**NTNU – Trondheim**
Norwegian University of
Science and Technology

Bachelor's Project
Information Science

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# STEDR
# SINTEF Storytelling

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# Preface

This report is the documented result of the course "IT2901 - Informatikk prosjektarbeid II" in the spring of 2014. Our group consisted of six NTNU students from the Department of Computer and Information Science.

We would like to thank our contact person at SINTEF, Jacqueline Floch. Throughout this semester, she have been incredibly supportive and helpful in all aspects. She is truly a spirited person with an astounding dedication to this project. It has been a lot of fun working with her. Additionally, we would also like to thank our supervisor Moshen Anvaari for giving us great feedback and being a cool guy in general.

Trondheim, 29th of May, 2014

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**Abstract**

Through this project SINTEF wanted to further develop a multi-platform application mainly for handheld devices called Stedr. The aim of the project was to add more important functionality to the application, increase usability and generally improving it in all aspects. In this report we will describe the whole process from preliminary work and planning, the process and then present the final product with test-results etcetera. enclosed. The application is written in Titanium Studio using mainly XML, Java and JavaScript. The application makes use of many different APIs and frameworks to make use of existing services to reduce the necessary maintenance. This was requested by the customer. During the course of the project we experienced and overcame many challenges complicating the project, but in the end we reached most of our goals and ended up a result we are happy with. Multiple new features have been added, including support for collections and sound implementation.

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# 1 Introduction

This report is written as a bachelor project by computer science students at NTNU. The project revolves around upgrading and expanding features of a multi platform app called "Stedr" which is currently in beta. Stedr's purpose is to enable people to share their stories about places around the world. This can be anything from a famous attractions to just an ordinary building Trondheim. The contributors will be able to share stories and media through external services like Digitalt Fortalt, Flickr, Instagram, SoundCloud etcetera. With the application, users can view other peoples stories and images to help them explore a certain place.

## 1.1 The subject: IT2901

*IT2901: prosjektarbeid i informatikk* is the name of the course this project is a part of. Through this project the students will work in groups on a specific project within the scope of informatics. The institute will recommend chosen tasks for the students to choose from. From here the students work self-reliantly under the supervision of employees at the institute. *(Text based on the information gathered from the study guide.)*
The main purpose of the project is for the students to acquire practical experience in the software engineering process. Through working with a real customer in a team throughout the entire process the student gain valuable experience to prepare them for their future careers after the studies.

## 1.2 About Stedr

The app "Stedr" was created in a collaboration between a group of Computer Science students from NTNU and Jacqueline Floch from SINTEF.

Stedr is an app that connects places and stories. It combines the formal history with the social media experience. The latter will also help to create a network effect. We see Stedr as the first step towards a national effort for documenting narratives of places. Take the statue of Olav Tryggvason for instance. Here you can write a story about Olav, the building process, or something on the debate about removing it. That being said, Stedr is made to experience - not for creating content. To create a story takes time. It requires finding sources, put together materials, editing , etcetera. This is not something that can be performed easily on a smartphone.

Ideally we wanted to create a social network for cultural heritage - a kind of GoGoBot for cultural heritage - but this is a much more extensive project. The question is also who would drive such a platform? Kulrurådet offers a platform called Digitalt Fortalt

for stories. This is unprecedented and no other countries in Europe offers something like this. But unfortunately, Digitalt Fortalt has many limitations and it is a bit old fashioned. Europeana is an alternative that has support for user generated content and might thus be used in Stedr in the future.

The main goal of Stedr is to engage people more in the cultural heritage by

1. Giving them easy access to stories related to a cultural heritage.
2. Providing different narratives for people who have different interests like history, art, sports, music etc.
3. Utilizing network effects to increase awareness about places.

Only about half of Europe's population visited a cultural venue in 2010. This is not a satisfying statistic and hopefully in time, Stedr will help to improve this by making people aware of interesting places. A place in Stedr is a point of culture heritage. All places have several stories associated with them. That means there is a potential for providing various stories from each place.

To this date, there is many books related to locations, buildings and art in Trondheim, but several of these books are no longer available in book stores. It is also very inconvenient to walk around with books all the time. Is not it amazing that we do not have access to all this information on the mobile in 2013? Documentation and dissemination of culture in the countryside is of course challenging. There are countless places, many of which lie outside the responsibility of institutions. Associations and individual enthusiasts have helped to gather information and document the places, but the results are fragmented.

So the first step with Stedr is to create a great cultural user experience. To provide the opportunity to discover new places. The second step would be to engage people to tell about places around them.

## 1.3 Stakeholders

In this subsection we will present the main people involved with the project.

### 1.3.1 The team

The team consists of six students all taking a Bachelor degree in Informatics at The Norwegian University of Science and Technology (NTNU). In our team we have a great variation in areas of expertise and knowledge which helped us greatly during the course of the project. Having expertise in many different areas we could help each other and

share knowledge across the group to make everybody suited to different tasks. The importance of this project made the whole group very motivated to succeed and make for a good result. We are:


| | |
|---|---|
| **Hallvard Jore Christensen** | hallvarc@stud.ntnu.no |
| **Jon-André Brurberg** | jonandbr@stud.ntnu.no |
| **Jørgen Rugelsjøen Wikdahl** | jorgenrw@stud.ntnu.no |
| **Tor Barstad** | torob@stud.ntnu.no |
| **Vegard Storm** | vegs@stud.ntnu.no |
| **Øyvind Hellenes** | oyvihell@stud.ntnu.no |


### 1.3.2 Customer

Our customer is SINTEF (The Foundation for Scientific and Industrial Research). They are the largest independent research organisation in Scandinavia. The organisation was established at the Norwegian Institute of Technology (NTH) in Trondheim in 1950 and expanded rapidly in the following years.

| | |
|---|---|
| **Jaqueline Floch** | *Project Manager* Jacqueline.Floch@sintef.no<br>Our main contact inside SINTEF and Coordinator of the project from the customers side. She is also the primary driver for the app this project evolves around. |
| **Babak Farshchian** | *Interim Project Manager* Babak.Farshchian@sintef.no<br>After some unfortunate events made our main contact unavailable in the very beginning, Babak took over for a period of time until Jaqueline could return as our main contact. |

### 1.3.3 Course Staff

We also have great support from the university during the course of this project, mainly from the course staff consisting of assistants, lecturers etcetera.

| | |
|---|---|
| **Mohsen Anvaari** | *Supervisor* `mohsena@idi.ntnu.no`<br>Supervises our group during the project, giving feedback and support. |
| **Monica Divitini** | *Course co-ordinator* `divitini@idi.ntnu.no`<br>Is the course co-ordinator and in charge of the subject. |

## 1.4 Report Structure

**Chapter 1**
The introduction chapter. Presenting the course, project and the different people involved in the project.

**Chapter 2**
Chapter describing the pre-study phase of the project. Since this project is based on an existing project with a beta product, this phase was important for us. This process is documented in this chapter summing up all our research.

**Chapter 3**
This chapter describes the basis of our project with the main focus on the projects' structure. This includes how both the group and the project have been organized.

**Chapter 4**
This is the Software Requirements Specification (SRS) for the new version of "Stedr", and may be read both as a single chapter in this report or a stand-alone document. The SRS describes the behaviour of the system consisting of a detailed description with supplementation of diagrams and tables.

**Chapter 5**
In this chapter we are presenting the system focusing on the architectural part.

**Chapter 6**
Here you will be presented with the whole implementation process, containing all the Sprints describing how the project developed during the project period, through the iterations.

**Chapter 7**
This chapter focuses on the testing phase of the project. Acceptance-, case- and non-functional requirements testing are among what is on the agenda in this section.

**Chapter 8**
Attachments.

After theses chapters the appendices follows, containing other important documents and charts.

# 2 | Pre-study

## 2.1 Solution today

### 2.1.1 Existing functionality

Since the application already is considered a working prototype, we will provide a list which gives a description for the functionality. Working functionality is in this report defined as the functionality that is implemented in the frontend or backend. If something is implemented backend it has to be used frontend. A more detailed techincal description is found in the architecture-section.

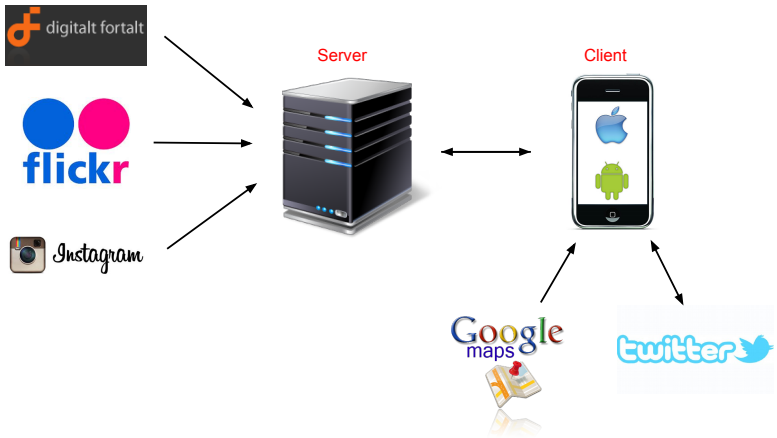



**Figure 1** – A simple overview of the architecture

- Browse a map and zoom in and out.
- Load **places**.
- Click on a place in the map and access **stories** from Digitalt Fortalt.
- Get social media related to a place from the content providers Instagram and Twitter.
- Go to a users exact position on a map.

- Search for a location in the map.

### 2.1.2 Limitations

There are some limitations to the system that needs to be further developed, and some that probably would require total architectural review of the project to be fixed. Our task is to continue the development of the application. An overview of the features we are going to improve are discussed in the requirements-section. Flaws that arose during the development which requires a new architecture will be discussed in the conclusions-section under Recommendations.

### 2.1.3 App evaluation

After the first meetings we concluded that the best way to proceed is to evaluate the existing system, to uncover potential issues and flaws. Therefore we decided that everyone should individually do a usability test when exploring the app for the first time. Here are a short summary of all our reports:

When opening the application the first major issue most of us experience is how slow the app loads, with little feedback that something is actually working in the background. Another thought that generally comes to mind is *I don't understand the apps function when opening it without prior knowledge*. What happens is that you get a map with tags you could click on, making you believe the apps function is to bring it when visiting a town (not Trondheim in particular) and want to explore historical monuments and get Wikipedia like facts. When clicking on tags you get to the location-specific page, and there are displayed content from Instagram. Some of us found this social feature not to have very obvious intentions, it can seem like there is added social interactions to the applications just because it is popular. You would want actual and useful information about the places to be the first thing displayed and get confused when suddenly a lot of Instagram photos with random people posing with the attraction appear. Our first impression is that this social part have to offer something more interesting to be relevant at this point. There is added a nice touch with a slight gradient to white i the bottom indicating that you can scroll down for more content. When the phone is turned (switched to landscape mode) there are issues however, there are no scroll function here limiting the content available and the images are cropped. Also if there is lot of text added in the Instagram feed, this and hash-tags disappears. The way to collect images from Instagram to the application also seems to be less than optimal when sometimes completely irrelevant content are displayed. When tweeting there are no limitations on length, which causes problems when trying to post tweets over 140 characters.
These are some of the feedback extracted from the individual tests.

## 2.2 Survey

One of the most important research we did during the pre-study was to conduct interviews about Stedr. In these interviews we let six everyday people, use the current version of Stedr and paid close attention to how they used it. The subjects was both male and female raging between 18-30 in age. The main purpose of this interview session was to get feedback on proposed features from our customer.

Firstly, after the test subject had some time to play with the app. We asked asked some questions about social media integrations, and this is the results:

*Can you see yourself tweeting about a place from Stedr?*
Yes: **0** No: **3** Don't know: **3**

*What about Instagram?*
Yes: **0** No: **3** Don't know: **3**

*What about SoundCloud?*
Yes: **0** No: **4** Don't know: **2**

Additionally, we asked about Wikipedia. This was a proposition from us.

*Would you like the app better if Wikipedia was integrated?*
Yes: **6** No: **0** Don't know: **0**

In retrospect, we see that even though people were positive to this, it doesn't really fit into what Stedr is about. Because of this, we abounded this feature late on.

When asked if they can envision using the app in the future, this was their responses:

- ”Yes, if the app can also show patios.”
- ”Unfortunately, I don't use social media that much, but if the app was more historically oriented, I would be intrigued to use it.”
- ”Yes totally!”
- ”It must be better than Google Maps for me to bother using it. I want the social features, but only for contributing, not for looking at what other people write. I would also use twitter with the app, but only if there was pre defined tweets.”
- ”Maybe, if I knew about it.”

- ”Yes, it sounds like a good idea.”

The general consensus was very positive about Stedr. Everyone liked the idea, but some were sceptical in regards to the social features that was purposed.

In response to these results, our customer thought this survey was helpful, but it didn't change her mind because she had previously organized focus groups with other results. She still wanted us to integrate Stedr with SoundCloud, even though the user feedback wasn't positive about this feature. We of course respect this decision, but we felt it was our duty to do this research anyway.

## 2.3 Tools and technologies

### 2.3.1 APIs

There was a wish from the customer that we should use other existing services as mush as possible instead of having our own database and a comprehensive back-end. The result of this is that the project will be dependent on many different APIs to function properly. As a result of this we spent alot of time researching different APIs. The existing system had already Norvegiana, Flickr, Instagram and twitter, though some of them needed a fresh up. In addition our both us and our customer had ideas to expand functionality which meant more APIs. We did research on a lot of different APIs, many of them we ended up not using, among them Google Places, Wikipedia, NRK.

**Digitalt Fortalt and Norvegiana.** After an evaluation in the pre-study phase we decided to switch the main API the application is using for better performance. Here are a short summary of why:

In current condition, Stedr uses an API called Norvegiana. This API is basically a collection of all public APIs that can be used in collecting different data. The major pros using Norvegiana are the portion of information accessible from different sources including *Statsarkivet, Digitalt Fortalt, Digitalt Museum* etc. There are many filtering options making Norvegiana able to return all the information needed.

There has been some complaints about how the current service works. Norvegiana is an interface to the dissemination system, not the production system. Which means that when a story is created, one has to wait for the Art Council Norway to perform an export from production to dissemination. This means that stories are not available through Norvegiana at once after they are produced. In some case we had to wait a few weeks. This is not acceptable with respect to our goal of increasing user participation. We think this problem might be solved by switching completely to the Digitalt Fortalt API, which should not be too much trouble considering the existing code only makes simple calls to the API trough Norvegiana. It is worth noting though that Digitalt Fortalt

is originally meant for Norwegian cultural heritage, which might cause problems in a potential international expansion.

The functionality in the APIs, for our usage, are about the same. Where both come short is that both strictly speaking work like databases that you only can retrieve information from, making them impossible to use for posting new content. This has to be solved in another way.

## 2.4 Similar products

A natural part of the pre-study was to explore the market for systems providing similar services. Though we did not find any identical products in terms of purpose and execution, there were a lot of products with some similar functions.

**Jørgen**

# 3 Project organization

## 3.1 Responsibility Areas

Good delegation of responsibilities helps so that someone at all times have an overview over what tasks needs to be done in specific areas. This also makes it easier to estimate workloads and delegate tasks during the group meetings. It is important to note that even though there are specific responsibility areas, all the group members will be able to get practical experience in all of the project areas, even though the time spent in different areas will be distributed individually according to the responsibility areas.

**Øyvind Hellenes** `Scrum master` Øyvind was selected as the scrum master because of his leadership qualities and because he early on took an interest in the organizatorial part of the project.

**Jon-André Brurberg** `Project leader` Jon-André is the driving force in this team and hence, he is also the project leader. Additionally, Jon Andre showed interest in the documentation so he is also responsible for this.

**Tor Økland Barstad** `Technical coordinator` Tor, with his competence and knowledge of programming, is our technical coordinator and will thus oversee the code and functions as a technical supervisor for the group.

**Jørgen Rugelsjøen Wikdahl** `Testing manager` Jørgen is responsible for testing the application to make sure the application has as few bugs as possible.

**Hallvard Jore Christensen** `Report coordinator` Hallvard have the main responsibility of managing the report. This is because of his experience with LaTeXand report documentation in general.

**Vegard Storm** `Usability manager` Vegard showed interest in making sure the application is as user friendly as possible and will manage that aspect of the project.

## 3.2 Process model

For the process model we chose to use the Scrum framework. This was the most natural choice for us amongst the agile methods since it is a system we all have experience with through previous projects. There are many advantages working with Scrum. It gives clear priority for features and deadlines, which will allow us to focus more of our energy on other vital tasks. This approach promotes communication and transparency. All the team members as well as the client always knows what is going on and the current tasks' development through the product backlog. With the backlog cards, the whole

production team is also involved with the overall time estimate, which makes it fairly accurate and controllable.

We considered a few other methods as well, like Kanban and XP, but came to the conclusion that Scrum was the system for us. This was due to Scrums many structured rules which brings order, but still allows us the freedom we might need during the projects development.

With Scrum we'll work in iterations called "Sprints" which are typically a week or two, we also stibe towards making these sprints incremental. Doing this, the model is designed, implemented and tested incrementally, feature by feature, until the project is finished. The advantage here is that for every sprint we have a working product to show for, which is a good reference to have, both for ourselves and the customer.

Since we already have a working project from the very beginning for us to further develop, there is some obvious phase partitions. The first consists mainly on assessing the current version of the product and define the path ahead before we start the actual programming. This will be done through thorough dialogue and discussion with SINTEF, to give us a unison idea of where the product are heading. User evaluation is also important in this phase, both internally and externally within the target user group. And of course technology and framework selection. After this comprehensive planning, the actual coding phase can begin. The sprints will be a big part of this, and since we are working incrementally; So we will do with the testing. Following this: the evaluating phase. In which user tests hopefully will force as many problems and bugs with the early version to surface, for us to correct.

Prototypes through a digital mock-up will be important in the planning phase. We have chosen to use Balsamiq for this, which will mean we will have an interactive prototype mock-up to show the customer, and should also make sure we're all on the same page. This makes it easier to have something concrete/"physical" as a reference.

## 3.3 Development Environment

Since our project is based on further developing on an existing product, there is an advantage in using the same main framework as the previous developers. We decided to use Titanium to easily develop a multi-platform app, but we also took a close look at other options (like PhoneGap) and compared them meticulously in their most critical aspects. With the Titanium framework we use the Titanium SDK which is based on eclipse but tailored for it. For sharing code, Git was our system of choice, mainly because we were already familiar with it, and know it has all the functionality we could need throughout the project. Other documents and files, like notes, summaries, etcetera. we decided to share through a dedicated Google Drive and Dropbox folder, because each has its own advantages in different aspects. As SCRUM service we first choose Agilefant, but later decided to just use spreadsheets instead.

This project obviously involves working with a big set of APIs, like social media, dictionary and other media services. These will play a great part of the development and introduce other frameworks we will have to account for. For communication we often use mail and chat-services, but we prefer more "personal" forms of communication like a video chat through Skype, phone calls and/or ideally, meetings in person.

## 3.4 Scrum Planning

In our version of Scrum, we focused primarily on three key points. The first one is process evaluation. In meetings, we always discuss and evaluate what we have done since last time. This is vital for both ensuring good process quality and team motivation. We focused on writing good summaries from meetings such that we later can go back and learn from what we have done.

The second point is product improvement. This concerns both design and code. We believe that in having a constant dialogue, where we talk about what direction we should take the app, we can maximize the potential of the project. The customer is of course highly involved in this part. Each week we meet with our customer to discuss function, and design choices. In these meetings we can suggest new functions and features to our customer.

Last but not least is testing. We did a lot of planning to make sure both our functional and non-functional requirements would be up to date with our customers vision. Writing and documenting usability and acceptance tests helps us making sure the product quality is satisfactory. Additionally we planned and performed user tests to identify user needs.

## 3.5 Work Breakdown Structure

This Work Breakdown Structure is an overview of what we have done and how our work is distributed between packages. It is updated to match our end result. We have given percentages to each task to show how much work have been put into it.

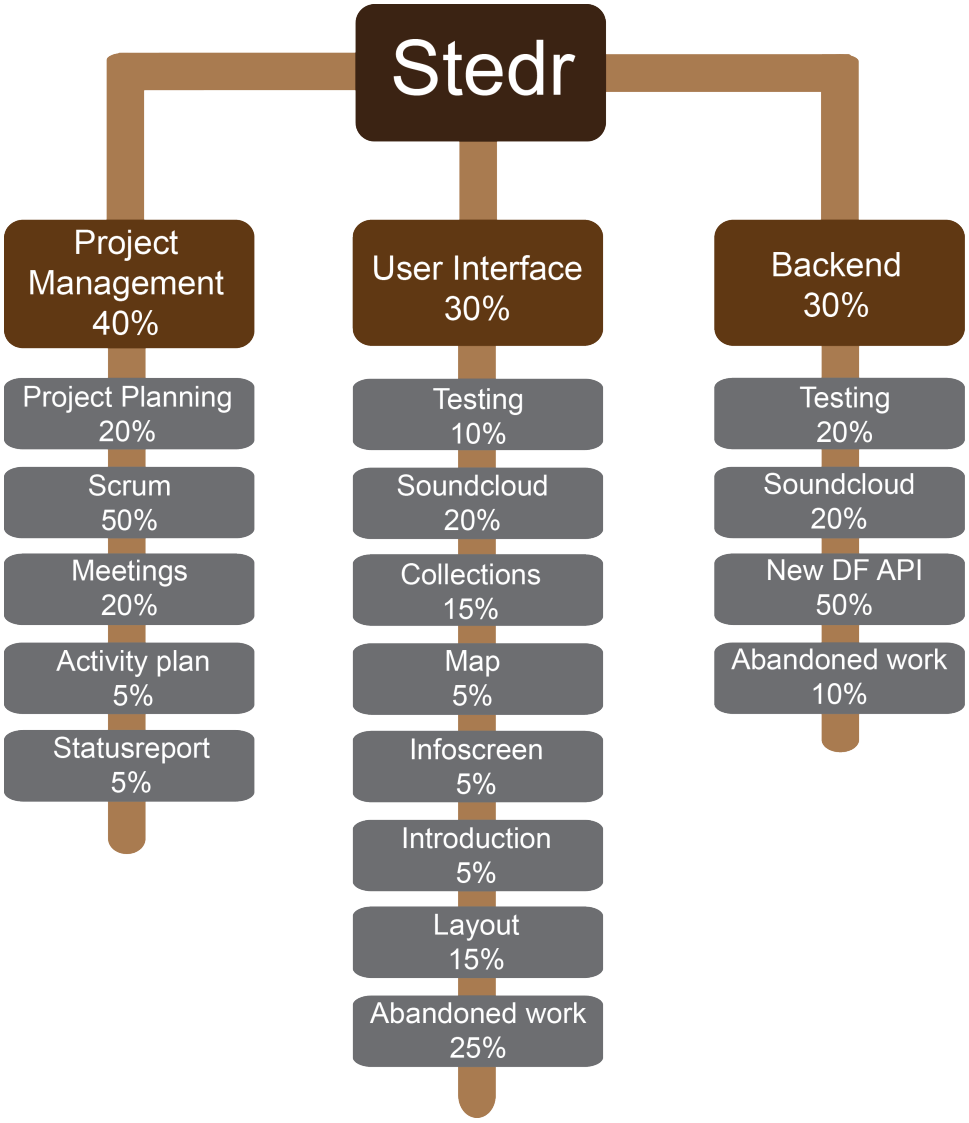



**Figure 2** – Work Breakdown Structure

# 4 System Requirements Specification

## 4.1 Purpose

This is the software requirement specification for the new version of Stedr, both the back-end system that provides content and also the front-end that shows the content and the context of the content to the user. Here the traditional architectural terms back-end - and front-end are used, but there are some subtleties to this term, as the front-end itself is managing a content service of its own.

## 4.2 Intended audience and reading suggestions

Intended readers for this document are current and future developers, and the customer. The reader should also be noted that the SRS both can be read as a stand-alone document to get an overview of the rationalization behind the development process, but that it also is a part of the project report as a whole

## 4.3 References

The software requirements are based on the standard as provided by ISO/IEC:25010 **25010** and also the models that can be found in this report's section for architecture and modelling. References to the ISO-standard and other literature are found at the end of the project report under references.

