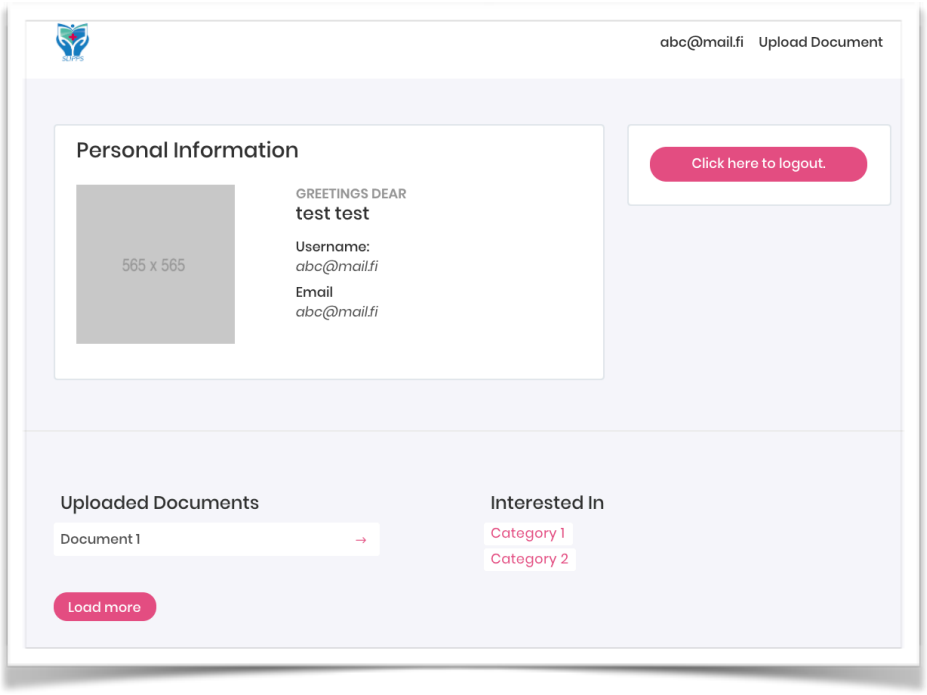

Figure 17. View profile page

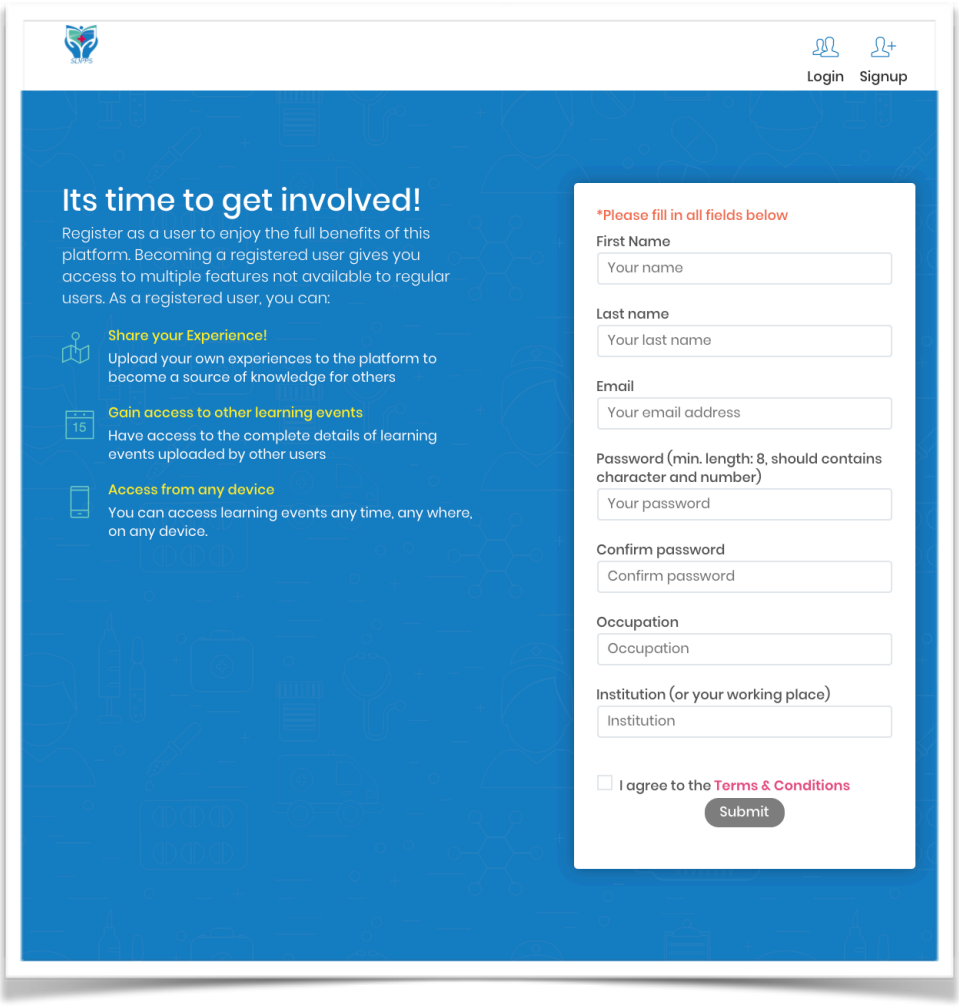

Figure18. Sign up page

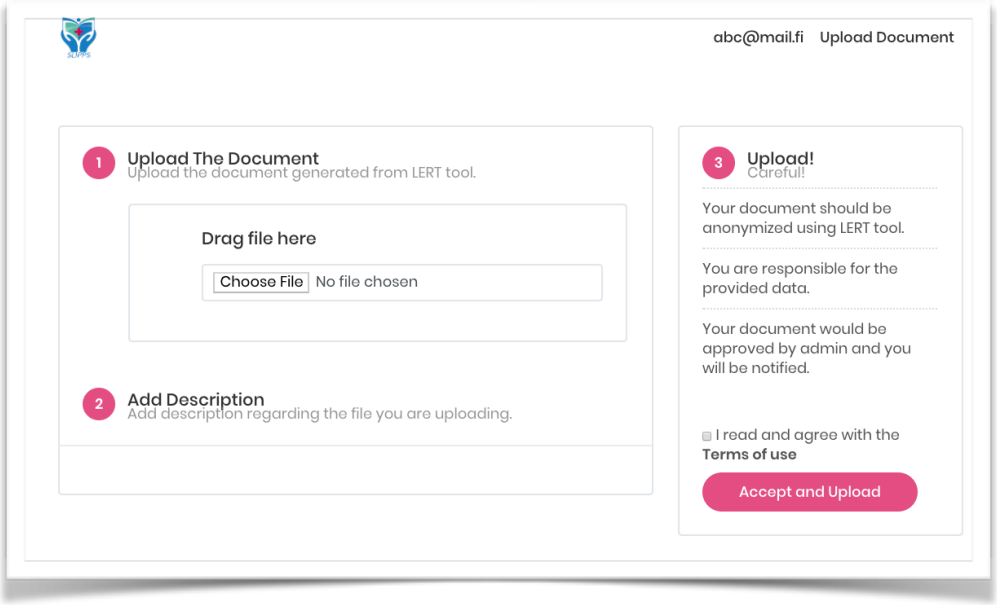

Figure 19. Uploading documents

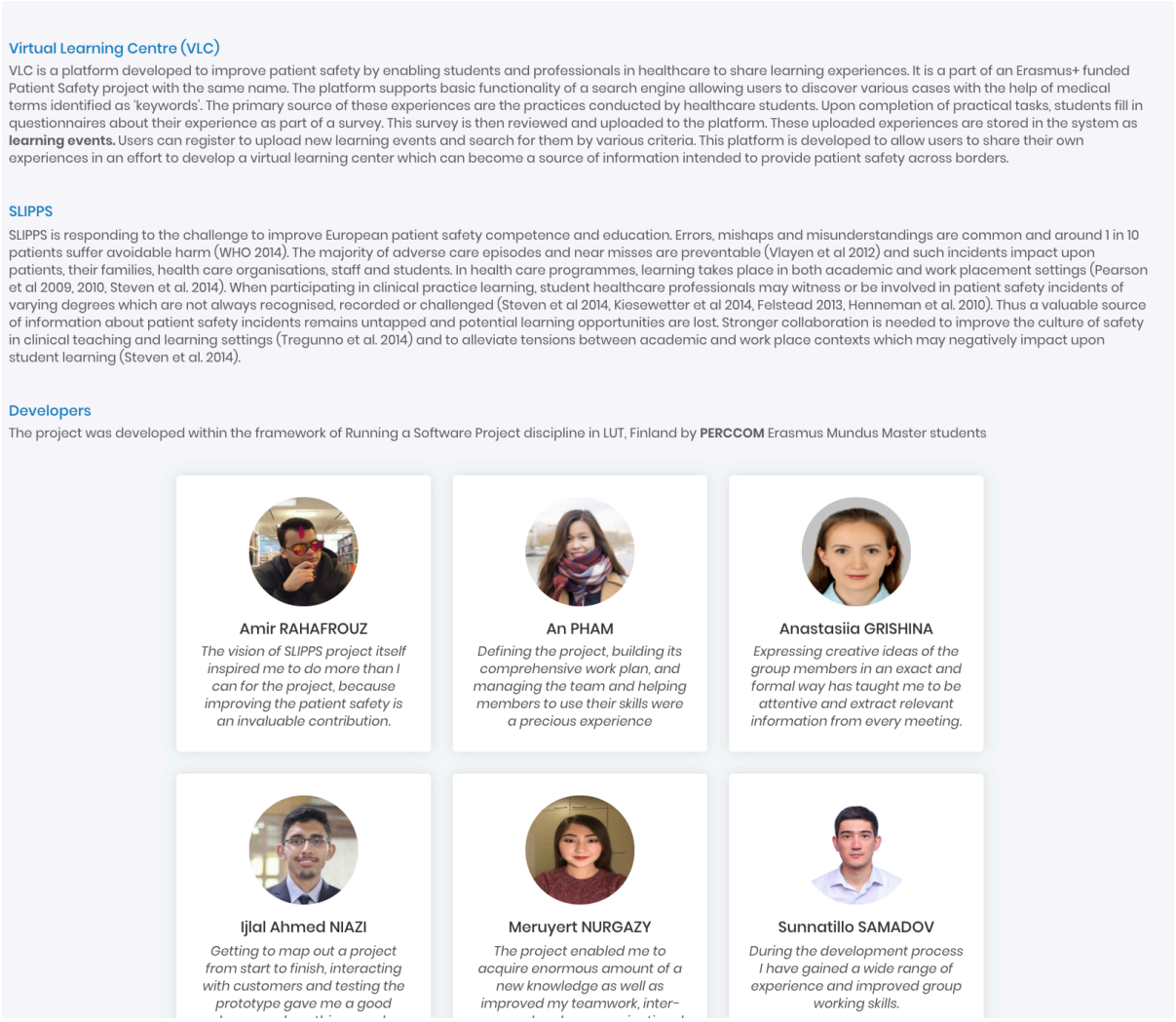

Figure 20. About us page with project summary and team instructions

4.1.4 Demo

SLIPPS web page: http://slipps.it.lut.fi:3000/

SLIPPS admin page: http://slipps.it.lut.fi:8000/admin/

4.1.5 User Engagement

“Learning events” is the main context of the platform. The professors of seven participant universities uploads Learning events periodically. During the education or training processes student will face different dilemmas. Student use SLIPPS web site to find solution to their problems during educational processes and internship. They search related keywords and enter Field of study to find related events to their situation. Also, professors use website during teaching process.

4.2 Deliverables

Search websites:

- Search by single keyword
- Advanced search with filters: country, language, year when event is created and field of study.
- Display results according to user role. We display only a part of the event for guest users, but for registered users that log in, we show full detail of an event, including title, description, language used, country of origin and list of tagged keywords.

5. TESTING & MAINTENANCE

5.1. Testing plan and activities

To understand how user will interact with SLIPPS web site and to improve the its features we planned to conduct usability testing. The plan of the test prepared based on usabilility.gov organization template. Following goals of usability testing was included in the testing:

- Overall user performance measures
- Identifying a baseline of user performance
- Users feelings about sufficiency of information to meet their learning objectives
- Assessment of functionalities appropriateness

This usability test is mainly focused on website functionality and its content.

Roles of each team member was defined in the testing plan. The roles were facilitator, data logger, test observer, test participants. According to the roles team members defined their task for the testing event.

Four usability tasks were defined and prepared for participants. Certain task included checking certain features of the web application, for example using advanced search in the task 3 and logging in the task 4.

Following metrics was defined on the plan to collect during testing: Successful task completion, Critical errors, Non-critical errors, Error-free rate, Time on task, Subjective Evaluations. Also, personal feelings of users planned to be collected, such as likes, dislikes and recommendations.

For collecting feedback SUS test is planned to use. And Google survey was prepared to participants to give their opinion after the using web site and completing task.

Link to the google survey: https://goo.gl/forms/r2EwG66IEGdCduPi1

5.2. Testing activities

Testing activity held in the common area of LUT university on 5.04.2018. Each user took brief introduction about web site before starting the testing. Printed version of the task was given to each user. Also, permission was taken from each user to record their voice and their action on the screen. While users completed the task, data logger (and observer) was taking notes each action and comment of the user as users were asked to think out loud his/her thoughts while using the web site. And the end of the test each user answered System Usability Scale (SUS) questions according to their experience.

In the event 11 participants used SLIPPS web site and completed given tasks. Four of the participants were real users (2 medical students and 2 medical professor) of the system. Other users were students and professors of LUT university.

5.3. Testing Feedback

After the testing event the comments and answers were collected, and all recordings were placed in our team Google Drive. Team members analyzed all recordings and added comments on feedback list. Also, notes taken by observers listed on the feedback list. Overall number of feedbacks was 30, after removing duplicate comments. The next stage was

grouping all comments according to their relevance. Comments sorted into following groups: results page, advanced search, event page, functionalities and general comments.

In the next meeting after testing event team members discussed comments in detail. Owing to feasibility and relevance, comments were categorized in to 3 group: mandatory changes, optional changes and irrelevant comments. Mandatory changes group covered comments which is required to change. Optional changes were functionalities and changes in the design which would be implemented if there is enough time and necessity. Irrelevant comments included comments which did not concern Project Idea or was already included. As many testers were not from medical school, there were some comments which were not applicable for the web site.

Main page design	
	Action
Mandatory changes	Remove the map Add "about" field Logged in user should be able to save events for further reference Check that "Enter" button works for search after entering keywords Use breadcrumb menu across the website
Optional changes	Experiment with colours (blue, purple) to match the logo
Irrelevant comments	Currently we support Finnish and English languages Green colour is more associated with medicine than blue or purple Use "experiences" instead of "events"
Search function	
	Action
Mandatory changes	Save history of search Add more keywords to advanced search Filter results by country, date range, language
Optional changes	Recognize parts of keywords Automatically correct misspelling
Irrelevant comments	-

Figure 21. Classified changes for Main page and Search function

5.4. What features did you improve/change after the public testing experience?

After having analyzed and classified version of comments list, development team members decided what kind of solution needs to be taken to solve listed problems. In the next meeting, team members chose techniques and made decisions to start improvement process. Following features added and improved.

1. Removing the map from home page
2. Adding About page
3. Placing the “back” button in every page
4. Limiting functionalities of web site for unlogged users.
5. Showing number of founded results on “Results” page

6. Start searching with pushing “Enter” button
7. Improving filtering result by country, date range, language.
8. Improving readability of results
    - Adding title for each event
    - Display text with wider separators between lines change text font
    - Remove duplicates within one event
9. Adding more keywords in advanced search page
10. Saving previous entered keywords
11. Displaying number of results in the top of result page
12. Showing keywords at the end of a learning event
13. Move stars into logged in account pages only
14. Shortening event description in Results page to improve readability
15. Adding space between lines of the text in event page to improve readability
16. Narrowing column of text in event description page
17. Removing duplicate description line on results page

Usability testing improved project significantly. After implementing changes web page become more easy and understandable to use. Checking usability with users in the middle of development of project saved time, since it was easy make changes according to users needs.

6. DISCUSSION

6.1. Learnings

6.1.1. Project management

During the implementation of this project, the management and roles of the team members were kept quite flexible. There was not much interaction with the customers so the team had to revise the plans and ideas multiple times. Initially, the user experience design procedure was carried out along with other teams according to the schedule of the course. However, the first customer meeting was not until later on so the team came up with their own ideas of the platform to be developed.

Until the meeting with the customer, only the project manager role was assigned while the rest of the team was working together on the whole project and coming up with ideas. After the prototype was presented to the customers in the first and only meeting and after their initial feedback, the team roles were divided to move on to the implementation part. Three of the team members worked as developers, two for backend and one for frontend. Two team members worked on the documentation and one team member focused on testing. The team was imbalanced regarding the technical abilities and coding skills and this was a challenge towards the development of the platform.