## 4.4 Product perspective

Originally Stedr is a product developed by students at NTNU as a part of the subject TDT4290, and this application will form a basis for out continued development. The state of the existing application is considered to be a working prototype, and to some degrees it is an application that is built up with a traditional server-client architecture. A simple technical overview of the system is provided below.

## 4.5 User classes and characteristics

The users of the program mainly divide into two categories. One of those groups is the primary user group which are interacting with the smartphone application, front-end, to see content. A typical primary user is an high school student which is introduced

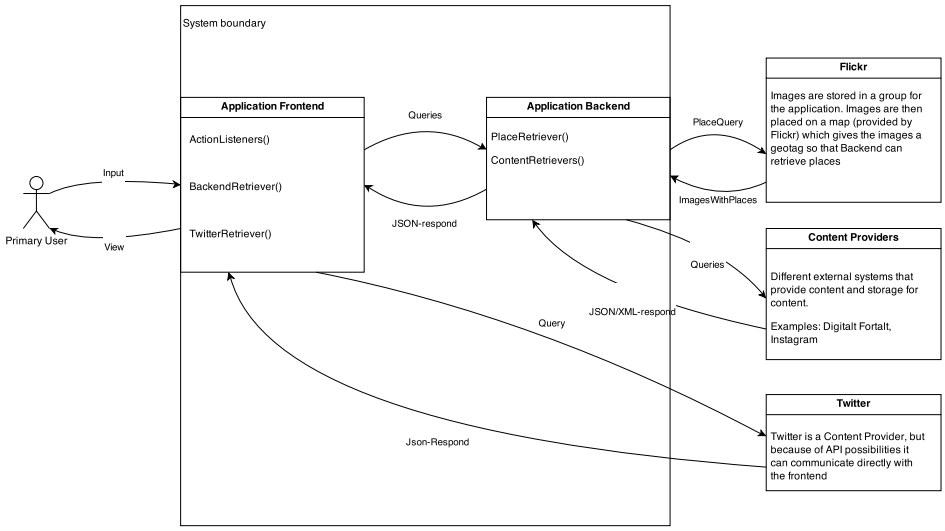



**Figure 3** – A simple technical overview of the architecture

to the program in the context of cultural heritage awareness. As mentioned earlier, the broad goal of the application is to make people aware about cultural heritage. If that goal is fulfilled, some primary users of the application will hopefully transit over to become a content provider.

A content provider has the possibility to interact with the system directly, but also he or she can choose to interact with the system more indirectly. This varying degree of interaction will hopefully lower the threshold for users transiting from content consumer to content provider, which is the overall goal of the application.

Another secondary user is the maintainer-administrator. The maintainer-administrator will use a special set of tools to approve creation of the systems places, but these tools are provided by the external system Flickr. Our internal system is communicating with that external system so that applications relevant information is sent from the external to the internal system, but in the end the external system is stand-alone and can not be controlled directly from the internal system.

## 4.6 Product functions

The main features of the program for different user categories are presented as a bullet list below. All of the provided functions by the system are available to every user without the need of registration or approval by the systems maintainer-administrator with one exception relating to adding new places. In addition the user may need to register on external systems to make use of those features.

**Primary user**

- See places on a world map
- Navigate the map
- Select places on the map, and look at stories to the related place.
- Select places on the map, and look at pictures to the related place.
- Select places on the map, and find sounds to the related place.
- Select places related to pre-defined themes (i.e: art in Trondheim).
- Make posts to a social medium.

**Secondary user, content provider**

- Create stories and pinpoint them so that they appear in relation to a place.
- Create sound and pinpoint them so that they appear in relation to a place.
- Create pictures and pinpoint them so that they appear in relation to a place

**Secondary user, maintainer-administrator**

- Approve content providers so they can create places.

## 4.7 Operating environment

The front-end application of the system is a smartphone application which aims to run on the two major smartphone platforms Android (2.2 and above) and iOS. Because of difficulties with developing towards the iOS platform without equipment from Apple, the goal is to get the application to run on a unspecific versions of iOS to see that a full implementation of the application on iOS is feasible. The back-end of the system, or server, should run as a cloud-based platform provided by Heroku, as the case was for the existing version of the server. Since that service now is unavailable the new version of the back-end will run as a new service instead of replacing the former one.

## 4.8 Design and Implementation Constraints

Because of the nature of the project as a part of a course, there will be few constraints regarding the development of the system. Because there already exists functionality it's natural to constraint the system to make use of the existing code and technologies. Reimplementing them with new code or technologies are allowed, but since time is a limited resource (approximately 20 hours per member per week) it is important to be time effective. That time effectivity and available workload is also to be seen as a design

and implementation constraint. Apart from a private GitHub account, the project is to be done without funding so for the deploying a free service has to be chosen.

Since the customer is a professional organisation, it is also important that the system behaves correctly according to licensing. The system itself is to be open source under the Berkley Software Distribution license version 3 (BSD-3). It is also important that the system handles licensing from external systems correctly, and only shares legal content.

## 4.9 User Documentation

Documentation to system users will be provided in the application itself, this documentation has to easily be editable by the maintainer-administrator which will. In addition to the user documentation there will be provided documentation for developers as an appendix in this report, and code documentation in the code itself and in the GitHub-repository.

## 4.10 Assumptions and Dependencies

An important assumption in the development of the system is that the former system delivers the functionality which is stated in the feature list given by the customer. A copy of this list can be found in the appendix.

Another important assumption, is that the external systems that were implemented in the earlier systems still is functional. This is also a dependency, because changes in those external systems will make internal system malfunctioned. This can be seen as a large drawback in the system, but as the back-end is to be kept to a minimal external sources have to be used for content storage and content providing.

## 4.11 System Features

| SF-1 | |
|---|---|
| Name | Find place on map |
| Priority | H |
| Goal | To browse the map to find a given place |
| Actors | Primary User |
| Preconditions | 1. The home screen is displays<br>2. The internal system and external systems are running<br>3. The device has a internet connection |
| Stimulus-Response | 1. The home screen is displays<br>2. The internal system and external systems are running<br>3. The device has a internet connection |
| Alternate Flow | 2a The place does not exist and is not shown on the map |
| Functional Requirement | A user should be able to access and browse a map, with places as pinpoints at their respective geographical location. The pinpoints should contain the picture and information found on Flickr. Group places close to each other in one icon on map. |
| Related Use Cases | 1,3 |
| Dependencies | none |

**Table 4** – System Feature: Find Place on Map

| SF-2 | |
|---|---|
| Name | Open menu |
| Priority | H |
| Goal | Open the drawer menu |
| Actors | Primary User |
| Preconditions | 1. 2,3<br>4 A screen with the menu button |
| Stimulus-Response | 1. The user clicks the menu button<br>2. The menu opens |
| Alternate Flow | 1a The user clicks the menu button, and the menu is already open<br>2a The menu closes |
| Functional Requirement | A button with the possibility to open the menu should always be presented to the user, so that the user easily can navigate the application. |
| Related Use Cases | 1,2 |
| Dependencies | none |

**Table 5** – System Feature: Open Menu

| SF-3 | |
|---|---|
| Name | Search for a location |
| Priority | M |
| Goal | Go to a location on the map |
| Actors | Primary User |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. The user searches for a location with the search bar in the map view.<br>2. The map navigates to the location |
| Alternate Flow | 2a Location is not found and is not navigated to. |
| Functional Requirement | A search bar related to the map should be presented to the user, so the user can search for locations (independent of places) to see if there are any stories at that place. |
| Related Use Cases | 1 |
| Dependencies | none |

**Table 6** – System Feature: Search for a Location

| SF-4 | |
|---|---|
| Name | Refresh map |
| Priority | H |
| Goal | Update the map with content. |
| Actors | Primary User |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. The user clicks the update button.<br>2. The map refreshes and show new places |
| Alternate Flow | 2a No new places are found, so no places are added to the map. |
| Functional Requirement | The user should be presented with a button that makes requests for new places with content when pushed. This function should also be done automatically so that new content is sent to the user within 5 minutes after it is added. |
| Related Use Cases | 1 |
| Dependencies | none |

**Table 7** – System Feature: Refresh Map

| SF-5 | |
|---|---|
| Name | Go to location |
| Priority | H |
| Goal | Go to users location. |
| Actors | Primary User |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. The user clicks the GPS button.<br>2. The map zooms to the users location. |
| Alternate Flow | 2a GPS not available so it can not go to the users location. |
| Functional Requirement | Since the user has the possibility to navigate the map freely, it should also be possible to quickly navigate to places relevant (in context of location) to him/her. |
| Related Use Cases | 1 |
| Dependencies | none |

**Table 8** – System Feature: Go to Location

| SF-6 | |
|---|---|
| Name | Open views |
| Priority | H |
| Goal | Open views and see the content related to that specific view |
| Actors | Primary User |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. The user clicks on a view<br>2. The user changes views at will<br>3. Content |
| Alternate Flow | 1a If the user clicks a button for the already chosen view, nothing should happen. |
| Functional Requirement | For navigation in the place view, the user should be presented with different buttons (or tabs) so that the user easily can navigate between content and still have an overview of what types of content the application provides. Preview picture gallery when places are grouped together. Add description about place, own vire for sound. Be able to show place location on map from story. Be able to filter stories by tag, author, institution video/no video. preview stories by sound from SoundCloud |
| Related Use Cases | 3 |
| Dependencies | none |

**Table 9** – System Feature: Open Views

| SF-7 | |
|---|---|
| Name | Load content |
| Priority | H |
| Goal | Content is loaded from the external systems |
| Actors | Internal System |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. Access the server as done in the previous version of the system<br>2. Provide input to the server “placeId=”<br>3. Content is loaded and a JSON-object is replied by the server |
| Alternate Flow | 1a If the user clicks a button for the already chosen view, nothing should happen. |
| Functional Requirement | The API for DF has to be changed, without changing the behaviour of the response from the server. In addition to this the server will respond with a new container for the audio content. Other content should be handled as normal. Retrieve collection from DF based on hash-tag and location. Retrieve stories in a collection from DF based on tags. Open info retrieved from SoundCloud based on hashtags or location. Retrieve information from Instagram based on Hash-tags. Be able to get tinyUrls to different content. |
| Related Use Cases | Null |
| Dependencies | none |

**Table 10** – System Feature: Load Content

| SF-8 | |
|---|---|
| Name | Collection |
| Priority | H |
| Goal | Get all places related to a theme. |
| Actors | Primary User |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. Access the menu bar.<br>2. Click on the Collections-button<br>3. Choose a collection<br>4. Collections view is opened<br>5. Change to map view<br>6. Places related to the collections is shown on map |
| Alternate Flow | 3a No Collections are available |
| Functional Requirement | A container called Collections are to be implemented. Collections. Allow switching between map-related and collection related functionality. Display picture, title and description about a collection. Have a storyListView. Preview stories in collection story list. Open story in collection list. Places on map view with icon for each story in collection. Preview a place for story on map. |
| Related Use Cases | 3 |
| Dependencies | none |

**Table 11** – System Feature: Collection

| SF-9 | |
|---|---|
| Name | Upload content |
| Priority | M |
| Goal | Upload content |
| Actors | Primary User |
| Preconditions | 1. 1,2,3<br>5 The user has an account at the content provider he or she is trying to upload to.<br>6 Places related to the collections is shown on map |
| Stimulus-Response | 1. Access the tabs for different views<br>2. Click the add-button in the views. |
| Alternate Flow | 3a No Collections are available |
| Functional Requirement | The user should have the possibility to add content so that. Add picture directly from stedr. ask the user for login-credentials the first time, then store locally for continued access. A similar approach for SoundCloud. Have relevant hash-tags copied to clipboard. Be able to comment and like pictures on Instagram. |
| Related Use Cases | Null |
| Dependencies | none |

**Table 12** – System Feature: Upload Content

| SF-10 | |
|---|---|
| Name | Get help and info |
| Priority | H |
| Goal | Be informed |
| Actors | Primary User |
| Preconditions | 1. 1,2,3 |
| Stimulus-Response | 1. Access the drawer menu<br>2. Click the help button.<br>3. Select the option for what help you need |
| Alternate Flow | |
| Functional Requirement | Introduction for first users. Help available at any time. |
| Related Use Cases | Null |
| Dependencies | none |

**Table 13** – System Feature: Get Help and Info

## 4.12 Product Quality

Guided by ISO:25010, meetings with our supervisor and the feature list given to us by the customer the product qualities that are important for the project is compatibility, performance efficiency, reliability and portability.

### 4.12.1 Compatibility

There are a lot of information processing done by the backend, and the information is derived from multiple sources and in different formats. It is therefore important that the backend processes this information into a standarized format. Since there already exists code, new additions should be comatible with the old code.

**Co-existence** Since the architecture behind the system relies on a clients (V) and a server (MC), it has to be possible for the clients to share the resources from the server. This means that several instances of clients should be able to be functional at the same time.

The test for co-existence consists accessing the server at the same time with multiple clients. This can be done in combination with the test for maturity under Reliability.

**Interoperability** All information sent from the server should follow the same format (JSON) so that the front-end only will have to communicate with the back-end using the same format. This means that the back-end will have to convert XML from some of the external systems into JSON. With this approach the front-end will also remain separated from the back-end, which will make it easier to exchange parts of the GUI later on as it is

For valid interoperability it is necessery that all respones from the back-end to the front-end is in the JSON-format.

### 4.12.2 Performance Efficiency

Even though the system isn't a part of a critical operation, the new and improved system will have performance efficiency as an important model of quality. The reasoning behind this is that the customer wanted to give users an experience of a more responsive system. In addition to this the server has to utilize minimal resources, as it is going to be ran in a resource restriced envirment.

**Time behaviour** As of now the time to load new content from the content providers to the application is slow and random. Because of this there are no exact estimation on the time used to pull content from Digitalt Fortalt and Instagram, but the application should use no more than *300 seconds* to pull new content. This fairly high time frame is due to processing times at the external APIs. 300 seconds is therefore the time limit given to the system within it should have pulled new stories/pictures from Digitalt Fortalt/Instagram. The time limitations set for the back-end to respond to requests is set to *120 seconds* for places (with an empty cache) and *15 seconds* for places (with a full cache), stories, images and sounds. Unrelated to the goal of performance issue; the user should be informed when the application is processing information.

**Resource utilization** Requirements related to resources utilized by the application when performing it's tasks, are already met by the prototype. The new version of the application are bound also bound by these goals, which means that new functions must maintain minimal and Specifically the back-end is bound by the resources provided by the free service of the Heroku Cloud Platform. One of the implications of this is that the cache cannot be written to disk as the filesystem on the disk is read-only. Without writing capabilities or database access, the back-end will have problems improving the time behaviour for place-loading when the cache is empty.

**Capacity** Regarding capacity used by the the application, there should be an improvement. Because the application is to be used on the go where there may not be any WiFi-hotspots, the application should restrain itself to download content that is unrelated to where the user is. Because of the varied content types, it is hard to set a defined limit in how much content (in terms of megabytes) the application should download. The limitations given to the application will therefore be set by the equation:

$$\begin{aligned}\text{Bound} = \text{Content from Digitalt Fortalt} + 5 \times \text{Content from Twitter} + 10 \times \\ \text{Picture from Flickr} + 5 \times \text{Picture from Instagram}\end{aligned} \tag{1}$$

### 4.12.3 Reliability

Since the application is going to be online without a team responsible for the technical maintenance, the server should be operative as long as the external content providers are feeding it with content.

**Maturity** Because of the early versioning of the application, the aspect of maturity is not important for this application. Users of the application are few, and they know what

the capabilities of the application is. This means that a user follows a rigid pattern and within that pattern, the probability to execute faults is almost non-existing. Functionality outside that pattern is not supported and thereby it's impossible to execute mistakes.

Testing of this should be done by simulating a high number of calls towards the server. The simulations should be done as threads as this will better simulate a real-life situation these are not done sequentially.

**Availability** An important characteristic of the application is that it has to be available just as often as a professional service. This means that under normal circumstances, the uptime of the back-end and front should be 90 % or above.

Testing of this is done over at least a week while monitoring the uptime of the server. $1 - \frac{Downtimeinhrs}{Daysrunning \times 24hours} \times 100 = uptime\%$

**Fault tolerance** Whenever faults are occurring, it is crucial that the back-end has implemented services so that it can recover without the need of a maintainer. Because of the relative simplicity of the back-end, the server should restart itself within *180 seconds*

Testing for this should be done by deactivating components and then monitor if a system is to be considered functional. A functional system is a system which serves places and stories on a map.

**Recoverability** Since most of the system will be ran without a maintainer, the system shoud recover quickly on faults by its own.

Recoverability-testing is done together with testing the fault tolerance, by monitoring the time the system uses to become operational after critical components are disabled and reactivated. Beacuse of the existing architecture it is already known that the system will fail when certain components are deactivated so a fail-proof system is not theoretically possible.

### 4.12.4 Portability

One of the main reasons for using the Titanium-framework is that it is possible to code once, and compile it down to native applications for a number of smartphone environments. Beacuse of iOS developer requirements, the former application has unfortunately never been tested on iOS, which is a goal set by the customer.

**Adaptability** One main constraint for obtaining a high grade of adaptability is to not use platform specific GUI elements front-end. This should lead to an identical codebase

front-end, which can compile down to all the Titanium-supported platforms. With this method it is also possible to ensure some degree of compatibility against new platform versions, since the mobile platforms usually have support for older platforms. Of course this is not satisfied by the system, but by the developers of a given mobile platform. Therefore this support is not guaranteed.

**Installability** Since the system is supposed to be a native application, it should be possible to install the application from platform-specific repositories (i.e: Play and iOS-store). Since the program is still under development this won't be accomplished though, and the requirment is to deliver a file which can be installed on phones meant for development (debugging enabled).

**Replaceability** A above, the system should update through a platform specific service. Since the system isn't a part the official repositories yet, replacement of the application should also be through debugging enabled devices.

Note: Since the program builds down to native applications under 15MB, it should be a fairly small job to make the program available on the different platform-specific repositories.

# 5 Architecture

The current architecture of the application is as shown in the figure 1 from the requirements-section. We have a back-end written in Java that retrieves information from services like Digitalt Fortalt, Flickr and Instagram. Digitalt Fortalt is where all the stories are obtained from, Flicker holds all the locations, and the pictures are taken from Instagram based on tags. The information is stored on the server and can now be used by the client, which holds the front-end of the application that is being developed on Appcelerator Titanium, using mainly JavaScript and XML. Twitter is integrated directly into the front-end and does not have to go through the server. This is what we eventually would like to do for all the external services, and completely get rid of the back-end, but given the time available for the project and the features the customer wants us to implement, this is not a task that will be developed. We would also like the user to be able to publish to more of the external services via the application. Publish a picture to Instagram, add a new location to Flickr, or share a story on Facebook are all features we would like to add, but are not top priority given our time restrictions.

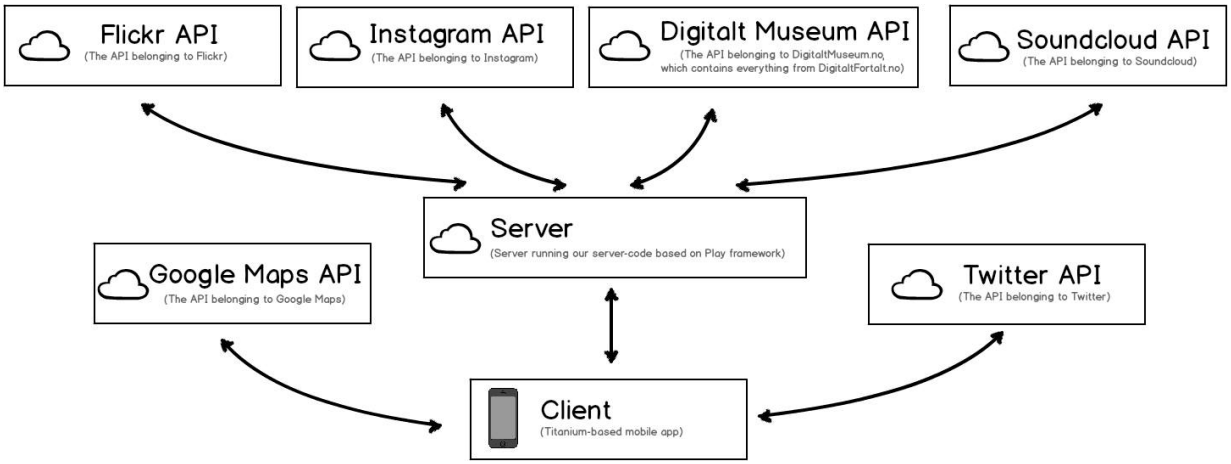



**Figure 4** – Deployment View

## 5.1 Back-end

The Back-end is written in Java and mainly retrieves data from external APIs and save it on the server so that it can be used by the application.

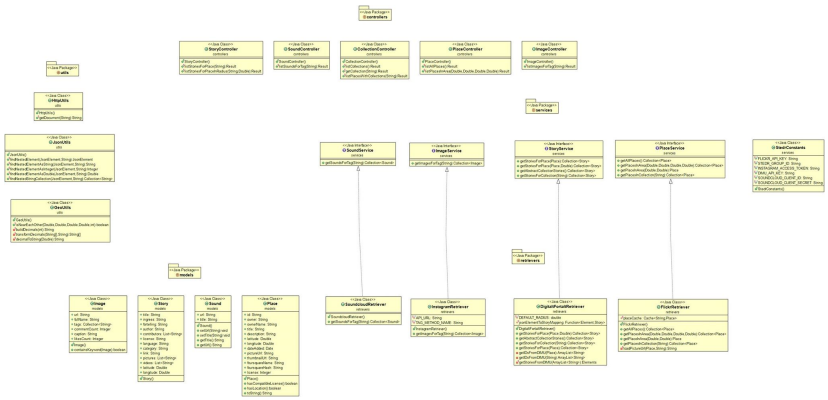


**Figure 5** – Full scale class diagram can be found in Attatchments 9.1

## 5.2 Front-end

The front-end of the application is an interface to let the user enter, manipulate and view data. It is the part of the application that is being interpreted on the users own device, and is based on XML, TSS and JavaScript for design and functionality.

Every window in the application has a JavaScript-, TSS- and XMLl-file associated with it. A window can contain various views that can each have different event listeners. What the user sees depends on the window currently open and its associated XML, TSS and JavaScript files and what happens when interacting with a view depends on the event-listeners attached to that particular view. Interactions can be purely visual or it can trigger core functionalities. For example the refresh button on the map window has an event-listener attached to it so that when the user clicks it, it will attempt to fetch the locations from the server and plot them on the map. It will also animate the refresh icon to spin, giving the user feedback that the click was registered.