After the initial technical implementation, user testing was carried out in an event. The platform was not completely developed at this point. For testing purposes, the initial prototype with more interactive features was used.

After the user testing, final implementation progresses were carried out to complete the admin part of the platform and to incorporate changes and feedback advised by users during the testing event.

Before the technical implementation, the team worked coherently and seamlessly to carry out the tasks. During the implementation phase some challenges were faced due to the imbalance of technical abilities of team members. User testing was carried out with the contribution of the whole team without any issues. On the whole, not many changes were made to the initial timeline and plan devised by the team. The challenges were handled by the team members professionally and the only changes made were in the architecture after the meeting with customers.

6.1.2. Customer interface

The customers for this project are the SLIPPS project team. During the whole of this course, the team only had one meeting with the customers in the middle of the course. During this meeting a prototype of the platform was presented to the customers. Some initial feedback was received from the customers in the meeting. However, there was no further interaction with the customers. After the completion of the project and after reflecting on the course as a whole, all the team members feel that more interaction with the customers would have been beneficial. Some other teams during this course had multiple meetings with their customers, almost every week. While this was somewhat difficult for them, they managed to define their needs and requirements according to the wishes of the customers very early on in the project. This was not the case for the SLIPPS team. The team members had to come up with the requirements from only the initial information provided about the project and build prototypes according to it. And after implementation the team did not have a chance to meet with the customers to discuss the platform. The initial feedback from the customers during the only meeting was helpful but more interaction with customers was felt to be necessary.

6.1.3. Reflections towards the initial requirements

After the first meeting with the customer representative, the initial list of requirements was drawn. This list was a long one containing multiple functional and non-functional requirements focusing on the search functionality, anonymity, multi-lingual support and data analysis. In addition to these, admin support and user account login were also specified. The team was hopeful of fulfilling most of these requirements but after starting the implementation of the platform, the team realized that all of these requirements cannot be fulfilled. Hence the most important ones were prioritized and implemented. The search functionality, admin support and user account setup was prioritized along with uploading and downloading of learning events. Multi-lingual support and data analysis were supposed to be accomplished but after starting the implementation, the team realized that the main functionalities to be implemented were taking more time than was precedent.

6.1.4. What went wrong during the entire project lifecycle?

As a whole, the project was a success. The most important requirements were fulfilled and a platform was developed. The main challenge which was faced by the team appeared after

starting the implementation phase of the project. The group realized that the team was imbalanced regarding the coding skills required to complete the technical implementation phase. Due to this some team members came under more pressure for a small period of time than the others. The initial effort was directed towards the learning of all of the members regarding the coding and implementation part. However, due to lack of time to complete all the requirements the tasks had to be divided among some of the team members with coding skills while other members worked on other aspects of the project (documentation and testing).

6.1.5. What are the future plans for your project?

In terms of the future plans for the project, the team has not decided upon anything. Feedback has not yet been received from the customers. There are some areas in which improvements could be made. Some of the initial requirements which were not taken into account due to lack of time can be incorporated in to the platform such as multi-lingual support and data analysis. However the team is unsure as of yet if they wish to continue working on this project in the future.

6.1.6. Reflect what did you learn as a team from the course

The learning opportunities were in abundance during the whole of this course, both individually and as a team. As a team the main thing we learned was teamwork and how to handle a project in a professional environment. Except for two of the team members, none of the others had experience working in such a project in a professional setting. Working with real customers gave a new and much needed experience as to how things work in the real world. Customer interaction was one of the main learning outcomes from this course. The team learned how to incorporate needs and requirements of the customers towards the actual implementation. Another important learning outcome was the user design experience phase. The team realized the importance of understanding the users and completing design elements before actually implementing the solution. The user testing was also a new experience for the whole team and a realization of how important and useful the intermediate testing of a product can be. Finally the most important thing we learned as a team was how to encounter and overcome the challenges faced by using teamwork and how to maximize the productivity of the group by using the strengths of each individual member. Some of us did not have the

necessary coding skills but we managed to overcome this challenge by maximizing the output using the abilities of each individual.

6.1.7. Reflect what each team member learn from the course

Anastasiia - "*Design techniques, documentation development, preparing and conducting a testing procedure.*"

Ijlal - "*Conducting professional testing, professional documentation of a project, working in a professional environment for a project.*"

An - "*Defining the project, building its comprehensive work plan, and managing the team and helping members to use their skills were a precious experience in addition to development skills.*"

Amir - "*The vision of SLIPPS project itself inspired me to do more than I can for the project, because improving the patient safety is an invaluable contribution*."