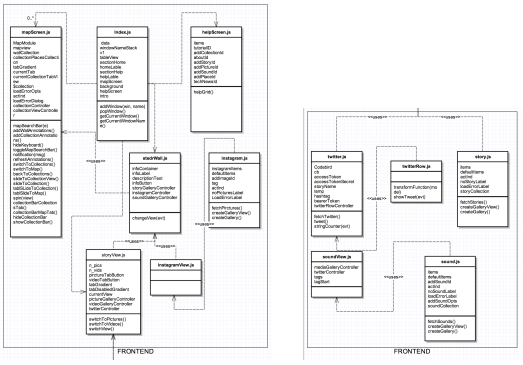



**Figure 6** – Full scale class diagram can be found in Attachments 9.1

## 5.3 Process View

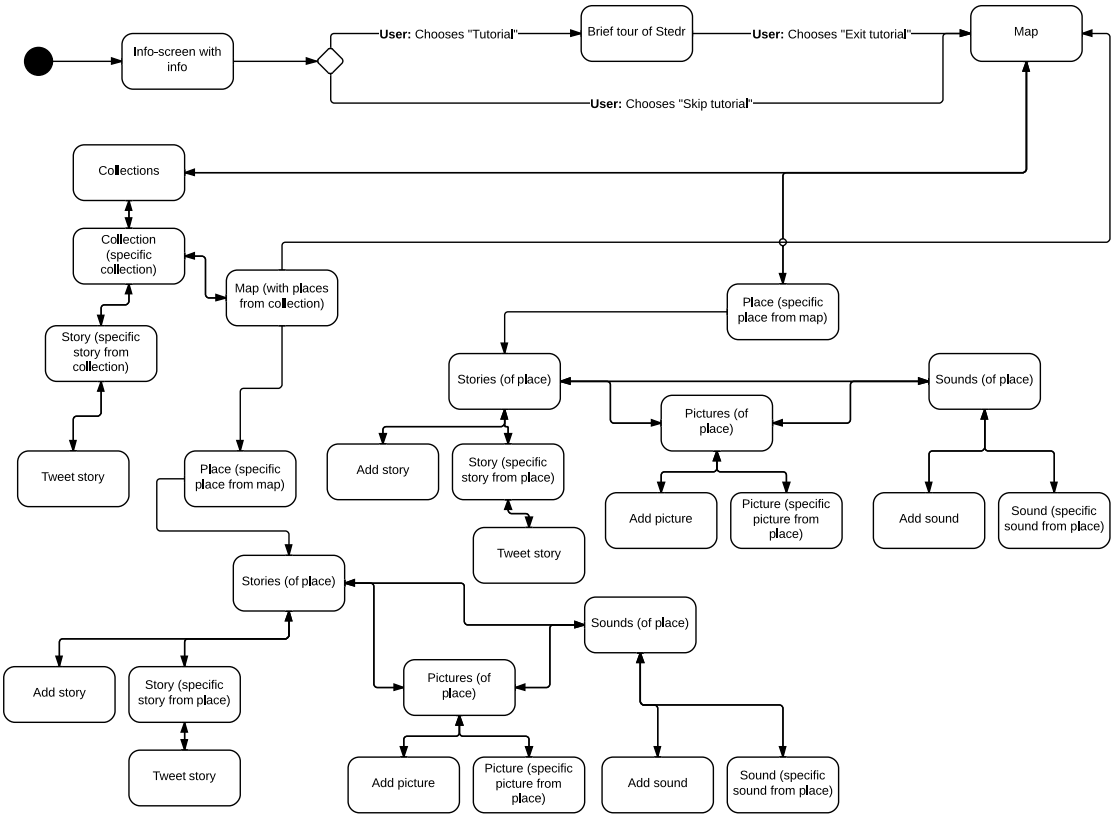



**Figure 7** – Process View

## 5.4 Use Case

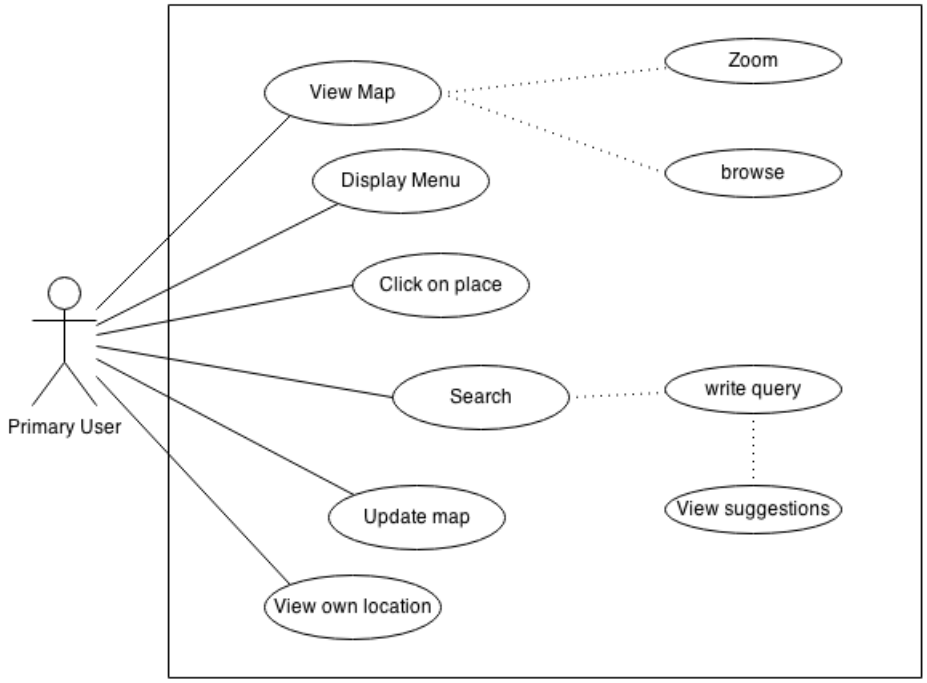



**Figure 8** – Map View (Home)

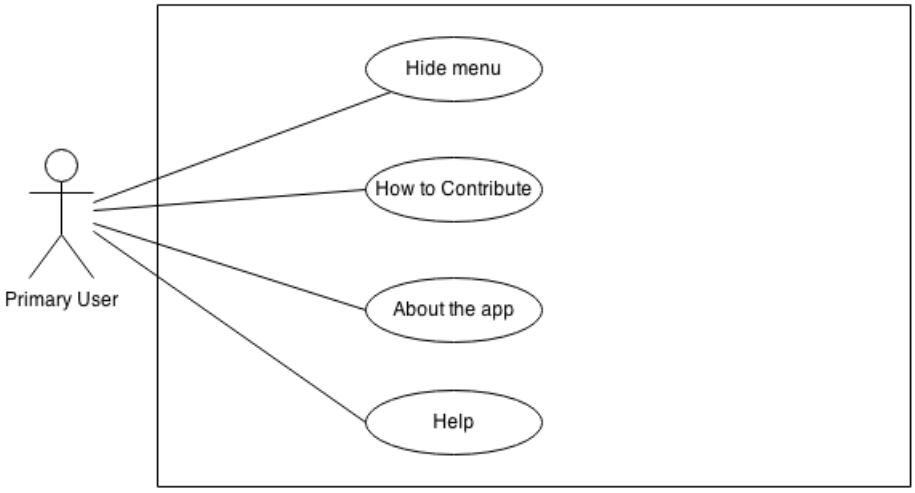



**Figure 9** – Menu View

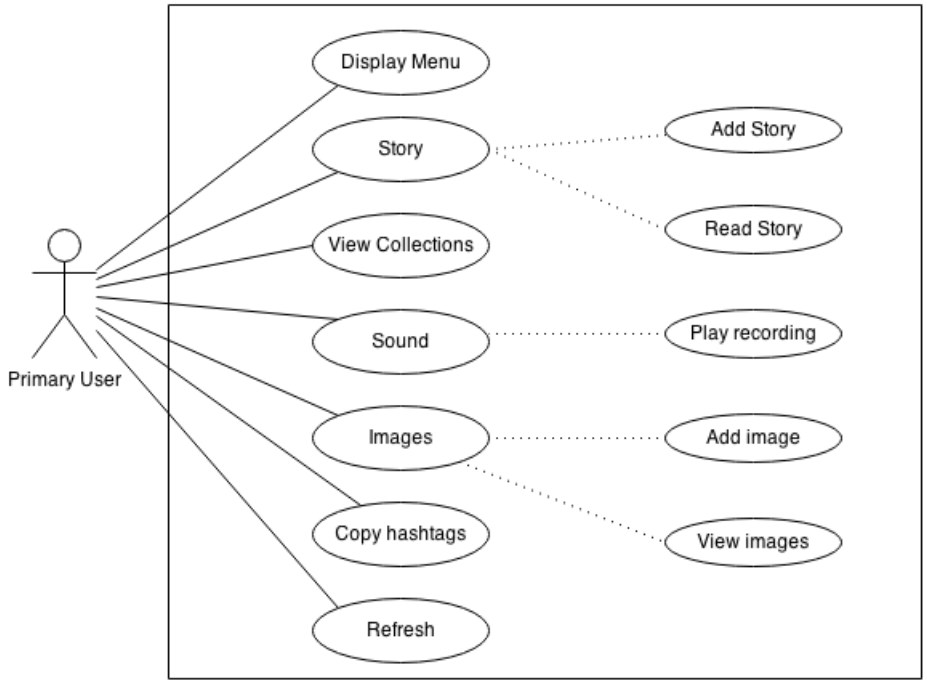



**Figure 10** – Place Screen

## 5.5 Sequence

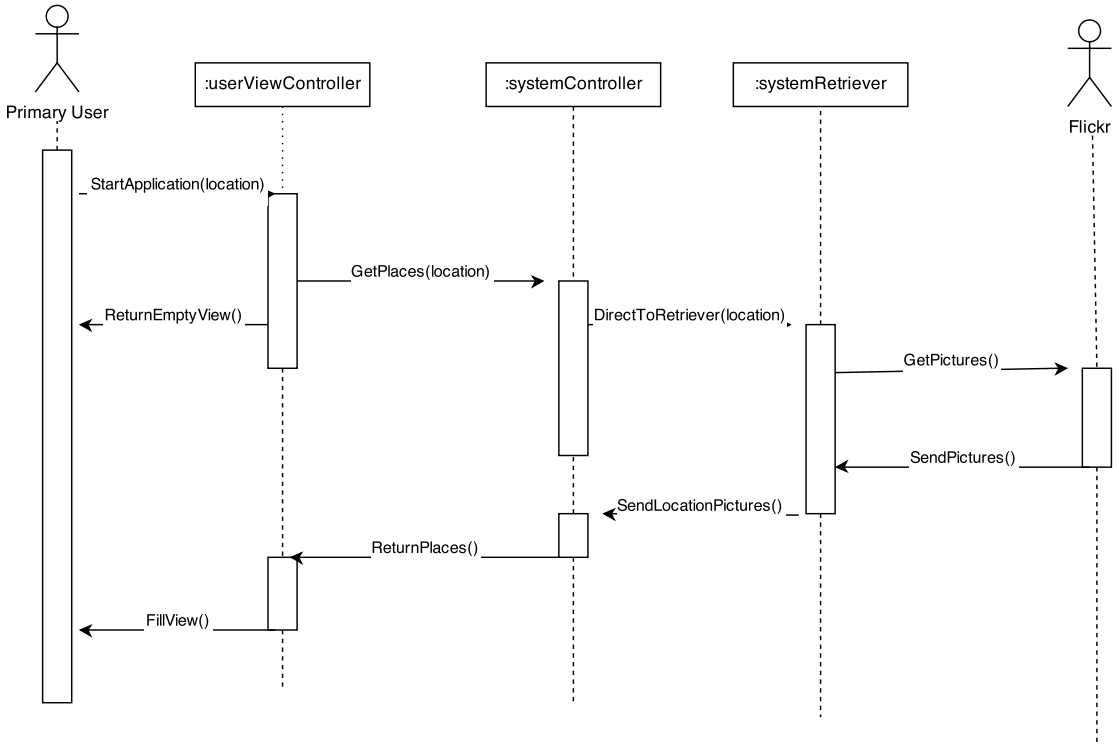



**Figure 11** – Get Stories

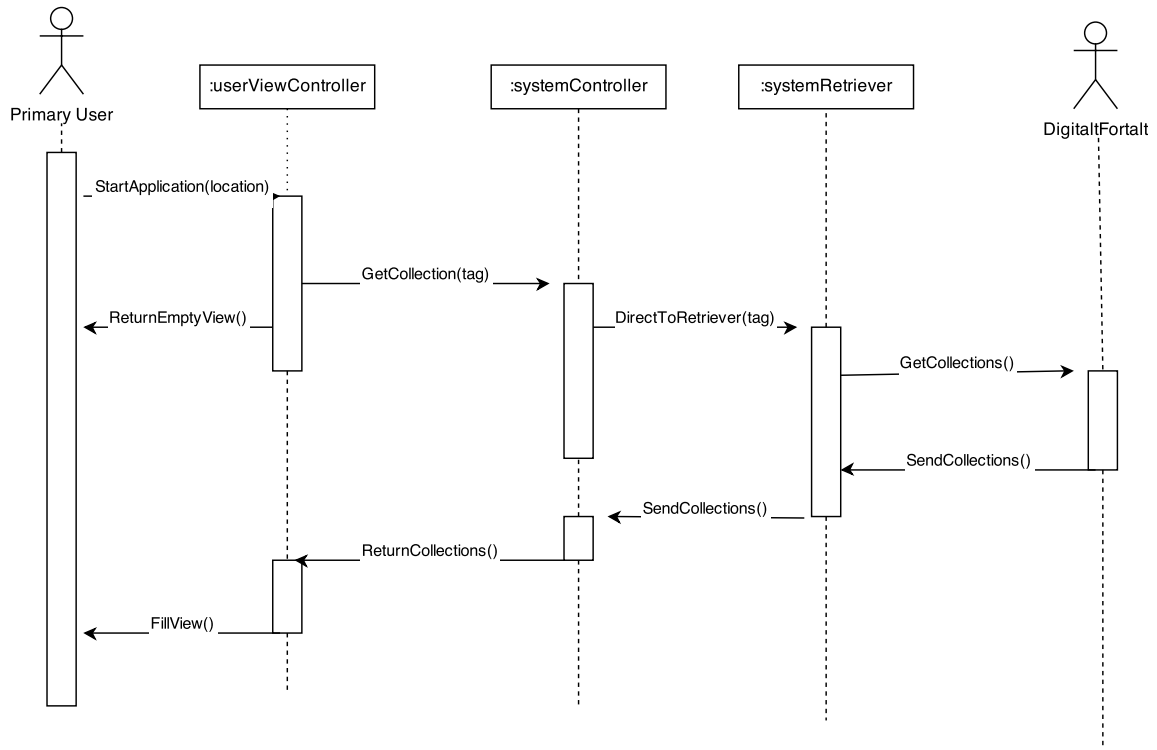



**Figure 12** – Get Collections

# 6 Implementation

TODO

## 6.1 Backlog

| ID | Tema | As | I want... | Such as... | Notes | Priority |
|---|---|---|---|---|---|---|
| 1 | UI | User | To browse map, zoom in and out. | Watch where there are events of interest. | | 1 |
| 2 | UI | User | Click on event in map | users can view stories and pictures for that specific event | | 1 |
| 3 | UI | User | Watch pictures of the place | To identify it. And get another view on it. | | 1 |
| 4 | UI | User | To have an easy-to-use menu | | Slider | 1 |
| 5 | UI | Developer | Let the user's have an easy user interface | user experience is the best it can be. | | 1 |
| 6 | UI | User | be able to switch between map-related and collection-related functionality | A new View or activity | | 1 |
| 7 | UI | User | view picture/video gallery from DF | | Make clear that several pictures are available | 1 |
| 8 | UI | User | read text from DF | | keep url, remove tags, show institution (aditionally to author) | 1 |
| 9 | UI | User | Share my experiences and knowledge about a place | To give something back to the community | | 2 |
| 11 | UI | User | Search for storyies | read and learn | | 2 |
| 12 | UI | User | Get my exact point where i am, in map. | I can know which attractions are near | | 2 |
| 13 | UI | User | Share a place on social media | To recomend to my friends | | 2 |
| 14 | UI | User | Read a description about a place | | Retrieve description from flickr, add under picture. | 2 |
| 15 | UI | User | Have a own tab for sounds | | | 2 |
| 16 | UI | User | record stories for the app. | SoundCloud integration | Be able to add sounds, preview stories from soundcloud and play sounds in the app. | 2 |
| 17 | UI | User | Read other peoples experiences of a sight. | collect and compare experience of a sight | | 3 |
| 18 | UI | User | Search for places in map | the map takes us to the specific place the user search for. | Google maps | 3 |

| ID | Tema | As | I want... | Such as... | Notes | Priority |
|---|---|---|---|---|---|---|
| 19 | UI | User | See the place location on map | | This requirement is added wrt collections. It should be easy to get the location for a story related to a collection when startin from the "collection - story list view" (see below) | 3 |
| 20 | UI | User | get written feedback when no data is available | sounds, collections, stories, images | | 3 |
| 21 | UI | User | Get a collection from DF based on hashtags and location | | | 3 |
| 22 | UI | User | View information about a collection | picture, title and decription | Preview of stories on collection story list, View information about a collection, open story in collection story list (click on previewed information), view on map | 3 |
| 23 | UI | User | Have a "story list view" | | | 3 |
| 24 | UI | User | preview information about sriories related to the place | | | 3 |
| 25 | UI | User | Discover new sights | | | 4 |
| 26 | UI | User | seperate between professional and informal stories | DigitaltFortalt vs intstagram/twitter | | 4 |
| 27 | UI | User | open information from DF in browser | | | 4 |
| 28 | UI | User | Get others' experiences and reactions from social media | for fun | | 6 |
| 29 | UI | User | Ability to share stories on other social media | twitter/instagram | | 6 |
| 30 | UI | User | Like and comment on pictures | | After logged in with intagram of course. Check with API, if possible. | 6 |
| 31 | UI | User | get a picture gallery retrieved from other databases as well | trondheimbilder.no | | 7 |
| 32 | UI | User | Get route description | get shortest path | Google maps API | 8 |
| 33 | UI | User | "Streetview" a place | Digital discovering | Link the places-koordinates to Google streetview. | 10 |
| 34 | UI | User | Have places close to each other group together | | be shoen a gallery of photos when places are grouped together | 10 |

| ID | Tema | As | I want... | Such as... | Notes | Priority |
|---|---|---|---|---|---|---|
| 1 | IM | User | Se stories from DigitaltFortalt as soon as they are submitted. | | | 1 |
| 2 | IM | User | Read dictionary/wiki input about a place | Get historical unpersonal facts | IE wikipedia | 1 |
| 3 | IM | Developer | Retrieve information from Digitalt Fortalt based on geo-loaction | | New API from DF | 1 |
| 4 | IM | User | get infromation from Instagram based on hashtag | | Two hashtags? | 1 |
| 5 | IM | User | add hashtags to clipboard from a place (picture view) | | | 1 |
| 6 | IM | User | Mark a spot on the map as a new place | To start a contribution | | 2 |
| 7 | IM | User | Listen to and record sound for a given place. | | | 2 |
| 8 | IM | Developer | Retriveve information from SoundCloud based on #hashtag or location | | Only when attribute is creative common | 2 |
| 9 | IM | User | Get tinyurl to data | stories!, places, (link to picture in Flickr, instagram message etc.) | | 2 |
| 11 | IM | User | Find relevant hashtags for a place | Make sure my social media posts gets picked up by stedr | | 6 |
| 12 | IM | User | Add picture directly from the app | | Instagram API (store credentials to external site on local device, not server) | 6 |
| 13 | IM | User | Add sound directly from the app | | SoundCloud API (store credentials to external site on local device, not server) | 6 |
| 14 | IM | Developer | be able to filter story by tag, author, institution, video/no video | | | 7 |
| 1 | INFO | User | Have help information available at any time | | information shoul be structured so that elements of information can be reused. | 1 |

## 6.2 Sprints

In our version of Scrum we had two week sprints conposed of eneries from the sprint backlog. **TODO**

| Sprint 1 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stories** | **Tasks** | **Day 1 (17.2)** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| IM6 - Mark a spot on the map as a new place | Tag a place on the map. | 40 (estimated time remaining) | 40 | 35 | 35 | 35 | 35 | 30 | 35 | 30 | 20 | 20 | 20 | 20 | 15 |
| | Create new place object | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| UI4 - To have an easy-to-use menu | Slide from map to menu. | 10 | 15 | 15 | 10 | 10 | 10 | 10 | 10 | 5 | 0 | | | | |
| | Make the slider look nice | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 10 | 10 | 5 | 5 | 0 | |
| | Create link between buttons and functions. | 10 | 10 | 10 | 10 | 5 | 0 | | | | | | | | |
| IM2 - Read dictionary/wiki input about a place | Find solutions for getting data from wikipedia | 30 | 30 | 30 | 40 | 40 | 40 | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 20 |
| | Implement in UI. | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | Implement parser. | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| IM1 - Se stories from DigitaltFortalt as soon as they are submitted. | Research the new API and find out if its worth replacing the old one. | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 10 | 5 | 5 | 0 |
| | Make the GUI more understandable. | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 10 | 5 | 5 | 0 | | |

| **Hours** | **Total** | **Organizatorial** | **IM6** | **UI4** | **IM2** | **IM1** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Øyvind | 41 | 25 | | | 16 | | | | | | |
| Hallvard | 40 | 15 | 17 | 5 | 3 | | | | | | |
| Tor | 36 | 9 | | | 14 | 13 | | | | | |
| Jon-Andre | 43 | 20 | 5 | | | 18 | | | | | |
| Jørgen | 37 | 26 | | 11 | | | | | | | |
| Vegard | 42 | 11 | | 25 | 6 | | | | | | |
| **Total** | **239** | 106 | 22 | 41 | 39 | 31 | | | | | |

| Sprint 2 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stories** | **Tasks** | **Day 1 (3.3)** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| IM7 - Listen to and record sound for a given place. | Inform when no sound is avalible | 1 (estimated time remaining) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | | |
| | Show add sound icon in blogg | 1 | 1 | 1 | 1 | 1 | 0 | | | | | | | | |
| | Play sounds from soundcloud | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 0 | | | |
| IM1 - See stories from DigitaltFortalt as soon as they are submitted. | Implement the new API for digitalt fortalt | 20 | 20 | 30 | 35 | 30 | 30 | 25 | 25 | 25 | 20 | 15 | 5 | 5 | 0 |
| IM6 - Mark a spot on the map as a new place | Mark a spot on the map as a new place | 20 | 15 | 15 | 15 | 10 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| UI3 - Watch pictures of the place | See picture from Instagram | 15 | 25 | 25 | 25 | 25 | 15 | 10 | 10 | 10 | 10 | 10 | 5 | 0 | |
| | Create symbol for watching several pictures | 5 | 5 | 5 | 5 | 0 | | | | | | | | | |
| | Make a sliding function to watch several pictures | 10 | 10 | 10 | 5 | 0 | | | | | | | | | |
| UI17 - Read other peoples experiences of a sight. | Read twitter messages inside stedr | 40 | 30 | 30 | 30 | 30 | 30 | 10 | 10 | 0 | | | | | |
| UI18 - Search for places in map | Make Search field in the navigation top bar | 20 | 20 | 20 | 20 | 20 | 20 | 30 | 30 | 30 | 20 | 20 | 20 | 10 | 0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UI32 - Get route description | Get route description | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 10 | 10 | 10 | |
| UI33 - "Streetview" a place | Use the google API's function to get a streetview | 30 | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | |
| | | | | | | | | | | | | | | | |
| **Hours** | **Total** | **Organizatorial** | **IM:1** | **7** | **6** | **UI:3** | **17** | **18** | **32** | **33** | | | | | |
| Øyvind | 38 | 19 | | | 3 | 16 | | | | | | | | | |
| Hallvard | 40 | 8 | | 7 | 10 | 3 | | 3 | 9 | | | | | | |
| Tor | 40 | 7 | | | | 14 | 17 | | | 2 | | | | | |
| Jon-Andre | 45 | 15 | 5 | 7 | | | 18 | | | | | | | | |
| Jørgen | 41 | 5 | 2 | 11 | | | | 14 | | 9 | | | | | |
| Vegard | 43 | 5 | | 9 | 10 | 6 | | 8 | 5 | | | | | | |
| **Total** | **247** | 59 | 7 | 34 | 23 | 39 | 35 | 25 | 14 | 11 | | | | | |