Meru - "*The project enabled me to acquire enormous amount of a new knowledge as well as improved my teamwork, inter-personal and communicational skills.*"

Sunnat - "*During the development process I have gained a wide range of experience and improved group working skills.*"

6.1.8. Improvement ideas for the course

The overall course was quite beneficial and well structured. However, there are some areas which can be improved. The projects should be chosen to have more customer interaction for all of them and there should be a balance among all of the projects. They should contain requirements in the scope of the course which can be implemented in the given time. Another idea is to provide guidance for users without or with limited software engineering background and to make more balanced teams to have sufficient number of people with coding abilities because during the latter part of the course more focus is towards the actual implementation as compared to the learning of the team members.

6.2. Conclusion

The SLIPPS team successfully developed a web based platform for sharing the learning outcomes and knowledge of various individuals in the healthcare field. All the design procedures specified in the course were carried out. The team interacted with the customers and their representative to establish requirements and goals and in the end developed a

system fulfilling most of the customer requirements. All the documentation and design elements were recorded and saved in the repository along with the contribution and progress. The team obtained various learning outcomes during the whole of the course.

REFERENCES

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2. Django Rest Framework, http://www.django-rest-framework.org/#api-guide
3. PostgreSQL, https://www.postgresql.org/
4. Python, https://docs.python.org/3/
5. React/Redux real world example, https://github.com/gothinkster/react-redux-realworld-example-app
6. Redux usage, https://redux.js.org/basics/usage-with-react

APPENDIX 1. Weekly reports

The team used weekly reports to plan and reflect on tasks of each week. They are available via this link.

APPENDIX 2. Terms of Use

General Terms of Use

- Registration on the website is necessary to view full details of search, upload and download learning events as well as save events which interest me for further reference.
- Users without an account will have access to a limited information concerning the search results and cannot upload or download learning events, neither save them for further reference.

Profile

- I confirm that my profile information is valid and my contact details are updated. Inappropriate profiles will be banned once detected by the system administrator.
- I agree to provide my email address, which is collected in order to inform me about my activity on the website, namely my history of uploaded documents.
- I agree to provide my working place and my name in order to personalize my profile and check its the validity.

Documents Uploading

- I confirm that I am responsible for the information I am uploading.
- I agree to check the file for anonymity, i.e. it must not include names of patients or medical representatives, neither exact location nor time.
- I understand that in case of committing non-anonymized files they will not be published.
- I agree that if I upload identical files, only the first upload will be considered. The number of commitment of identical files does not influence the publishing period.
- The information I am uploading does not contain inappropriate or abusive language and does not violate the rights of other users.

Pre-downloading agreement

- I understand that a user can either fill or skip a questionnaire before downloading a learning event.
- I understand that my work location, field of interest and profession are needed for the statistical purposes of assessing project activity in participating countries and are shown exclusively to system administrators.
- I agree to answer questions regarding my interest in downloading a learning event, which are necessary for estimating the correspondence of the website initial goals and outcomes regarding the target audience.

APPENDIX 3. Pre-downloading questionnaire

The SLIPPS Team would be grateful if you could complete a questionnaire intended to collect users` interest statistics. The questionnaire is confidential. The answers will be used to improve the searching functions of the system.

1. What is your country of residence?

   <Countries list>

2. What is your profession?
   - Professor, Medical department
   - Student, Medical department
   - Doctor
   - Nurse
   - Patient
   - Authorities representative
   - Other

3. What is your medical field of interest, if any?
   - Non-medical (specify)
   - Medical
     - Bioanalytics
     - Nutrition
     - Nursing science
     - Medicine
     - Nursing (Nurse)
     - Nursing (Midwife)
     - Nursing (Public health nurse)
     - Nursing (Other)
     - Occupational therapy
     - First aid
     - Pharmacy
     - Physiotherapy
     - Radiographer
     - Social work (Children)

- o Social work (Adults)
- o Social work (Other)
- o Speech therapy
- o Other (specify)

4. Why are you downloading this learning event?

- · It is relevant for my research
- · It is relevant for my medical practice
- · It is connected to my health state
- · Other (specify)

5. Will you recommend this website to your friends or colleagues?

- · Yes
- · No