| **Sprint 3** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stories** | **Tasks** | **Day 1 (17.3)** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| IM3 - Retrieve information from Digitalt Fortalt based on geo-loaction | Implement geo-location from digitalt fortalt's API | 10 (estimated time remaining) | 10 | 10 | 10 | 10 | 5 | 0 | | | | | | | |
| INFO-1: Have help information available at any time | Make a tab for help information in the navigation drawer | 3 | 3 | 3 | 3 | 0 | | | | | | | | | |
| | Make a blogg | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 0 | | |
| | Make several blogg post about help information needed in stedr application | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | |
| UI16 - SoundCloud Integration | Integrate soundcloud API in stedr | 20 | 20 | 20 | 40 | 40 | 40 | 40 | 30 | 30 | 30 | 20 | 15 | 5 | 0 |
| | Check with the test data, that we can listen to sounds inside the application | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 |
| UI21 - Get a collection from DF based on hashtags and location | Implement Digitalt fortalt's API to receive collection based on hashtags and location | 20 | 20 | 20 | 20 | 10 | 10 | 3 | 3 | 3 | 0 | | | | |
| UI8 - Read text from DF | Be able to read text from digitalt fortalt's API | 5 | 5 | 5 | 5 | 5 | 10 | 0 | | | | | | | |
| UI-12 Get my exact location in map. | Get exact location through a button using the Google maps API | 10 | 5 | 0 | | | | | | | | | | | |
| UI34 - Group places close to each other | Be able to group places, based on location and how close they are to each other | 30 | 30 | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 20 | 10 | 0 | | |
| IM4 - Get infromation from Instagram based on hashtag | Review the Instagram retrieval method, getting pictures based on hashtags and changing it. | 15 | 15 | 15 | 20 | 10 | 5 | 5 | 5 | 0 | | | | | |
| | | | | | | | | | | | | | | | |
| **Hours** | **Total** | **Organizatorial** | **IM:3** | **4** | **UI:8** | **12** | **16** | **21** | **34** | **IN:1** | | | | | |
| Øyvind | 43 | 23 | | | | | 20 | | | | | | | | |
| Hallvard | 41 | 13 | 7 | | 2 | 7 | | 3 | 9 | | | | | | |
| Tor | 41 | 4 | | 13 | | | 18 | | 6 | | | | | | |
| Jon-Andre | 45 | 13 | 5 | 10 | 8 | 7 | 2 | | | | | | | | |
| Jørgen | 39 | 5 | | | | 11 | | | 14 | 9 | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vegard | 42 | 4 | | 9 | | 9 | | 8 | 5 | 7 | | | |
| **Total** | **251** | 62 | 12 | 32 | 10 | 34 | 40 | 11 | 34 | 16 | | | |

| **Sprint 4** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stories** | **Tasks** | **Day 1 (31.3)** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| UI2 - Click on event in map | Implement event listeners | 15(estimated time remaining) | 10 | 15 | 15 | 5 | 3 | 3 | 0 | | | | | | |
| UI6 - Be able to switch between map-related and collection-related functionality | Implement tab view in the home screen so you can switch beetween collection and map related functionality | 5 | 5 | 0 | | | | | | | | | | | |
| UI11 - Search for stories | Implement search field, so you can search for stories inside the application | 20 | 20 | 20 | 40 | 30 | 30 | 30 | 30 | 15 | 5 | 0 | | | |
| UI13 - Share a place on social media | Implement shared technology, so you can share places on social media | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 10 | 10 | 15 | 5 | 5 | 1 | 0 |
| UI14 - Read a description about a place | Implement an information button on inside story view. | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | |
| | Retrieve discriptions from digitalt fortalt's API | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | | |
| UI15 - Have a own tab for sounds | Implement new tab for sound view. | 5 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 0 | | | | |
| UI25 - Discover new sights | Be able to discover new sights using the map-related functionality | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 0 | |
| UI27 - Open information from DF in browser | Be able to open digitalt fortalt in a browser view. | 10 | 10 | 10 | 10 | 15 | 15 | 10 | 0 | | | | | | |
| IM13 - Add sound directly from the app | Implement sound recording functionality, using the Soundcloud API. So that you can add sound directly from the application | 30 | 30 | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| IM14 - Filter story by tag, author, institution, video/no video | Be able to filter stories, by tag, author, institution, video and no video. | 20 | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 |

| **Hours** | **Total** | **Organizatorial** | **IM13** | **14** | **UI:2** | **6** | **11** | **13** | **14** | **15** | **25** | **27** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Øyvind | 38 | 19 | 10 | 5 | | 4 | | | | | | | |
| Hallvard | 39 | 11 | 8 | 10 | 2 | | | 3 | | 5 | | | |
| Tor | 40 | 7 | | | 10 | | 18 | | | | 5 | | |
| Jon-Andre | 46 | 13 | | | 10 | | 10 | 7 | 4 | | | 2 | |
| Jørgen | 44 | 6 | | | | | | | 14 | | 15 | 9 | |
| Vegard | 46 | 3 | | | | | 9 | 15 | | 5 | 7 | 7 | |
| **Total** | **253** | 59 | 18 | 15 | 22 | 4 | 37 | 25 | 18 | 10 | 27 | 18 | |

| **Sprint 5** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stories** | **Tasks** | **Day 1 (21.4)** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| UI7 - View picture/video gallery from DF | View picture gallery, in story view from digitalt fortalt's API. | 5(estimated time remaining) | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | 0 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | View video in stories from digitalt fortalt | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | 0 | |
| UI9 - Share my experiences and knowledge about a place | Implement share functionality. | 30 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 10 | 10 | 5 | 0 | | |
| | Test the share functionality | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | | |
| UI20 - Get feedback when no data is available | Implement "no story avalible icon" | 3 | 0 | | | | | | | | | | | | |
| | Implement "no picture avalible icon" | 3 | 0 | | | | | | | | | | | | |
| | Write logic | 10 | 10 | 10 | 3 | 0 | | | | | | | | | |
| UI22 - View information about a collection | Based on digitalt fortalt's API you can view information about collections | 10 | 20 | 20 | 10 | 0 | | | | | | | | | |
| UI23 - Have a "story list view" | Implement Square view over stories, inside the collection tab. | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | |
| | Retrieve stories based on filtering in the collection view. | 5 | 5 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 10 | 1 | 0 | | |
| UI28 - Get social media experiences and reactions from other people | Be able to review and create expirience through the Twitter API | 20 | 15 | 20 | 10 | 0 | | | | | | | | | |
| UI30 - Like and comment on pictures | Implement like and comment button. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | | | | | | |
| | Implement functionality responding to the like and share button with the Instagram API. | 15 | 15 | 15 | 15 | 15 | 5 | 1 | 1 | 0 | | | | | |
| IM5 - Add hashtags to clipboard from a place (picture view) | Implement add to clipboard button, picture view. So you can easily post a picture on Instagram and later review it inside the stedr application. | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 5 | 0 | | |
| IM8 - Retriveve information from SoundCloud based on #hashtag or location | Retrieve information based on hashtag or laction, from the soundcloud API. | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 10 | 5 | 1 | 0 | |
| IM11 - Find relevant hashtags for a place | Be able to retrieve relevant hashtags for a place of interest. | 10 | 5 | 1 | 1 | 1 | 0 | | | | | | | | |
| IM12 - Add picture directly from the app | Implement camera function inside the app. | 15 | 15 | 15 | 15 | 15 | 30 | 30 | 30 | 30 | 30 | 20 | 20 | 20 | 20 |
| | Be able to post picture inside the application, so that it can be reviewed later on. | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

| **Hours** | **Total** | **Organizatorial** | **IM:5** | **8** | **11** | **12** | **UI:7** | **9** | **20** | **22** | **23** | **28** | **30** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Øyvind | 48 | 30 | | 3 | | 5 | | | | 10 | | | |
| Hallvard | 46 | 20 | 8 | | | 2 | 8 | 3 | | 5 | | | |
| Tor | 45 | 7 | | 13 | 10 | 10 | | | | | | 5 | |
| Jon-Andre | 44 | 5 | 11 | | | | | 7 | 9 | | | 10 | 2 |
| Jørgen | 40 | 2 | | | | | | | 14 | | 15 | | 9 |
| Vegard | 43 | 3 | | | | | | 15 | | 5 | 4 | 9 | 7 |
| **Total** | **266** | 67 | 19 | 16 | 10 | 17 | 8 | 25 | 23 | 20 | 19 | 24 | 18 |

# 7 Testing

System testing or software testing, falls into something that is called “Black-box testing”. This is a method of software testing, that investigates the functionality of the application. Eg. what it does, it is simply described as this: It will not require to know how to code, or need any sufficient level of skill to programming when an system test is about to go down. It will neither interfere with it is internal structure or workings.

## 7.1 Testing Procedure

When you are about to conduct a test, you find a test-person. Then you tell them what the software is supposed to do. And give them the Test cases[7.2], and explain to them it is very important to think loud so we get the most out of the testing.

## 7.2 Test Cases

Test cases are built around the specifications and requirements of the application. What the application is supposed to do.

| Get Places | |
|---|---|
| ID | T-F1 |
| Requirements | SF-1 |
| Feature | Places are shown on the map |
| Preconditions | 1. Flickr is up<br>2. The Flickr group contains photos with locations<br>3. Application is installed on device<br>4. Device is connected to the internet |
| Test Description | 1. Open the application<br>2. Wait for 30 seconds<br>3. Click on a pinpoint<br>4. Zoom out to a world view |
| Expected result | The map should show some clickable pinpoints.<br>When clicked the pinpoints should open a little box containing a thumbnail picture and small text provided by the Flickr Stedr group.<br>When zoomed out new places should be loaded according to what the user see. |
| Pass/Fail criteria | The test is considered a pass if the expected result happens. The last step that need to be passed is that the place at Grenada is shown.<br>If there are any inconsistencies with the expected result, the test should be considered a fail. |
| Severity | High |

**Table 14** – Test Case: Get Places

| Open menu | |
|---|---|
| ID | T-F2 |
| Requirements | SF-2 |
| Feature | Drawer menu with options is opened. |
| Preconditions | 1,2,3,4 |
| Test Description | 1. Click on the menu button<br>2. Click on all of the icons in the menu<br>3. Click on the menu again |
| Expected result | When the menu button is pressed, a drawer menu should open. All of the icons in the drawer menu is also buttons and when clicked again, the menu button should close the drawer menu. |
| Pass/Fail criteria | The test is considered a pass if the menu button opens and closes a drawer menu. Also, all of the icons should |
| Severity | High |

**Table 15** – Test Case: Open Menu

| Views | |
|---|---|
| ID | T-F3 |
| Requirements | SF-6 |
| Feature | All the views are accessible |
| Preconditions | 1,2,3,4<br>T-F1 Get places |
| Test Description | 1. Click on a pinpoint<br>2. Click on the small window that appears<br>3. Click on one of the buttons *Images, Sound, Story*<br>4. Dependent on the previous step, click on the buttons not yet pushed<br>5. Click the menu button<br>6. Click home |
| Expected result | Which view that is selected is shown to the user by being in a different colour than the two other buttons. If the button for the selected view is touched, nothing should happen.<br>For every button representing a non-selected view, the user should be taken to the view as indicated by the button text. |
| Pass/Fail criteria | The test is passed if the button:<br>Image - Takes you to the image view<br>Story - Takes you to the story view<br>Sound - Takes you to the sound view.<br>The selected view has a unclickable button in a different colour representing the selected view.<br>Considered a fail if there are any inconsistencies with the criteria above. |
| Severity | High |

**Table 16** – Test Case: Views

| **Load Content** | |
|---|---|
| ID | T-F4 |
| Requirements | SF-7 |
| Feature | Content is loaded for the places |
| Preconditions | T-F3 Views |
| Test Description | 1. Click on a pinpoint(not Camera Obscura)<br>2. Click on the description<br>3. Go through the views as in T-F3<br>3a Click on all of the titles on the story<br>3b Click on two random images<br>3c Click on a sound |
| Expected result | The places should be loaded with relevant and accessible content from all of the content providers.. If some content-types are not provided for the specific place, the content type should be loaded but indicate that it is empty. |
| Pass/Fail criteria | The test is considered a pass if the expected result happens.<br>If there are any inconsistencies with the expected result, the test should be considered a fail. |
| Severity | High |

**Table 17** – Test Case: Load Content

| Collection view | |
|---|---|
| ID | T-F5 |
| Requirements | SF-8 |
| Feature | Show a view with the stories related to a collection |
| Preconditions | T-F2 Open menu<br>T-F4 Load Content<br>5 It exist a collection |
| Test Description | 1. Press the menu button<br>2. Press the Collection button<br>3. Press a collection |
| Expected result | When the collection button is pressed a new view should open with the list of stories related to the collection. |
| Pass/Fail criteria | The test is considered a pass if it is possible to open the menu and access a collection with a list of stories. |
| Severity | Medium |

**Table 18** – Test Case: Collection View

| Collection map view | |
|---|---|
| ID | T-F6 |
| Requirements | SF-8 |
| Feature | Show places related to a collection as pinpoints in a map |
| Preconditions | T-F2 Collection View |
| Test Description | 1. Press the menu button<br>2. Press the Collection button<br>3. Press a collection<br>4. Press the *show on map*-button |
| Expected result | When the "show on map"-button is clicked, a map view should open with related places showed as pinpoints. Pinpoints not related to the collection should not be placed on the map. |
| Pass/Fail criteria | The test is considered a pass if all places related to a collection is exclusively shown in a map view. |
| Severity | Medium |

**Table 19** – Test Case: Collect Map View

| Gallery | |
|---|---|
| ID | T-F7 |
| Requirements | |
| Feature | Gallery function |
| Preconditions | T-F4 Load Content<br>The application is in a place with a story where there are multiple images to the story. |
| Test Description | 1. Press the story title<br>2. If there are more pictures related to a story, press the arrows |
| Expected result | When accessing stories with multiple pictures as content, arrows indicating the possibility to go through picture files should appear. When pressed new images should replace the old picture. |
| Pass/Fail criteria | The test is considered a pass if the expected result happens.<br>If there are any inconsistencies with the expected result, the test should be considered a fail. |
| Severity | Low |

**Table 20** – Test Case: Gallery

| Upload Content | |
|---|---|
| ID | T-F8 |
| Requirements | SF-9 |
| Feature | Content can be uploaded to Instagram, Twitter and SoundCloud |
| Preconditions | T-F4 Load Content<br>6 Successfully connected to the content (not story provider) providers |
| Test Description | 1. Click on a pinpoint<br>2. Click on the description<br>3. Go through the views as in T-F3<br>4. Upload textual content to Twitter<br>5. Upload picture to Instagram<br>6. Upload sound to SoundCloud |
| Expected result | The places should be loaded with relevant and accessible content from all of the content providers.. If some content-types are not provided for the specific place, the content type should be loaded but indicate that it is empty. |
| Pass/Fail criteria | The test is considered a pass if the expected result happens.<br>If there are any inconsistencies with the expected result, the test should be considered a fail. |
| Severity | Medium |

**Table 21** – Test Case: Upload Content

## 7.3 Test Execution

### 7.3.1 Acceptance Testing

Acceptance testing is one of the last levels of the software testing process. The purpose of such testing is to evaluate the system's compliance with the given requirements to check whether is is acceptable for delivery. Hence the name acceptance testing.

On May 14. during one of our last meetings we sat down with Jaqueline Floch for the final acceptance test of our system. Since the project has been based on further developing features and improving the graphical user interface to increasing usability, both these has to be included in the acceptance test.

For the main test we had a feature based acceptance test where we went through the requirement list. Not to say that usability is not as important, but our customer had received the latest build almost every week in the later stages of the project. Through this, the customer have conducted something similar to a usability based acceptance test regularly throughout the project, to which we received feedback. Because of this we did not have the same need for a usability based user acceptance test, which we know is the way many of the other groups have chosen to handle the test, but Jaqueline Floch had the app tested by four of her colleagues, which all gave positive feedback. If there had been any crucial shortcomings it probably would have been pointed out.

The test was conducted by going through the requirement list sorted by priority and individually receiving a verdict on acceptance. The individual requirement either reviewed `Pass`, `fail`, `outdated` or `cancel` if the requirement was pulled. The latter was the case on a lot of the requirements with lower priority since we had little time and the customer wanted us to focus on the more important tasks.

The result of the acceptance test are listed below:

| Verdict | Task | Priority |
|---|---|---|
| | *Overall* | *max 10* |
| | | |
| pass | Use English for user interface, code documentation and report | 10 |
| not tested | Maintain multi-platform consistency | 10 |
| pass | Maintain consistency with UI design with App developed in autumn | 10 |
| pass | Maintain a minimalist design | 10 |
| pass | Avoid using platform specific UI elements | 10 |
| pass | introduction for first users | 10 |
| pass | Provide a new user view (activity) or revise the current map view to allow switiching between map-related and collection-related functionality | 10 |
| pass | Retrieve information from Digitalt Fortalt based on geo-location; use new API til DF and check storie are available at once | 10 |
| pass | Check for places east from Greenwich | 10 |
| pass | Functionality to add #hashtag to clipboard. | 10 |
| pass | Show picture/video gallery from DF. Make clear that several pictures are available | 10 |
| pass | Show text from DF: make sure URL are kept; remove tags: show institution (additianlly to author) | 10 |
| pass | Licencing contraint set by DF | 9 |
| pass | Refine and update the refresh feature | 9 |
| | Retrieve information from SoundCloud based on #hashtag - Only retrieve when attribution creative common | 9 |
| pass | Show an "add picture icon( first in list) | 9 |
| pass | Show a "no picture" icon when no picture is available | 9 |
| pass | Preview stories: show sound icon from SoundCloud and title (square format) | 9 |
| pass | Retrieve collection from DF based on tag #stedr_collection and location | 8 |
| pass | Retrieve description (and picture thumbnail) about collection from DF | 8 |
| pass | Story view layout: Use similar layout as for "place information" except that 1) pictures from DF - not from Flickr 2) stories are child in collection 3) add is a different text | 8 |
| pass | Story view: retrieve stories for collectiosn based on tag | 8 |
| pass | Map view: Show icons from each place of stpry in collection | 8 |
| pass | Preview a story in collection | 8 |
| pass | Open a story in collection | 8 |
| pass | Add tab for sounds | 8 |
| pass | Show a "no picture" icon when no picture is available | 8 |
| pass | Show a "no story" icon when no story is available | 8 |
| pass | Add description about place | 7 |
| pass | Open as a normal story - not in a browser view (relatert til add story) | 7 |
| pass | Add tinyurl to story (i.e. Link to story in DF to tweet) | 6 |
| not realizable | Add tinyurl to place (i.e. Link to picture in Flickr to Instagram message) | 6 |
| pass | Help information available at any time | 5 |
| cancel | Add information directly from stedr | 5 |
| cancel | Ask the user for logging in Instagram (first time) | 5 |
| cancel | Store Instagram credentials on mobile - not on server | 5 |
| cancel | Ass information directly from stedr | 5 |
| cancel | Ask the user for logging in SoundCloud (first time) | 5 |
| cancel | Store SoundCloud credentials on mobile - not on server | 5 |
| cancel | Add like | 5 |
| cancel | Add comment | 5 |
| cancel | Filter story by tag, author, institution, video/no video. | 3 |
| cancel | Show picture gallery retrieving pictures from other databases, e.g. Trondheimbilder.no | 3 |
| cancel | Group places close to each other; one icon per place | 1 |
| cancel | Show picture gallery when several places | 1 |

| Verdict | Task | Priority |
| --- | --- | --- |
| | *Overall* | *max 10* |
| | | |
| pass | Layout for enhanced readability (improve usability) | |
| pass | Retrieve information from Instagram based on #hashtag | |

As you can see, one requirement are missing a verdict. This is is because this was not testable since we waited for a response from SoundCloud at the time. This was later implemented and are now working as it should.

### 7.3.2 NFR testing

It is important for the project that our result meets the projects main non-functional requirements, described in the "Product quality" section of the SRS chapter (4.12), for it to be considered a success.

**Compability** *Co-existence* With the result found under Reliability - maturity, it is clear that the system can handle that multiple client share the same environment. It is worth to notice that the testing program makes use of threads to be more realistic regarding parallell requests towards the server.

*Interoperability* With the result found under Reliability - maturity, it is clear that the system can handle that multiple client share the same environment. It is worth to notice that the testing program makes use of threads to be more realistic regarding parallell requests towards the server.

| # | Content | JSON |
|---|---|---|
| 1 | Places | Yes |
| 2 | Stories | Yes |
| 3 | Images | Yes |
| 4 | Collections | Yes |
| 5 | Sound | Yes |

**Table 22** – Compability: Interoperability

**Performance Efficiency** We have greatly improved the core of the system to boost the efficiency of the application, this should cause the application to use no more than 300 seconds to pull new content from the APIs. The efficiency was tested by adding new content and recording 10 times with different content posted at different times. By measuring the individual response times and calculating the average result we will get a rough estimate.

Since much of the test content had relatively consistent results we did not think more tests was needed. The Instagram images appeared almost instantly ( 1 second) consistently, since we completed the tests manually, we could not measure finer times, something we thought was not needed due to the nature of the tests. The twitter content

| # | Content | Time a day | Result |
|---|---|---|---|
| 1 | Instagram | 10:55 | 1 sec |
| 2 | Instagram | 14:40 | 1 sec |
| 3 | Instagram | 14:45 | 1 sec |
| 4 | Tweet | 14:16 | 19 sec |
| 5 | Tweet | 14:18 | 20 sec |
| 6 | Tweet | 10:40 | 20 sec |
| 7 | Story | 15:26 | 133 sec |
| 8 | Story | 16:15 | 10 sec |
| 9 | Story | 11:00 | 104 sec |
| 10 | Story | 15:48 | 135 sec |
| 11 | Story | 16:03 | 107 sec |
| 13 | Story | 19:01 | 132 sec |
| 14 | SoundCloud | 18:51 | 5 sec |
| 15 | SoundCloud | 19:15 | 7 sec |
| 16 | SoundCloud | 19:20 | 6 sec |

**Table 23** – Performance Efficiency: Publishing New Content

were a little slower as expected, but did also appear consistently at a reasonable time averaging in just under 20 seconds. The SoundCloud publishing also happened pretty quick averaging 6 seconds As for the stories we published through Digitalt Fortalt, the times were very inconsistent. In three of the tests (# 7, #10 and #12), which was the longest ones, the content had to be uploaded to DF as well as being published, this probably added to the time. All the other tests were performed with the content already uploaded, just to be published, but we still recorded a massive swing in results ranging from 10 seconds (#8) to 105 seconds (#9).

Average:

$$\frac{133+10+104+135+107+132}{6} = 103.5 \tag{2}$$

With all results clocking in under 150 seconds, and our goal being under 300 seconds, we are very pleased with the results and can happily see our app passing this test. Considering the version of the app we received sometimes needed multiple days for the results to appear, it is needless to say there have been a massive improvement.

Another important part of the performance efficiency are the application's data usage. Blowing the users' data limit and potentially taking a large part in increasing their phone-bill is something we want to avoid, and to avoid that we have implemented a data usage restraint. This restraint is set through equation (1) in section 4.12.

We tested the data usage to make sure our application met our standard. We measured this roaming unconnected to any WiFi-hotspots while running the app.

*Quick session*
Opening map: `55.74 kB`
Entering place with only one story: `+ 6.07 kB`

*Browsing session*
Browsing map over Trondheim: `1.64 MB`
Entering place with 6 stories and 2 Instagram pictures: `+ 0.02 MB`

We found these results to be pretty reasonable. The app does not download more content than necessary, and the results seems really consistent compared to the experiences we have had using the application.

**Reliability** Testing of components was done by feeding test cases to the components, and when accepted these new components was added to a running server instance that acted as a beta. The beta server was deployed at the 9th of April and has since been monitored to record uptime and errors. Shortly after Easter the old server was exchanged with the new one so that the customer could use new features, but also so that it was possible to monitor how the server performed under the expected normal use.

A shortcoming to the test-data below is that each time new features was deployed to the server, the server was restarted. Because of this, the longest interval the server has been running uninterrupted is approximately one week.

*Maturity*
The testing of maturity was done by analysing the data recorded in comparison to the feedback we got from the customer. Also, there was done an additional test where specific task were completed. Since maturity considers the system under normal use the additional test was not a stress test in terms of using the system until it broke, but using the system at a relatively high frequency and noting the number of incidents.

To simulate users we made a testing program which made a total of 500 requests over a short period of time ($< 5 minutes$). This test was done eight times over a single day, but with random rest periods for the server. If the server returned an error this was noted.

The test results clearly shows that there is a problem when the server has been inactive for more than an hour. This is because the server keeps a cache of places for an hour, before it deletes the cache. After the cache is emptied the server waits for a request before it again repopulates the cache, and when the server requests Flickr for new places it throws a time-out error. The time-out error doesn't have an effect for the user other than that the application is a bit slow if the user is the first to use the system after the cache has been emptied.

*Availability*
Since the customer started using the new server (23rd of April) the server has been

| # | Time since last test | Number of errors | Notes |
|---|---|---|---|
| 1 | NA | 1 | Places do not load. This also disables all other content retrievers |
| 2 | 30 minutes | 0 | Stories do not load. Does not affect other parts of the system |
| 3 | 60 minutes | 1 | Instagram pictures do not load. Does not affect other parts of the system |
| 4 | 10 minutes | 0 | Sounds do not load. Does not affect other parts of the system |
| 5 | 120 minutes | 1 | Total systems fail |
| 6 | 60 minutes | 1 | Places do not load. This also disables all other content retrievers |
| 7 | 10 minutes | 0 | Stories do not load. Does not affect other parts of the system |
| 8 | 60 minutes | 1 | Instagram pictures do not load. Does not affect other parts of the system |

**Table 24** – Maturity Testing

functional continuous, except from the 6th to the 7th of May. This gives that the system has had an uptime under presumably normal use of:

$1 - \frac{24hrs}{23days \times 24hours} \times 100 = 95.652\%$

*Fault tolerance*
The systems fail noted under the availability test was due to an global error on one of the systems external system. From this it is clear that the system depends totally on some of it's components and thereby external systems to provide the required functions. To determine how many critical components that exists in the systems, every component in the system was disabled to see the effect on the system. In addition, another part of the test considered in interrupting connections to external systems.

Note that to be considered functional the system had to show places and load stories to the end-user.

This describes a major drawback of the reliability of the system, as of the four retrievers there are two single points of failure. In addition, the system also depends on three of five external systems to function properly. It is also important to note that if any of the external systems make radical changes so the system components becomes outdated, this will also lead to a non-functional system. Because of this the system cannot say to satisfy the requirement for fault tolerance.

*Recoverability*

| # | Disabled Component | Functional system | Notes |
|---|---|---|---|
| 1 | Flickr Retriever | No | Places do not load. This also disables all other content retrievers |
| 2 | Story Retriever | No | Stories do not load. Does not affect other parts of the system |
| 3 | Picture Retriever | Yes | Instagram pictures do not load. Does not affect other parts of the system |
| 4 | Sound Retriever | Yes | Sounds do not load. Does not affect other parts of the system |
| 5 | External component (Heroku) | No | Total systems fail |
| 6 | External component (Flickr) | No | Places do not load. This also disables all other content retrievers |
| 7 | External component (Digitalt Museum) | No | Stories do not load. Does not affect other parts of the system |
| 8 | External component (Instagram) | Yes | Instagram pictures do not load. Does not affect other parts of the system |
| 9 | External component (Soundcloud) | Yes | Sounds do not load. Does not affect other parts of the system |

**Table 25** – Fault Tolerance Testing

Testing for recoverability was done together with the testing for fault tolerance, by taking the time on how long it took for the system to be functional after re-enabling an external or internal components. Since the system isn't a critical system the timing requirement was set to five minutes, so to pass the recoverability requirement the system should functional normally within five minutes of the component re-enabling.

| # | Disabled Component | Functional system after five minutes | Notes |
|---|---|---|---|
| 1 | Flickr Retriever | Yes | $< 5 minutes$ |
| 2 | Story Retriever | Yes | $< 5 minutes$ |
| 3 | Picture Retriever | Yes | $< 5 minutes$ |
| 4 | Sound Retriever | Yes | $< 5 minutes$ |
| 5 | External component (Heroku) | Yes | $< 5 minutes$ |
| 6 | External component (Flickr) | No | $< 60 minutes$ |
| 7 | External component (Digitalt Museum) | Yes | $< 5 minutes$ |
| 8 | External component (Instagram) | Yes | $< 5 minutes$ |
| 9 | External component (SoundCloud) | Yes | $< 5 minutes$ |

**Table 26** – Recoverability Testing

Because of a cache used to store places provided by Flickr, the system uses up to 60 minutes to refresh the cache. This means that errors at Flickr so that Flickr doesn't respond to requests, leaves the system with an empty cache and thereby no places. This will again lead to a failure of the FlickrRetriver and the system itself as describes under the Fault Tolerance Test.

**Portability** The multiplatform aspect of the project has played a major part in the development and have played a large part in our choice of environment and frameworks. What we want to achieve is a reasonable consistency through different platforms and versions. We have throughout the development process tested it with many different virtual devices on different settings, but the most valuable ones are the ones performed on the physical devices at our disposal.

| # | Platform (version) | Device | Notes |
|---|---|---|---|
| 1 | Android (4.4.2 KitKat) | LG Nexus 5 | Works |
| 2 | Android (4.3 Jelly Bean) | Samsung Galaxy SII | Works |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

**Table 27** – Portability Testing

# 8 Evaluation

## 8.1 Process

With our process model, Scrum, we found that following it by the book, became very troublesome. Therefore we decided to make some modification to the original model. The main problem with using Scrum by the letter is that we are all students, and this project only counts for half of the semesters study points. This means we all have different schedules, and thus making it difficult to have daily meetings. End meetings, or retrospective meetings is also something we have not prioritized much.

In Scrum it is common to use something called planning poker when deciding how long tasks should take. This essentially means that everyone "votes" on how time consuming they think a given task will be. We found this to be a little unnecessary because its usually so imprecise, and have therefore chosen to just let the persons responsible give their judgements to save time.

## 8.2 Project Management

One of the main challenges for us concerning project management was the frequent changes made in regards to features. Here we take some self criticism since some of these changes was made on the account of our decisions. It also took a while to come to a shared view on the requirements with our customer. It was not until later in the project, when the customer provided us with a list of about 50 features, that we fully understood each other. However, we ended up treating requirements different from this feature list. This was because, even though our requirements addressed much of the features in the feature list, they were still on a another abstract level. The feature list items was too detailed and specific to be listed as requirements.

## 8.3 Communication

We feel that the communication internally on the team have been good. By using different channels like Facebook, mail, and phone, we were able to stay in touch throughout the project even though we couldn't always be physically present on the school.

With the customer on the other hand, the communication could have been handled better on both parts.

Our customer went on an unfortunate sick leave at the start of the project, which meant that our communication had to go through a third party. At first, it didn't seem like a big

problem, but when we later discovered how this had led to major misunderstandings, it ended up hurting us more than we first thought it would.

About three weeks into the project, we started to have direct communication with our customer over Skype once a week. These meetings didn't work well for us. It made it hard for everybody to engage in the conversations. Although we always paid attention and were careful to write summaries from these meetings, the customer's visions didn't get trough to us somehow. We thought we had a clear picture of what our customer wanted, but it turned out to be wrong.

It was not really until we started meeting our customer in person, on March the 5th, that we understood how much we had been talking past each other. There had been lacking clarity in messages between us and since both parts thought they understood each other, no measures where made. Now, after an almost four hour meeting with our customer in person, we finally came to an common understanding of what purpose the app had. This also meant that we suddenly was far behind schedule since we had to completely redo the product backlog based on the new feature list. We strongly feel that this list should have been provided to us at the beginning of the project. It would have saved us a lot of time.

That being said, we also take self criticism. There was for instance one incident where a team members didn't pay enough attention on a meeting. This resulted in him working almost 20 hours with trying to integrate the SoundCloud UI experience into Stedr. Our customer had previous stated that it was enough for us to just make a simple API call to the SoundCloud servers and retrieve sounds based on title. Additionally, our customer felt that we sometimes were slow to answer emails. We of course take full responsibility for this.

## 8.4 Project planning

Our pre-study and project planning was really thorough, but in retrospective, much of it ended up being a waste. We spent a lot of time doing research and user tests, trying to figure out what direction we should take the app in. Because of the misunderstanding explained in Communication, we thought we had much more freedom than we actually had. We had the idea that we could just get creative and play with the app as we saw fit.

We do not have any problems working with predefined feature lists and requirements, but then it should be clear from the start that we in fact have these restraints.

In the first half of the project, these were some of the features we were working on that we later dismissed because 1) they didn't fit into what the app is about, and 2) we misunderstood some of the requirements.

- Adding new places from the app

- Wikipedia integration - Possibility to see wiki entries related to the place you are visiting.
- Adding full SoundCloud experience in the app.
- Attaching NRK archive footage to a place.
- General design overhaul. (Dismissed mock-ups can be found in D.1)

## 8.5 Problems and difficulty

The development of this app have been quite a bumpy ride for us. We have stumbled upon surprisingly many problems from our risk analysis.

One could of course question our preventive abilities, but we still feel we took the right precautions. Some things are just left to luck.

From out risk analysis, this is some of the more important problems we came across in this project.

- Communication failure - Between the team and the customer as explained in Communication.
- Major requirements change - For us, the new feature list meant we had to change the priorities of the requirements a lot.
- Technical difficulties - We had huge trouble setting up the development environment for titanium framework. Two team members didn't even get it to work at all.
- Unavailability - Two team members spent 2 weeks in china which reduces our capacity right before Easter.
- Lack of Competence - Combined we had zero experience with some of the technologies used in this project beforehand.
- Sickness - As explained above.
- Equipment Failure - One team member had to send his computer to service for a total of 6 weeks. Two others had to replace their android device.

This was also the first time for all of us to take over a project hallways to further develop it. We are not going to lie, this was little demotivating, but we managed to stay positive regardless. First of all, we didn't have the option to choose technologies based on our strengths since its already chosen by the previous group. Actually, none in our group had any experience with any of the technologies used. This was very unfortunate since we have to spend a lot of time to learn new frameworks. Additionally, you have the aspect of understanding all the code that had been written.

## 8.6 Lesson learned

In terms of management, we have learned some important lessons.

Firstly is the importance of clear milestones. In the beginning we had very unclear goals and this affected the group. It was later solved when we got a priority list from our cutomer. Working without a clear focus can be challenging for the team members.

Also, clarity internally. If we had been a bit more clear on responsibilities within the group, the development process would have gone more smoothly.

Lastly, we can not emphasis this enough: Communication is the key to every projects success. Of course we already knew this coming into the project, but in practice it is easy to lose focus. Because of a simple misunderstanding between two of our customers we spent two weeks working on the user interface and other irrelevant features, when we should have prioritised integrating APIs instead. So clarity on what the customer want is important. We also learned that Skype meetings or talking over the phone is not sufficient for good communication.

On the technical side, when it came to development platforms, we initially didn't have much to say, since the previous group had already made the decision to use Titanium front-end and Play back-end.

In the aftermath of the project, our general consensus is that Titanium is a sub-optimal framework for this kind of project. Stedr is an app that uses many different APIs and integrating these in a good way turned out to be hard. This is because Titanium provides a kind of half-breed between native and web development. Most APIs is made for either native or web and does not translate well into the Titanium environment, thus making it difficult to use.

Just setting up the work environment turned out to be quite difficult too. We actually failed to get it up and running on two of the team members machines.

It would, in our opinion, been better to work native or just use pure web-standard (HTML5, CSS3 and JavaScript).

## 8.7 Technical evaluation and recommendations

After reviewing the test cases the system seems to satisfy the requirements (and features) set by the customer, except for the non-functional requirement related to reliability.

The failing of the reliability is caused by the server, because of the lack of storage and the servers dependency of external systems. Especially the external system used for storage of the Places (Flickr) has been a problem, this is because the external system uses a very long time to respond to our internal system's requests. This problem will also probably

magnify in size as more Places are added to Flickr, which in turn will lead to an even greater delay of the response sent by the external system.

To enhance the systems reliability the customer should evaluate the possibility to add a database back-end. This would make it possible for the system to store it's own information so that the only dependency and single point of failure would have been the server itself. A requirement for this, is that the customer has to take editorial responsibility for the content stored on the server which the customer at the time of this project wasn't willing to do.

Another recommendation for further work is that the option to remove the back-end as a whole, should be considered. As of now the system roughly is a Model View Controller-application, where the smartphone application acts as the view. The computational restrictions is therefore back-end, but the back-end is limited to run as a cloud service with limited resources as it should be free of charges. A consequence is that it becomes natural to ask if the processing done back-end, couldn't be done more efficient at the end-users smartphone. Combining the removal of a back-end with local storage, would also lead to the application no longer require continuous Internet access.

Both of these recommendations implicates that some parts of, or the whole system, needs to be rewritten. Careful evaluation of the options needs to be done before eventually deciding if the reliability of the system isn't good enough

## 8.8 Conclusion

Even though we were both unfortunate and a little careless in the beginning, we managed to pull ourself together and produce a result we are really proud of. All that is left now, is to hope our customer feels the same about our work. Either way, we have learned incredibly much from this project. We have stumbled across a fair amount of unlikely, but yet realistic problems that can occur in every working project. We feel that this valuable experience can help us avoid many of the same errors in the future.

# 9 Attachments

## 9.1 Class diagrams

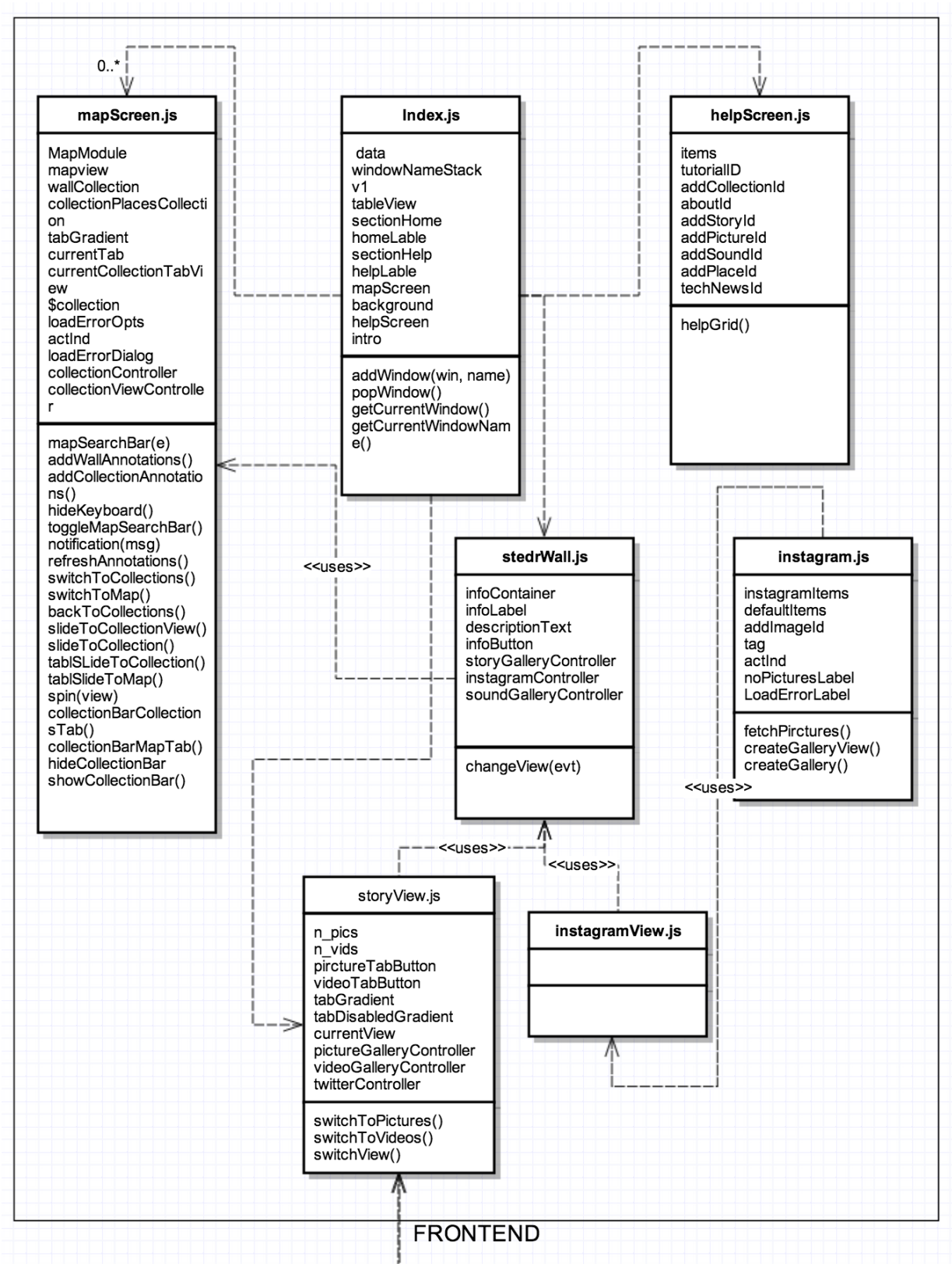



**Figure 13** – Class diagram for front-end part 1

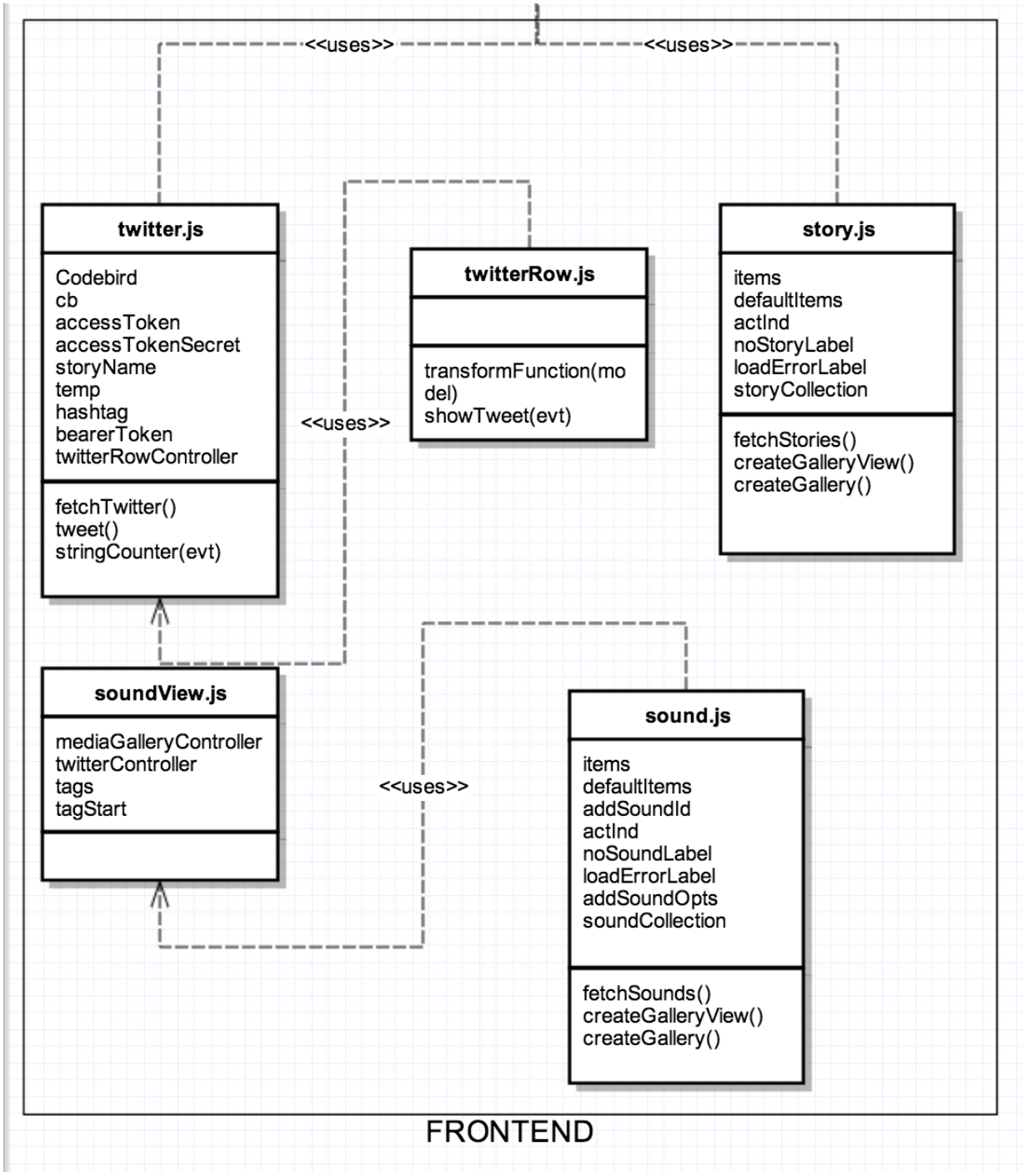



**Figure 14** – Class diagram for front-end part 2

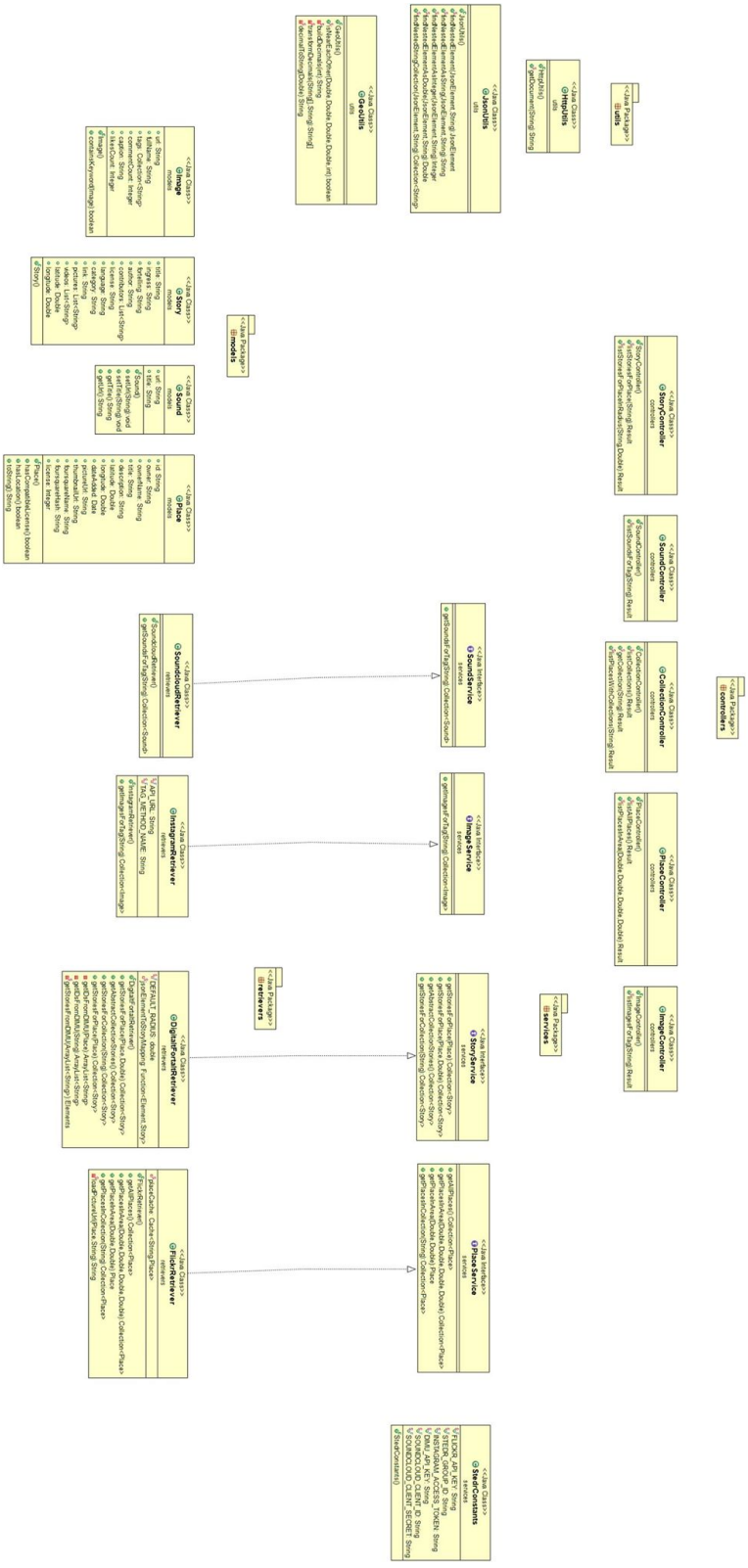
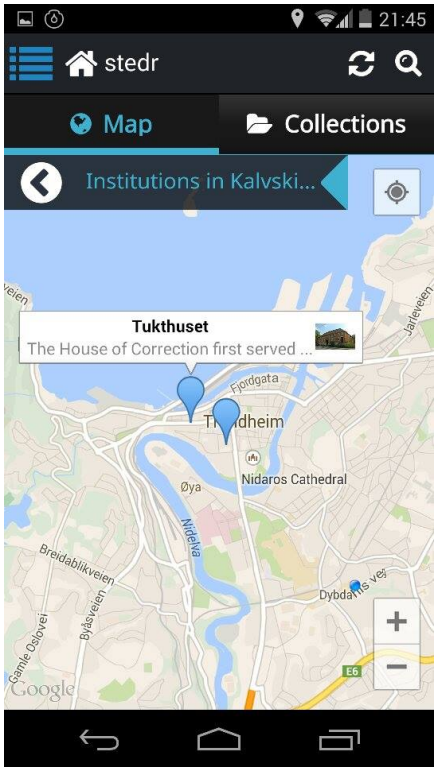
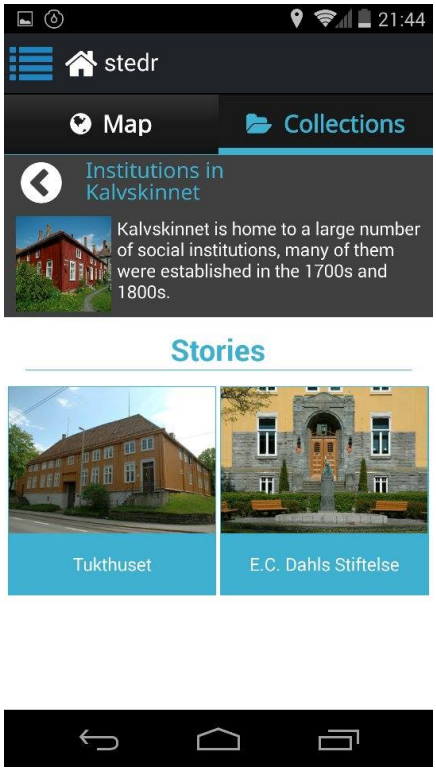
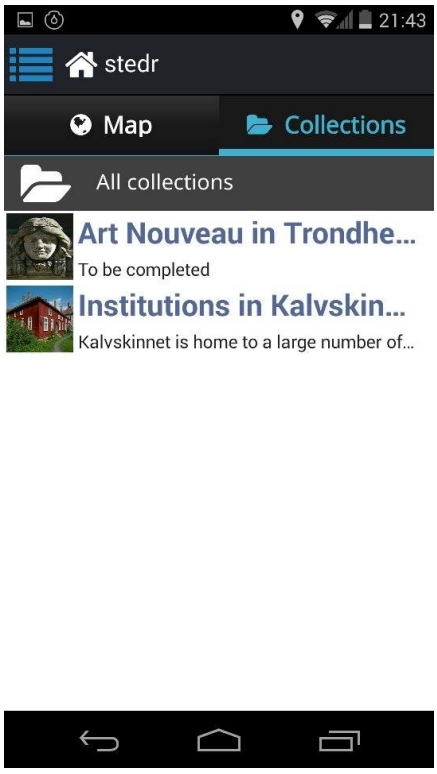


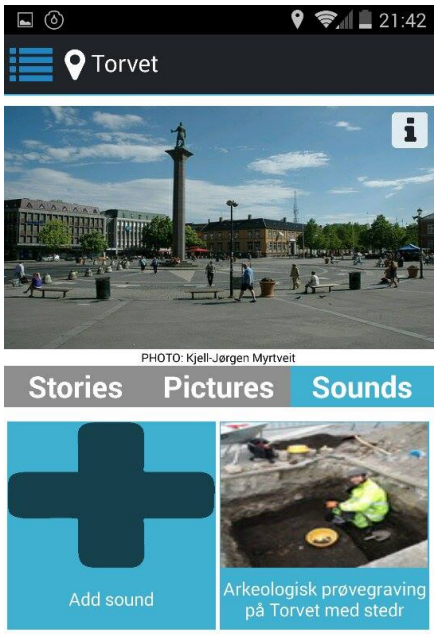
**Figure 15** – Class diagram for back-end

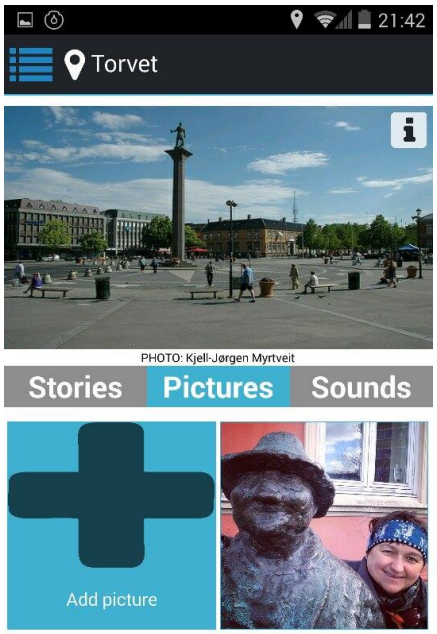
## 9.2 Screenshots





21:42
Torvet
PHOTO: Kjell-Jørgen Myrtveit
Stories
Pictures
Sounds
Add sound
Arkeologisk prøvegraving på Torvet med stedr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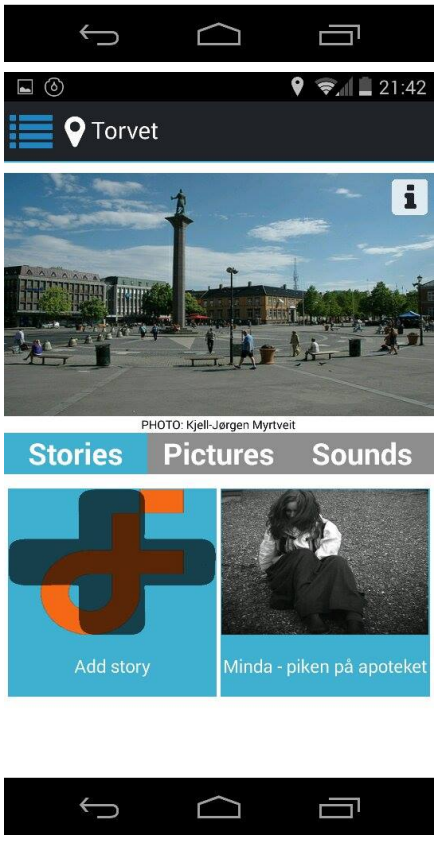
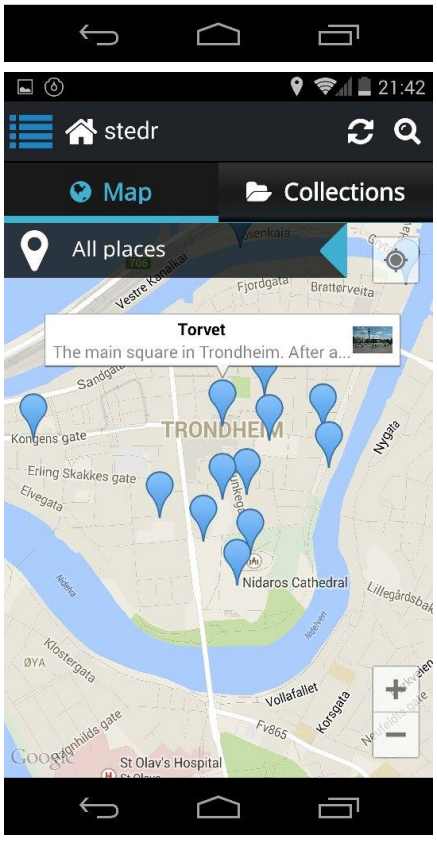
Torvet
PHOTO: Kjell-Jørgen Myrtveit
Stories
Pictures
Sounds
Add picture


21:42
Torvet
PHOTO: Kjell-Jørgen Myrtveit
Stories
Pictures
Sounds
Add story
Minda - piken på apoteket


21:42
stedr
Map
Collections
All places
Torvet
The main square in Trondheim. After a...
TRONDHEIM
Kongens gate
Erling Skakkes gate
Elvegata
Nidaros Cathedral
Klostergata
Vollafallet
Kongsgata
St Olav's Hospital

# References

# A Developers Guide

This introductory developers guide, aims to make a developer able to set up Stedr so that the developer gets an overview of how the system works and also how the developer can get started programming. The first part of the guide is about the back-end while the second part is about the front-end. Both of the guides needs to be completed to get the example program running, and the back-end part has to be completed before the front-end part.

This guide is **not** meant as a tool guide, so some parts of the guide is superficial and it is left to the reader to study the tools closer.

## A.1 Back-end

The back-end is a Java program using the Play Framework, and the back-end is deployed to the Heroku, a cloud platform hosting applications as services. The source code itself maintained on a GitHub account provided by SINTEF called TagCloud. Before continuing this means that a couple of prerequisites has to be fulfilled by the developer.

**The developer should have:**

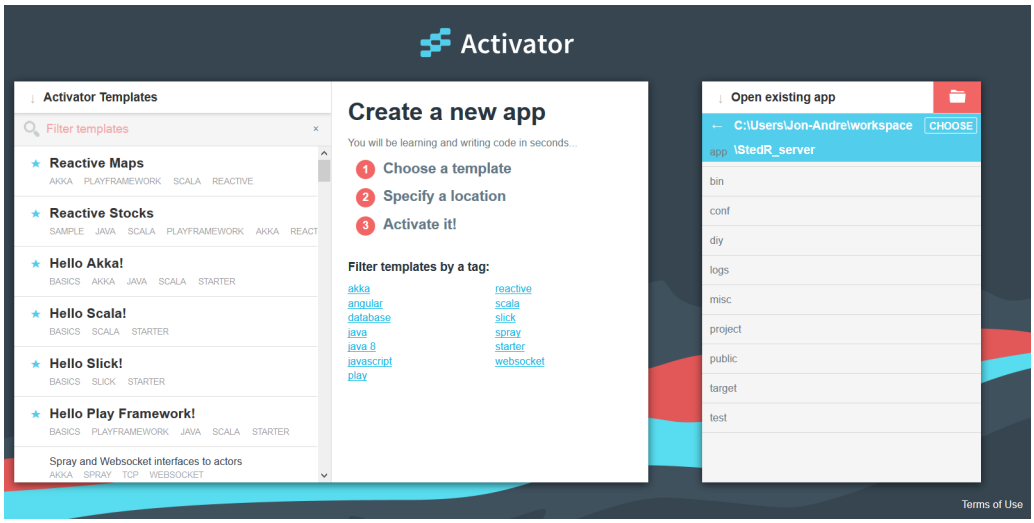
- Installed an updated version of JDK
- Installed a code editor (Eclipse will be used in the tutorial)
- A working GitHub-account
- Installed git
- Cloned TagCloud/StedR_server with the help of Git from GitHub
- Installed the Typesafe Framework from Play Framework
- An Heroku account

On your computer, open up a terminal of your choice (cmd, bash, ...) and navigate to the folder where you have extracted Typesafe Activator (Play Framework). Depending on your platform type the command which will execute activator. It is possible to use Typesafe Activator with a graphical user interface by passing ui as a parameter. This will look something like:

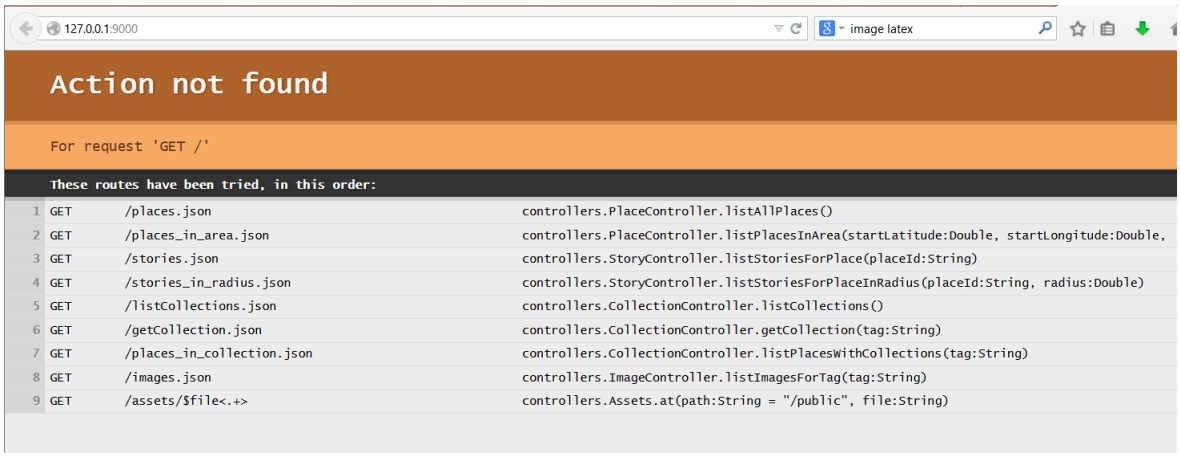
```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Jon-Andre>cd workspace

C:\Users\Jon-Andre\workspace>cd activator-1.0.13

C:\Users\Jon-Andre\workspace\activator-1.0.13>activator ui
```

The graphical user interface should then open automatically in a browser view. If this doesn't happen check the terminal for error messages.

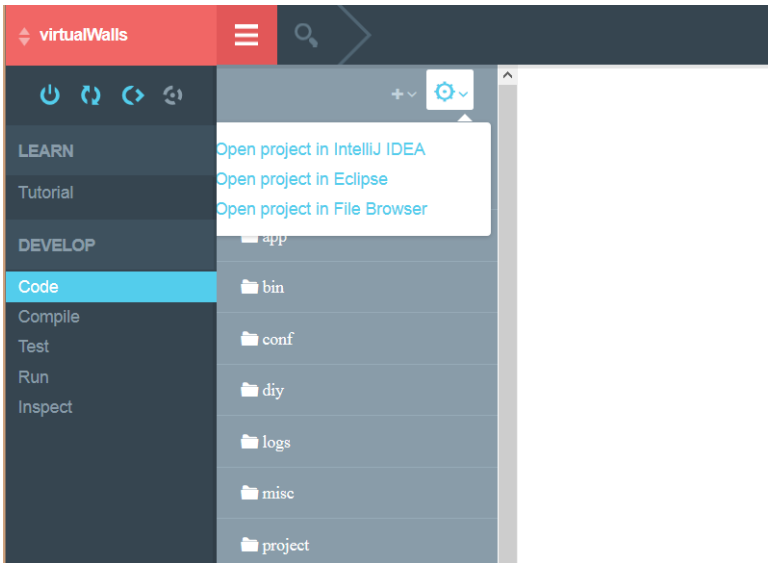
In the right sidebar navigate to the folder where you have cloned StedR_server from GitHub. Click choose. Now the program is starting to compile, and the server will try to run as a local instance on localhost port 9000.




Notice that Typesafe Activator itself is running on port 8888. During the compiling of the system problems may occur. Often this is related to a mismatch between Typesafe and Java, for example an updated version of Java and an outdated version of Typesafe often leads to issues. If the program is compiled successfully, something like this should appear at localhost:

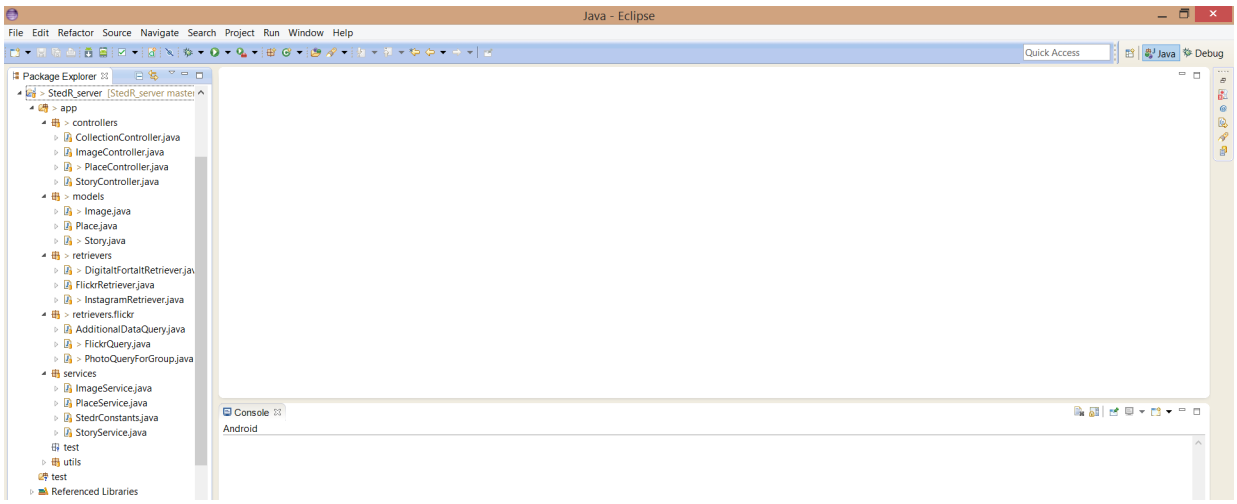



If you already have tried importing the folder with the source code to an editor like Eclipse, you may have noticed a lot of errors appears. To import the program and its dependencies as a project: In the left sidebar of Typesafe, click on Code, then the gear-icon. Here you can choose between IntelliJ and Eclipse, and Typesafe will then generate project files and guide you through how to open the program as a project.

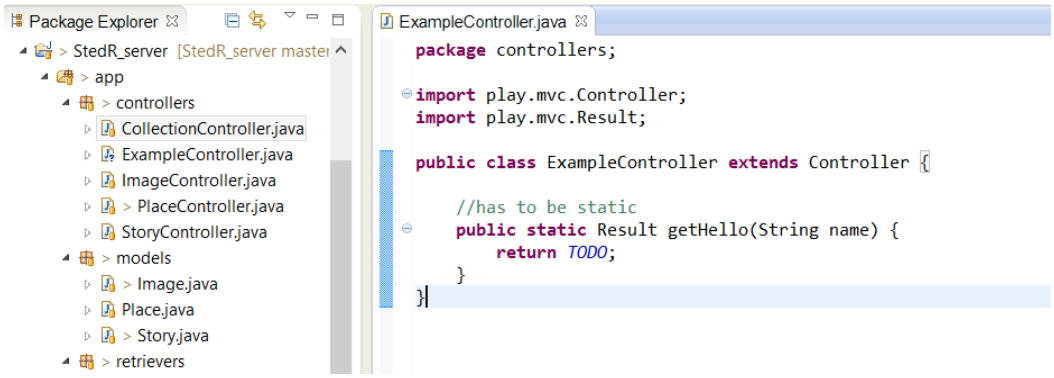



Now you should have a running instance of the server locally, and you're also ready to code.

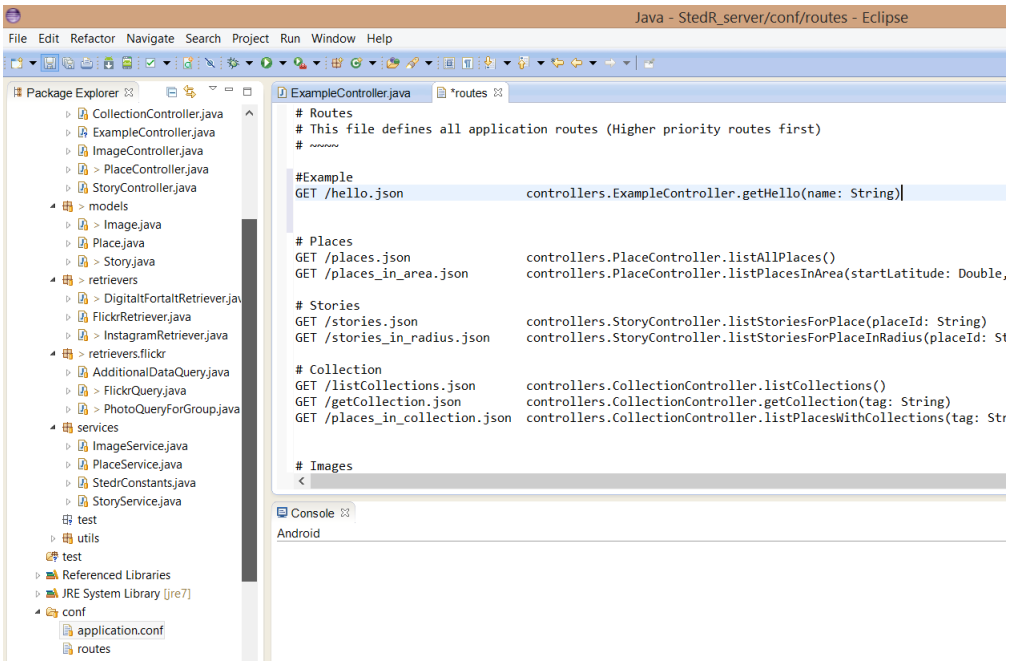
In Eclipse you will get an overview of the different source files and source packages. In the `Controllers` package you will find `controllers` that take care of identifying queries (sent as an URL), creating `Retrievers` that process the queries and at last returning a response to the query. All of the `Controllers` are written by former Stedr-developers, but all of the `Controllers` extends a `Controller` from the Play Framework.



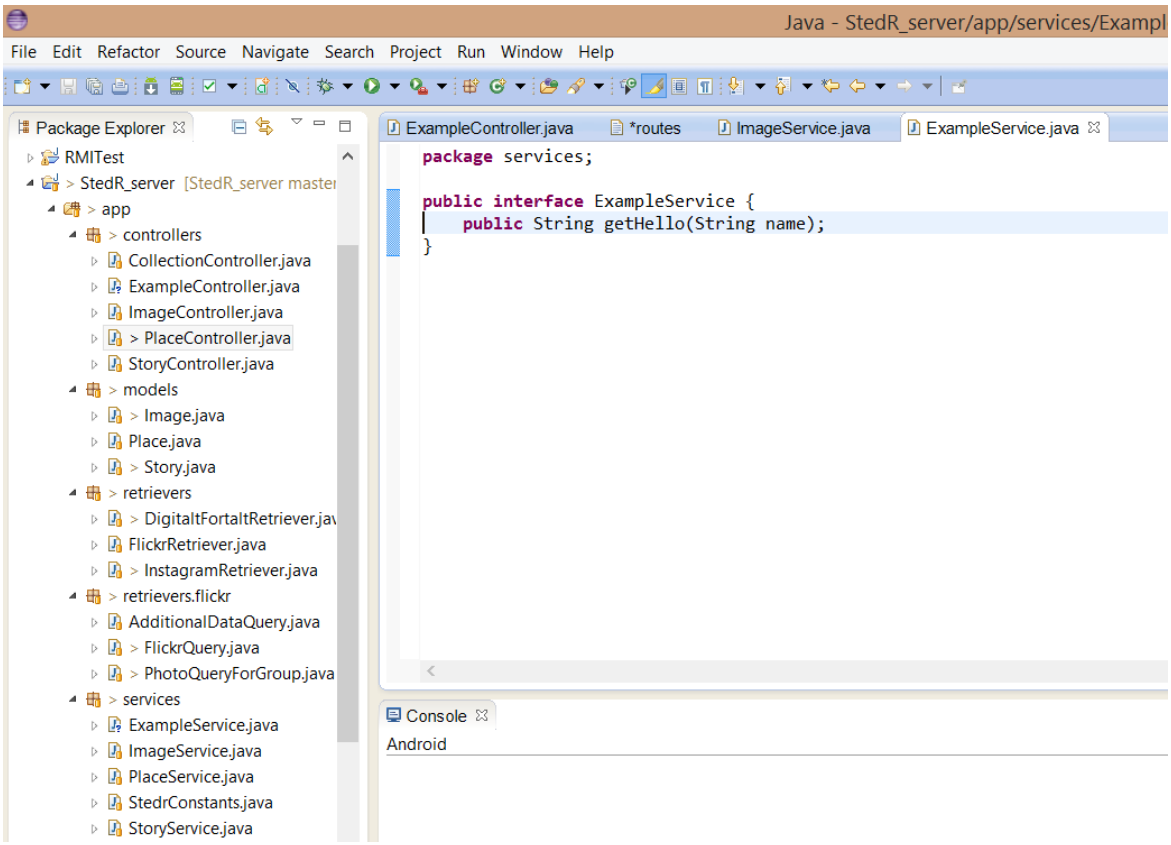

Now, let's create a controller for our example application:



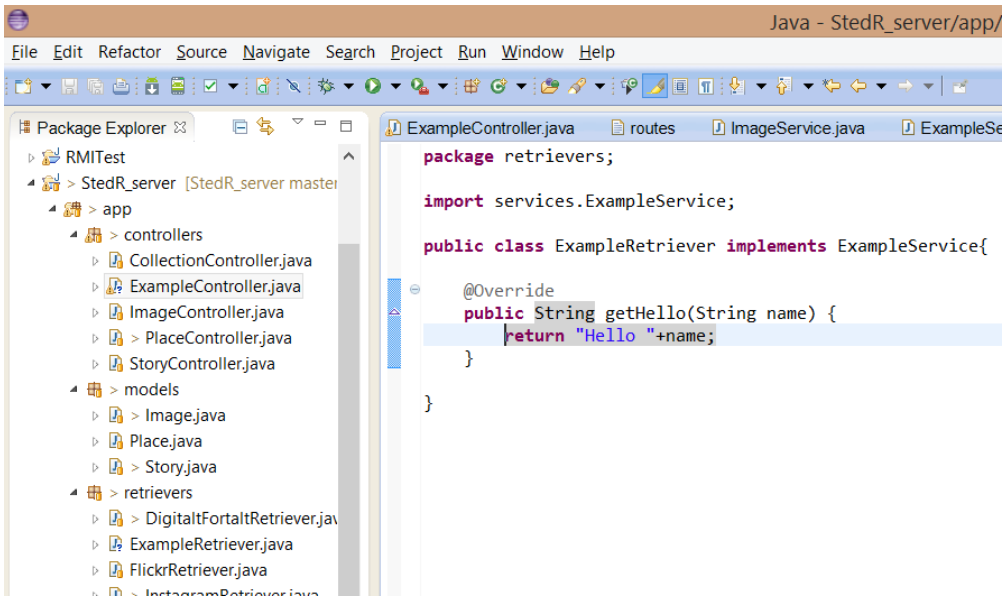

We ask for a parameter called `name` which naturally is the name you want to be displayed in the smartphone-application. To pass a parameter you have to edit the file called `routes` in the conf-folder, the passing is done directly from the smartphone application.



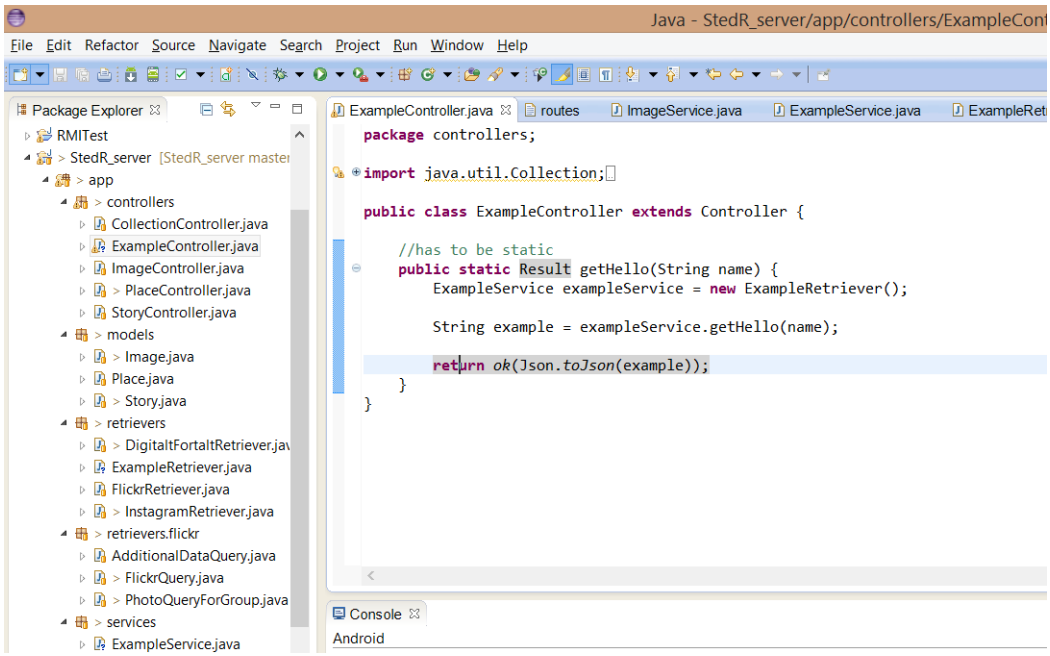

It would now have been possible to create a `retriever` directly, but we won't do that. In the services folder there are three files ending with `Service.java`. These files are interfaces, and the reasoning behind them is that it should be easy to add or change services. As of now stories are provided by Digitalt Fortalt, so we have a `DigitaltFortaltRetriever.java` which implements `StoryService.java` That way we can change the content provider to Wikipedia by creating a new retriever `WikipediaRetriever.java` which implements `StoryRetriever.java` A lot of code would then have to be written in order to get the fictional `WikipediaRetrever.java` functional. Back to the example we will therefore create an ExampleService.




Now we're ready to implement the `HelloRetriever.java`

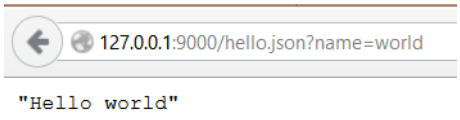



After the `HelloRetriever.java` the last thing that needs to be completed is the ExampleController which was created in the beginning of the example




This concludes in a server which will respond with `Hello World` if `World` is passed as a parameter. To see this, the system has to be recompiled in TypeSafe Activator. After recompiling open localhost port 9000, there you should see:


If this is correct, http://127.0.0.1:9000/hello.json?name=world should give:




Normally you would commit this to the git-repository on GitHub, and if the new functionality is to be a part of the running server it should also be commited or deployed to Heroku. This is done by pushing the server commit to `git@heroku.com:stedr-beta.git`.

Note that in order to push to the server directly, you will need contributor access to stedr-beta.herokuapp.com. If this isn't available or provided upon request you can create a new Heroku instance, but then the request URL destinations have to be changed in the smartphone application.

Note that the first server commit to a new Heroku instance is so slow that you can get an error message regarding time-out when compiling. At the time of writing we are not sure if this error is ours or Herokus, because it may seem like the error is related to Herokus slug compiler. Heroku needs to install OpenJDK on their instance the first time the server is pushed to Heroku, OpenJDK is fairly large so this would also explain that the server's slug is fairly large. The error was fixed by adding a `system.properties`-file under app in the project folder, with the value `java.runtime.version=1.7`. This file should now be pulled from GitHub when cloning the project.

**Remember to add the API-keys to the `StedrConstants.java`. These must ONLY be added to private repositories, and should really only be added to a deployment branch of the project. Also, since almost all of them are owned by members of former dev-teams they may become invalid without notice**:

```
// this apikey belongs to:  chrisfro@stud.ntnu.no
public static final String FLICKR_API_KEY =
        "cd04f142470e7de7c992b3a3b140f636";
public static final String STEDR_GROUP_ID =
        "2297124%40N25"; // escaped
this access token belongs to:  knut.nerga@gmail.com
public static final String INSTAGRAM_ACCESS_TOKEN =
        "623771306.1fb234f.09aa9355cc8e469f8839d18385f719d5";
// this access token belongs to:  Jacqueline Floch
public static final String DIMU_API_KEY =
        "h_LUmtZbSAC9CqsDzsuzgg";
// these access tokens belongs to:  Tor Barstad
public static final String SOUNDCLOUD_CLIENT_ID =
        "737095f8e223d83af9b88a9b48d90ea9";
public static final String SOUNDCLOUD_CLIENT_SECRET =
        "c559b568bfa50272ff18bcb27a87fa65";
```

## A.2 Front-end

The frontend is developed using Appcelerator Titanium. Similar to the backend, the source code itself is maintained on a GitHub account provided by Sintef called Tag-Cloud. Before continuing this means that a couple of prerequisites has to be fulfilled by the developer.

**The developer should have:**

- A working GitHub-account
- A working Appcelerator-account
- Installed git
- Cloned TagCloud/VirtualWall with the help of Git from GitHub.
- An Android or iOS device

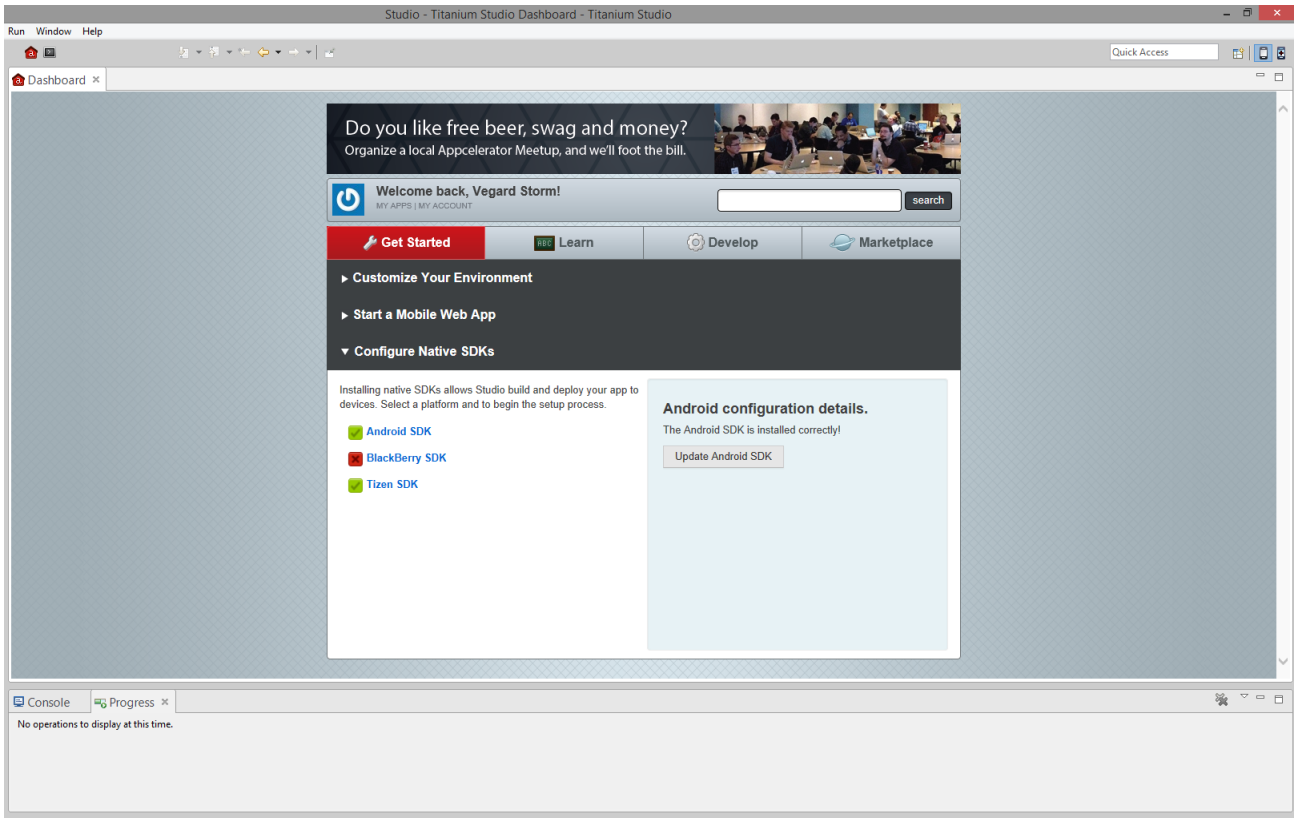
Note that you need a to install the sync software for your device and make sure you have USB debugging enabled. It is also important to note that you need a Mac in order to build the program for iOS devices. Android or iOS device is not required, since it is possible to use an emulator.

Download Appcelerator Titanium.

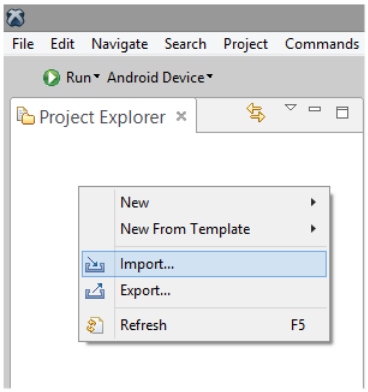
Install titanium by following the installation wizard. When titanium is finished installing, open it. Titanium will ask you to choose a workspace location, where your projects will be stored. You then have to log in with your Appcelerator-account.

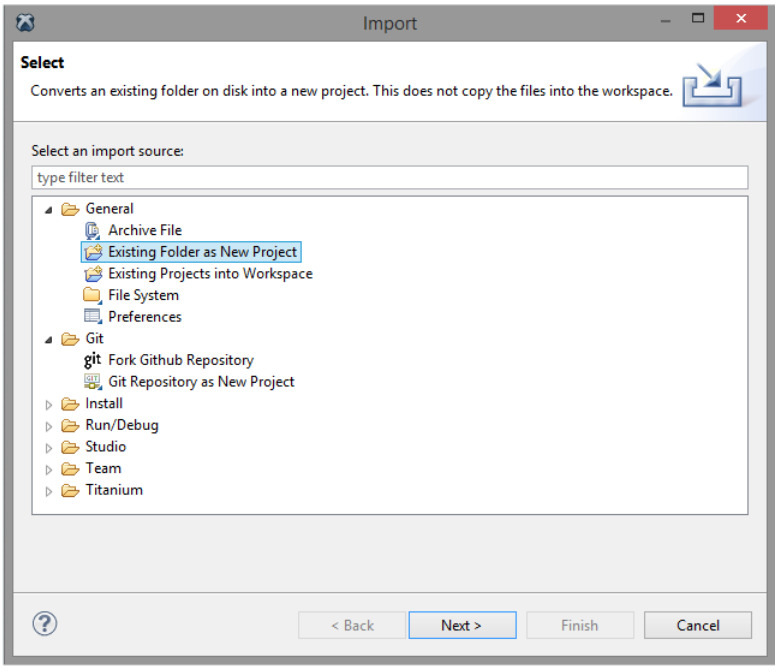
Titanium will then most likely attempt to install software development kit (SDK) for Android. If it does not, you can do so via the dashboard. Click the "Get Started" tab and scroll to "Configure Native SDKs", click Android SDK and make sure it is updated. The Tizen and Blackberry deveopment kits are not necessary for this application.

If you have a Mac, you should be able to install the iOS SDK aswell. You need this if you are testing the application on an iOS device.

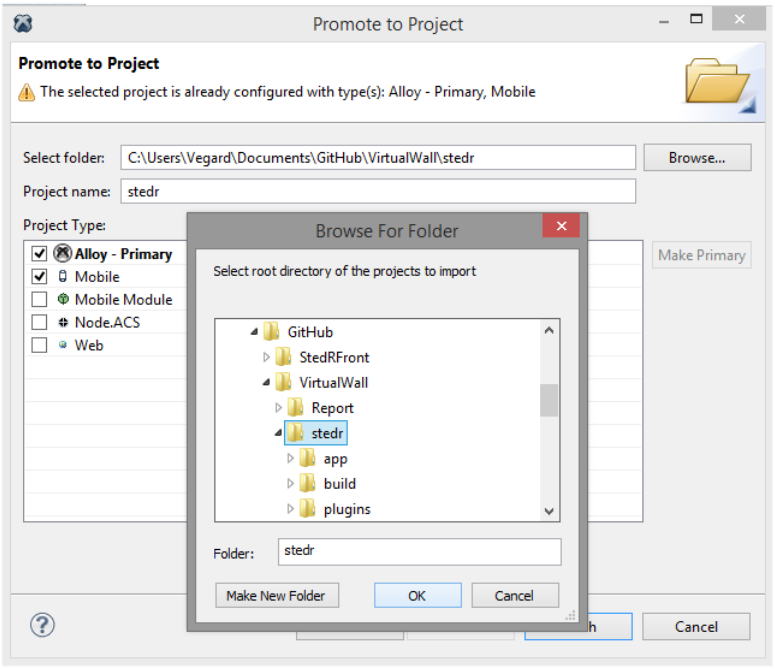



Now we are ready to import the stedr project. 1. Right click in the project explorer and choose "Import". 2. Choose the "Existing Folder as New Project"-option under "General" and press "Next".

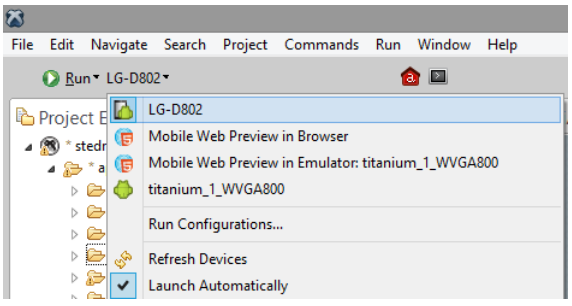


3. Click browse and choose the folder where you downloaded stedr and press “OK”. Example: C:/Users/Vegard/Documents/GitHub/VirtualWall/stedr 4. Under “Project type” make sure Alloy is checked as primary and mobile is checked (This should happen automatically) and press “Finish” if everything is in order.



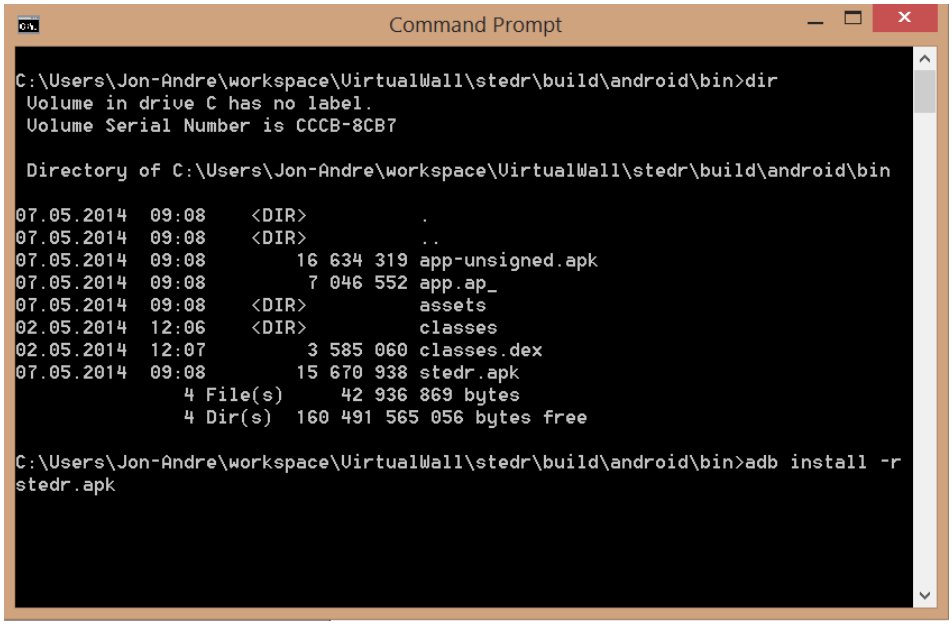

We are now ready to code or run the project. It might benefial to try to run the program on your device or an emulator before you start coding. If you have already done what is explained in the prerequisites and connected your device to the PC via USB, your phone should show up in the list of devices as desplayed below. If it does, select it and click “Run”. However if it does not, make sure you have the synchronization software for your device installed, and that you have “USB debugging” enabled in your phone settings. If you have issues finding the “USB debugging” option on your phone, it may be because you do not have access to developer settings. The easiest way to figure out how to get access is to google “how to access developer options on *your device*“.



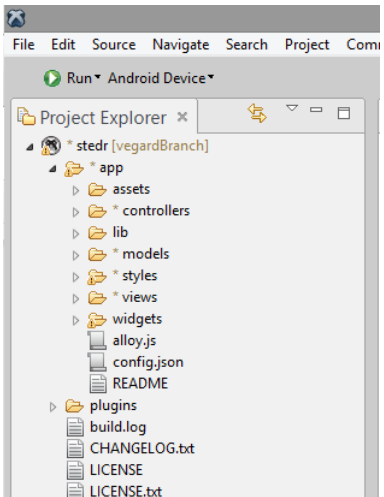
**Emulator:** It is possible to run the program on the official Android emulator, but it has some performence issues. An alternative emulator is the Genymotion. Note that this emulator has some restrictions when asking for a free license, so make sure not to break their term of service.

Genymotion does not support Google Apps (i.e Google Map Servce) which is needed to run stedr. To install Google Apps on Genymotion, see this screencast. Before continuing it is also practical to add adb to the enviromental path, so that adb is accessible directly in the terminal. On Windows you can locate adb.exe under the folder platform-tools where you have installed the Android SDK.

With Genymotion started (the emulated device should be running) enter `adb install -r stedr.apk`. It is easiest to do this from the builder folder where, but you can probably send the location of the apk as a parameter. Notice the -r parameter, this is for reinstalling an apk which becomes necessery to use if the apk already is installed at the emulated device.




**Structure in Titanium alloy:** if you explore your newly added stedr project in the project explorer you will notice that under the app folder there are a nouber of subfolders.




The views-, styles- and controllers-folders are the ones you will be working with the most.

Views: This folder contains an XML-file for every view and the basic structure of it

containing different UI-elements. Each element with an "id" will also get the properties assigned to it in the corresponding styles-file and controller-file.

Styles: This is a folder of TSS-files that are used to design elements used in the corresponding XML-file based on "id".

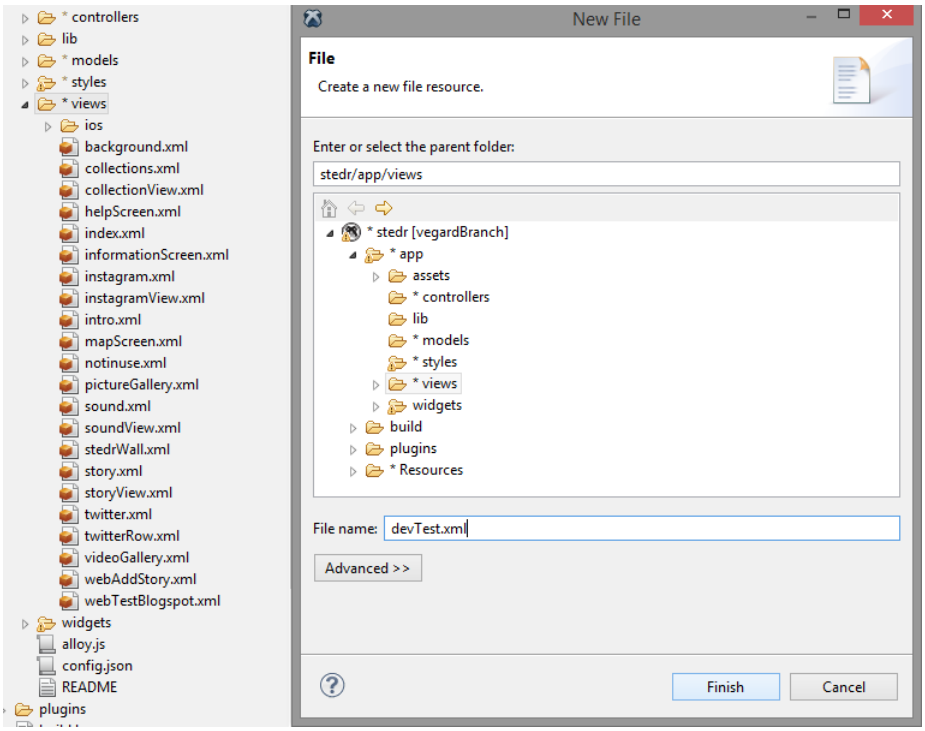
Controllers: This folder is where the JavaScript classes for the different views are stored and where you can add code that affect the corresponding view. You add new UI elements, event listeners, functions and more to achieve the desired functionality and design.

Additionally we have the assets folder, where media like pictures are stored; the lib folder, where you store relevant imported libraries; the models folder, where you can create models that are useful when for instance converting a string into an object; the widgets folder, where imported pre-made UI-elements are stored.

**Coding Example** In this example we assume that you have completed the backend example and uploaded it to the server stedr-beta.herokuapp.com.

We will be creating a view that cointains a label with the value that we retrieve from the server stedr-beta.herokuapp.com/hello.json?name=world. If done right, the text "Hello World" should be deplayed on the screen when opening this view.

1. Begin by creating a new devTest.xml-file in the "views"-folder, a devTest.tss-file in the "styles"-folder and a devTest.js-file in the "controllers"-folder.




2. Creating the XML-file for the view. This is the basic structure of the UI elements. You can also add some properties to the different elements.

*devTest.xml

```
<Alloy>
    <!-- This is our main view. You can have multiple views inside another view.
    In this example we will just make a simple view that fills the entire screen and has a white background -->
    <View id="devTest" class="container" width="100%" height="100%" backgroundColor="white">
        <!-- Here we can add elements we want inside our main view devTest.
        For this axample we just want a label -->
        <Label id="testLabel"/>
    </View> <!-- This closes out the view. -->
</Alloy>
```

2. Creating the TSS-file for the view. The purpose of this file is mainly to stylize UI-elements that are used more than once in the XML-file. Even though a TSS-file is not necessary for a simple view like is this and can be done easily in either the XML- or the JavaScript-file example, here is how you would stylize the label using TSS:

*devTest.xml *devTest.tss

```
//This stylizes every element in the XML-file with the ID "testLabel"
"#testLabel" : {
    color: "black",
    font : {
        fontFamily: 'Helvetica',
        fontSize : '36dp'
    }
}
```

3. Creating the JavaScript-file. This is where we retrieve the information from the server, aswell as set the text of the label.

devTest.xml devTest.tss devTest.js ×

```
// We want to retrieve the information stored in "stedr-beta.herokuapp.com/hello.json?name=world" and add it to a the testLabel
// "world" is the parameter
var parameter= "world";
var url = "stedr-beta.herokuapp.com/hello.json?name="+parameter;

var client = Ti.Network.createHTTPClient({
    onload: function() {
        var response=this.responseText;
        // This is just to see the information in the console aswell
        Ti.API.info("Received text: " + response);
        // Here we set the text of the testLabel to the resonse text
        $.testLabel.setText(response);
     },
     // function called when an error occurs, including a timeout
     onerror : function(e) {
         Ti.API.debug(e.error);
     },
     timeout : 5000  // in milliseconds
});

// Prepare the connection.
client.open("GET", url);
// Send the request.
client.send();
```

Now all we have to do is open this view where we want it. For test purposes i will in this exaple set it to open automatically when you open the app. To do this, we have to go into the index.js file under controllers. Every window/view opens or closes through this class because this is where the window stack is. To make sure the test view is shown automatically, scroll down to the bottom of index.js and add it right above $.index.open() as shown below:

devTest.xml devTest.tss devTest.js *index.js ×

```
    //sets the opened variable to "true"
    Ti.App.Properties.setString("appLaunch", JSON.stringify({opened:true}));
};

// First you create a controller for the 'devTest' view
var devTest = Alloy.createController('devTest').getView();
// Then you add the view to the view-stack by calling the "addWindow" function
addWindow(devTest, "test");

$.index.open();

// Decides if you are allowed to flip the view using phone orinetation etc.
$.index.orientationModes = [Titanium.UI.PORTRAIT, Titanium.UI.UPSIDE_PORTRAIT];
```

Now if you save and run you should see something like this when you start the application on your phone:


We have now gone over the basics of how to create a view aswell as retrieving information from the server. To further understand how to develop stedr using Titanium, looking at and understanding the previous code is essential. The documentation available on the Appcelerator website is also extremely helpful when learning about Titanium:

Hello world



# B Status Report Example

## B.1 Status Report

SINTEF

Storytelling

# Summary Status Report

**1. Introduction**

The last week has been pretty busy with a lot of progress in terms of development. The last customer meeting turned out to be very constructive and the customer seemed to be satisfied with the recent development of the system.

**2. Progress summary**

Updated Activity Plan (8)

Milestone/Gantt

**3. Open / Closed problems**

The last week has almost been problem free, and the progress has been pretty good. Regarding the continued development there has been a delay, because of some content which have not been made available to the group from the customer.

In the following week it will be difficult to keep up the momentum from last week, as Easter is approaching (unavailability because of travelling) and a couple of the group members are in China for a school excursion. The group members that still are available will therefore focus on few assignments which they are familiar with from earlier.

**4. Planned work for next period**

New Activity Plan (9)

**5. Updated risk analysis**

Risk analysis

## B.2 Activity Plan

| ID | Package | Activity | Resources | Planned work (hrs) | Start | Finish | Actual Work (hrs) | Status (% completed) | Comment |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Development | Sound recording | Øyvind | 15 | 10.03.2014 | 23.03.2014 | 15 | 50 | |
| 2 | Systems Engineering | New communication standard | Tor | 20 | 10.03.2014 | 23.03.2014 | 10 | 60 | |
| 3 | Systems Engineering | Collections, possibilities | Vegard | 5 | 10.03.2014 | 23.03.2014 | 10 | 30 | |
| 4 | Development | Integrate new DF-API | Jon-Andre | 10 | 05.03.2014 | 23.03.2014 | 9 | 75 | |
| 5 | Development | Soundcloud integration | Vegard | 10 | 10.03.2014 | 23.03.2014 | 7 | 75 | |
| 6 | Project Managment | Customer Meeting | All | 18 | 19.03.2014 | 19.03.2014 | 0 | Canceled | |
| 7 | Project Managment | Presentation | Hallvard | 5 | 19.03.2014 | 19.03.2014 | 20 | 100 | |
| 8 | Project Managment | Status Report | Vegard | 1 | 23.03.2014 | 23.03.2014 | 2 | 100 | |
| 9 | Project Managment | Supervisor Meeting | All | 3 | 17.03.2014 | 17.03.2014 | 4 | 100 | |
| 10 | Project Managment | Peer evaluation | All | 20 | 17.03.2014 | 23.03.2014 | 25 | 100 | |

## B.3 Risk Analysis

| Problem | Description | Likelihood (1-9) | Impact (1-9) | Importance (Likelihood * Impact) | Preventive action | Remedial Action |
|---|---|---|---|---|---|---|
| **Lack of abstractation in product** | The excisting solution does not have possibilities to add features following templates | 6 | 9 | 54 | None | Standarize communication, and also add a standard for content |
| **Communication Loss** | The groups' communication with each other is not satisfactory. Group don't establish good communication with the customer and supervisor. | 3 | 7 | 21 | Actively establish communication and reach out to the parties regularly. | Talk with the group about the communication, and try to get a good understanding of the problem. Establish communication media, so the group can talk with each other. |
| **Change requests** | Change requests that does not meet the requirements of the product | 3 | 7 | 21 | Have well defined requirements spesification and implement it iteratively. | Reach out to the customer and ask what they think about the request changes. |
| **Technical difficulties** | Some problems may turn up to be very hard to solve. This can in turn lead to delays and frustration. And may sometimes be very time consuming. | 5 | 4 | 20 | Regulary have technical discussions with the group, that way the hard problems can be handled by the group as a whole. | If the problem is to hard, try to get help from other groups. Also evaluate if the problem can be handled differentely. |
| **Workstation are noisy** | The workstation is filled with people who make alot of sound, so the developers team can't concentrate to the fullest. | 5 | 4 | 20 | Can preorder room, so we get our own workstation to work on. | Order room/move to a private facility, and move the whole developers team there if the noise are that bad. |
| **Failing to do planned work** | Members of the group fails to do schedueld work due to falling behind in other subjects or matters not related to the project. | 9 | 2 | 18 | Good scheduling habits. Sit down every week and see what's planned to do in the project the following week. Coordinate against what you have to do in other subject. | Make up for lost work during weekends or other available time slots |
| **Insufficient product** | Devolping a product that does not meet the requirements of the costumer | 2 | 9 | 18 | Good and continious communication with the costumer. Work with an agile devolpment structure such as Scrum | |
| **API change** | Changing the general API because lack of functionality. | 2 | 9 | 18 | Sufficient research about API before implementing it into the project. | Either drop the functionality that is missing, or start developing with the new API if there's time and the priority is high enough. |
| **Different app views** | Customer and developers have different views of the apps' purpose and funtions. | 3 | 6 | 18 | Have regular meetings, inform and discuss all changes to project scope, goals and features. | Discuss with customer and find middle ground. |
| **Scope** | The amount of features requested are beyond what the development team can deliver in time | 6 | 3 | 18 | Be specific with the customer how much time we have, and explain deeply how much time it takes to develop a single feature | Discuss what are the nessasery features that must be in the product, and flush out what is the least nessasery. |
| **Unavailability** | Group members are unavailable because of different projects, which makes it difficult to complete the planned work load | 4 | 4 | 16 | Get an overview over when group members are available, and then plan how to either work more before the time of the unavailability or plan to catch up the missed work at a later stage | Other group members have to make up for others unavailability |

| Problem | Description | Likelihood (1-9) | Impact (1-9) | Importance (Likelihood * Impact) | Preventive action | Remedial Action |
|---|---|---|---|---|---|---|
| **Lack of competence** | The developers don't have enough competence about the given software the project requires. | 8 | 2 | 16 | Meet every day, do workgroups together and learn by failing. | Talk with other members of the group, and hear if they have the competence. This will prevent hours of searching, when you can listen what the other members have to say. And direct you on the right path for the competence you need. |
| **Hardware communication** | Not possible to use the dev. environment to make use of some of the hardware (camera, microphone) | 4 | 4 | 16 | Try to keep the application relevant to what it's actually ment to do, focus on the core areas. | Access the hardware externally through APIs |
| **Loss of work (DUPLICATE)** | Disk failures or losing equipment that causes project related work to disappear | 2 | 8 | 16 | Establish good backup habits. Have the group share the code (using git etc) and use cloud services for document storage | Talk with other group members, hear if they have it on a local hard drive. If not rollback to the latest stabil version, where there is least of loss. |
| **Software issues** | Not all group members can install necessary sofware properly on their own devices. Software not functioning properly on device. | 5 | 3 | 15 | Research software before taking use of it. Install software together as a group. | Work together in small groups with the task, or reassign aother work to the individual. |
| **Missing deadlines** | Some work may take longer time than expected, this may cause delays later on in the project. | 3 | 5 | 15 | Have a steady and diciplined workflow and plan ahead. Overestimate work rather than underestimate. | All members meet and plan what is to be done, and assign it right away. This way the project can be delivered as soon as possible. |
| **Customer turnover disruption** | A key contact in SINTEF leaves the company, putting the project in a unclear state | 2 | 7 | 14 | Good communication. Multiple contacts with knowledge of the project | Quickly contact the customer and discuss how to proceed and how it's affected |
| **Sickness** | Group members or other crucial personell gets sick | 4 | 3 | 12 | Have regular updates about the progress of the work being done, and don't make important task rely completely on one person without a backup plan. Stay healthy. | Talk to the person about the individual tasks, how much he can handle, and distribute the work the member can't complete. |
| **Group members falling out.** | Members doesn't show for meetings, or goes of the grid without notice. | 2 | 6 | 12 | Good communication and agree on a schedule that suits everyone. | Take action at once, and make inquires to why the member didn't show. |
| **Uneven workload** | Uneven distribution of workload | 6 | 2 | 12 | Stay updated on the tasks given and work put in, then distribute new work accordingly. | Have intervention and discuss the workload, try to redistribute to make up for the differences. |
| **Conflict over changes** | Group members not in agreement over supposed changes in group management, work, responibility etc. | 3 | 4 | 12 | Have an open dialog. | Discuss in group and decide as a democracy. |
| **Late for meeting** | Members of the group are late for meetings with group/customer and supervisor | 6 | 2 | 12 | Good communication and agree on a schedule that suits everyone. | Take action at once, make inquires to why the member came late and make it clear to the individual that this is not acceptable. |

| Problem | Description | Likelihood (1-9) | Impact (1-9) | Importance (Likelihood * Impact) | Preventive action | Remedial Action |
|---|---|---|---|---|---|---|
| **Documents customer/superviso meeting** | Lacking the sufficeint documents for the meeting with the customer used for presenting changes, mockups or reports about fieldwork etc. | 2 | 6 | 12 | Have the documents stored in the cloud so you can acces it where ever you go. With your respective smartphone/tablet and pc's, | Discuss what you remember and try to make the best out of the meeting. |
| **Equipment failure** | Computers and other dependable devices malfunctions. | 4 | 2 | 12 | Keep documents and code in the cloud so you can work from another device if your primary device malfunction. | Get replacement as soon as possible. |
| **Application on mobile device** | Problems installing application from the used framework on mobile devices. | 3 | 4 | 12 | Make sufficient research about the framework we are suppose to use infront of the project. So we have as litle problems as possible to install on mobile devices. | Use google and try to find people who have had the same problems as you are having. And try to do the same as they have done before you. |
| **Document sharing failed** | Authorization of documents sharing is not complete, people don't have access to the groups documents. | 2 | 4 | 8 | Give all the authorization they need for the documents to be shared. So all can view, edit and share documents. | Find out where the problem lies, so everyone can get authorization for the given documents and folders. |
| **Lack of software** | Lack of software necessary for the develoment process. | 1 | 3 | 3 | Talk about what software is required for the development of the product. Ask the customer for this software or funds to aquire it in good time. | Ask the customer immediately for the required software, so the development progress don't have any major delays. |

# C Meeting Example

## C.1 Group Meeting

Here follows an example of notes one of our meetings. The summarys from the meetings are written in norwegian, and translating them for the report was not something we prioritized.

Til stede: Alle

**Agenda:**

- Oppsumering fra forrige gang
- Gjort siden sist
- Evaluering av stedr
- Preliminary report
- Diverse
- Til neste gang

**Oppsummering fra forrige gang:**
Forrige gang ble vi enige om å i hovedsak se nærmere på 'stedr' og evaluere appen. Siden sist har vi også hatt møte med supervisor og Sintef, det foreligger ikke noe referat fra Sintef-møtet enda. På grunn av sykdom var dette møtet med Babak og ikke den opprinnelige kunden Jacqueline.

**Gjort siden sist:**
Øyvind: Mock-up, og alt fra lista.
Hallvard: Titanium, APIer, RISK.
Jon-Andre: Titanium og oppsett mot stedr, skrevet en liten evaluering av stedr, agilefant, PHP/symfony, jobbet litt (for lite) på RISK-dokumentet.
Tor: Mange oppgaver viste seg overflødige, kommer tilbake
Vegard: Titanium, LaTeX, sharedLaTeX.
Jørgen: God evaluering av stedr, RISK

**Evaluering av stedr:** Diverse UI-bugs. F. eks kan man ikke rotere telefonen. Ikke noen scroll-funksjon på 'pictures'. I overkant mye scroll enkelte steder, man kan scrolle forbi slutten av teksten. Twitter tillater ikke mer enn 140 ord, men det gjør appen. Er det noe poeng å tweete fra stedr, eller skal man bare hente inn? Jørgen har prøvd å få inn et bilde fra instagram, men dette dukker ikke opp i stedr etter 12 timer. Måten stedr henter inn historier (vha. hashtags) gjør at det blir mye irrelevant informasjon. Autensisering opp mot Twitter er rart, hva er stedr homepage. Vi liker mye av designet. Hva er identiteten/poenget til appen? For utdypninger se eget dokument.

**Preliminary report:**
Risk-list er nesten ferdig. Jørgen, Jon og Øyvind skal møtes på lørdag for å jobbe og fullføre midterm.

**Diverse:**
For nå tar vi det med ro i LaTeX, bruker Google Docs i første omgang. Tor og Hallvard har sett litt på skytjenester (sky-backend), noe som kan virke interessant.

**Til neste gang:**
Øyvind: Prelim-rapport, fikse kodekopier
Hallvard: APIer, balsamering
Jon-Andre: Prelim-rapport, referat fra Sintef
Tor: Se på skybackend
Vegard: APIer, prøve å få kildekoden til å fungere i Titanium
Jørgen: Prelim-rapport

## C.2 Customer Meeting

Here is an example of the summart of a meeting with our customer. Again the text is in norwegian.

**Videomøte med Jacqueline 19.02.2014**

Til stede fra gruppe: Øyvind, Jørgen og Jon-Andre
Fra kunde: Jacqueline Floch

Gruppa har fått mye informasjon, men hva synes Sintef er viktigst?

1. APIet til Digitalt Fortalt
2. Stable bilder til samme sted.
3. Gjøre appen bedre og forbedre integrasjonen mot eksisterende APIer.
4. Skape interesse gjennom sosiale medier (link til fortelling f. eks)
5. Filtrering
6. Koble til andre databaser (Soundcloud)

Vil beholde så mye som mulig av det som allerede finnes i appen. Det ble brukt mye tid på design i høst, så dette bør ikke prioriteres nå.

Filtrering: Når et sted blir hentet kan man f. eks få en liste med tags. Filtrering basert på brukerprofil (og generelt) vil for øyeblikket være litt problematisk grunnet få fortellinger.

DF har link til Wikipedia.

Hvis vi har forslag til forandring både backend/frontend så kan dette gjennomføres.

Informerer om den lille brukerundersøkelsen vi har hatt, og at vi har et inntrykk av at den sosiale delen.

Flickr API: Et sted er definert som et bilde, geolokasjon, bilde er delt innenfor en gruppe. Gruppe-APIet til Flickr er ikke optimalt, gruppe er brukt for å gjøre søket enklere. Backend henter alle bilder og informasjon fra den gruppa.

Gruppa har et inntrykk av at appen ved førstegangsbruk er litt vanskelig, kanskje det bør være innlagt en sidemeny.

En litt abstrakt utfordring er: Hva er et sted, og hvor stort er et sted?

**Notiser:**
-Det APIet som ble brukt i høst fungerer ikke nå
-Gruppa bør sjekke ut Trondheim Byguide

## C.3 Supervisor Meeting

Here are some notes from one of our meetings with the our supervisor Mohsen Anvaari. We found these meetings to be a great resource during our project, giving us constructive criticism and advice. This specific meeting occurred 18.02.2014.

**Meeting with Supervisor 18.02.2014**

He thought the report was generally good, but some small things were missing:

In the introduction we should have given a short introduction to the customer.

He had some issues with the structure of the report:

The term Software Engineering is too broad. Should rather be split up in sections like Architecture, Design etc. An alternative would be to simply split the structure in to Sprint 1, 2 etc.

Time organization should just be called Project Planning.

Never use "things" in the report. Be more specific.

"GUI and APIs" - For what? Specify that we will work on Stedrs GUI and API.

Remember to give an brief description on what the application is for. Explain the usage.

Process is fine.

Timeplan and architecture is fine, but needs to be more detailed for the next version.

Some of the Non-functional-reqs is functional. ISO standard. Chose 3 or 4. How we tackled it later. Diary is functional.

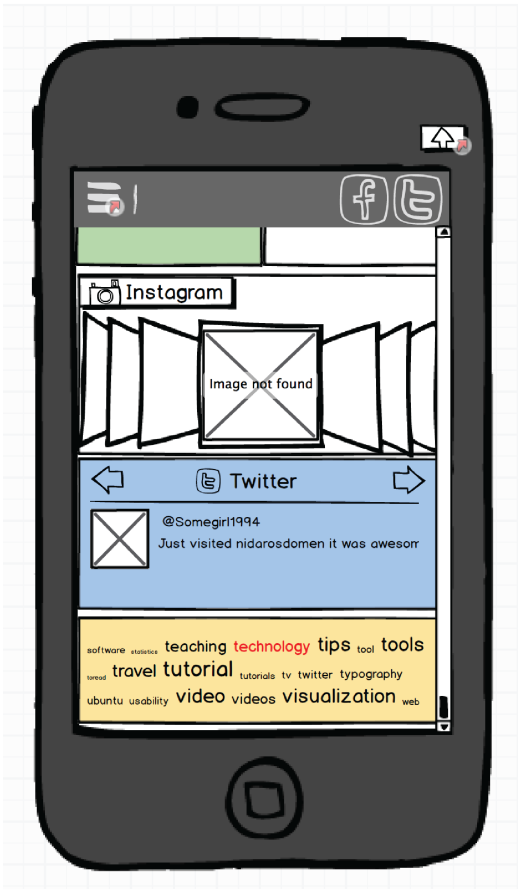
Linking is superimportant!

Risk analysis is very good.

# D | Other

## D.1 Mock-ups

In the beginning of the project we did made mockups to describe our ideas and thoughts. These was later dismissed as the project progressed, but we implemented ideas from them later on, so even though they are not directly relevant to the final project, we feel they are relevant enough for the subject, in terms of how time were spent etc, to include them in the report.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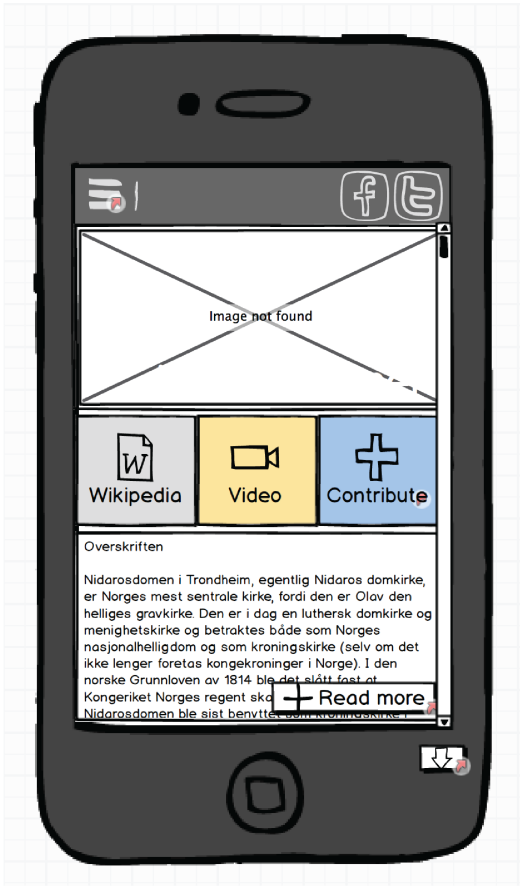
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Fram til reformasjonen i 1537 hadde kirken også det høystemte tilnavnet «Cor Norvegiae» (Norges hjerte), fordi St. Olavs skrin var plassert bak høyalteret. Et vanligere navn var Kristkirken i Nidaros, selv om kirken var sterkt knyttet til Hellig Olav, var den ikke viet til ham, men til den hellige Treenighet.


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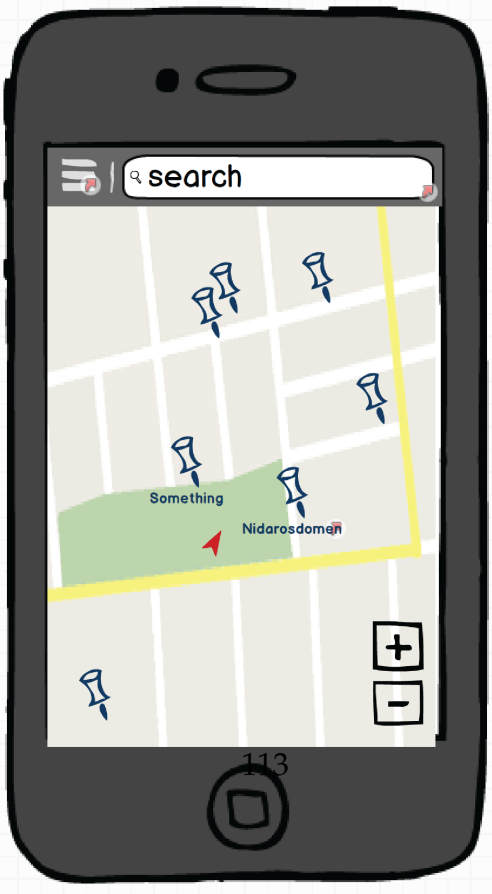
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