Norwegian University of
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National Integration Platform for Citizen Centric eHealth in Norway

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Helsedirektoratet
Norwegian Directorate of Health

Abstract

This report describes the design of the National Integration Platform (NIP) used for Citizen Centric eHealth in Norway. The NIP is a platform to collect different user generated eHealth data from third party solutions and services. It also describes the making of the working prototype. The challenges of this prototype is to demonstrate the transfer of personal and/or medical data from different devices and systems. The intention of the platform is to enable citizens the ability to publish information they produce into the government run NIP. It is worth noting that security is not a requirement of the prototype. To demonstrate these different parts the creation of an Android application (App), a web App and a back-end Application Programming Interface (API) was required.

The motivation for working in this project is to innovate and create a new platform that can be used to better understand the health of citizens. The citizens gather various health data from different locations and devices and in return provide a better understanding of the citizens health. Together with educated health professionals and doctors this can be a powerful tool for improving the quality of life of the users. The most interesting part was to figure out how to design a system that can have the high level of security required to transfer personal health information.

The demands were to plan, design and describe the NIP and to develop a prototype. The demonstration of this product is aimed mainly at two groups of people: 1. Educated health professionals 2. Developers The product should have a demonstration side that is easy for the first group to grasp, understand and form an idea of how it will work while also making it appealing and technical for the second group.

The result of this project is first and foremost a working prototype of a NIP. It is also a web App and an Android app to make the demonstration easier to grasp. This report is also part of the result which has the purpose of documenting the problem, the process, the workflow and the final products.

Preface

This report is for the main project in the course TDT4290 Customer Driven Project at NTNU. The team consisted of a three students from NTNU.

The team would like to thank our supervisor Meng Zhu for his guidence, help and advice for this project.

In addition we would also like to thank our customer Helsedirektoratet and their contact person Helge Blindheim. Say something about helge

Thank the people from usability tests valuable feedback

Contents

List of Figures

List of Tables

Abbreviations

API	**A**pplication **P**rogramming **I**nterface
App	**A**pplication
NIP	**N**ational **I**ntegration **P**latform
NTNU	**N**orges **T**eknisk-**N**aturvitenskalige **U**niversitet i T
Norwegian University of Science and Technology	

Chapter 1

Introduction

1.1 Project description

This project is part of the Customer Drivent Project (TDT4290) at NTNU. The purpose of the course is to let students acquire practical experience in development of a medium-large software project, including experience in project management, group dynamics, customer relations

1.2 The client

The customer of this project was the Norwegian Directorate of Health (Helsedirektoratet).

Helsedirektoratet er eit fagdirektorat og myndigheitsorgan som ligg under og blir etatsstyrt av Helse- og omsorgsdepartementet. Helsedirektoratet har også oppgåver frå Kommunal- og regionaldepartementet.

The Directorate has, among other, the task of digitalizing Norway's health care system by providing services for both specialists and citizens.

The customer was represented by Mr. Helge T. ... His contact is shown in table 1.1

Name	Phone	E-mail
Helge T. ...	...	...

Table 1.1: Customer representative

1.3 Involved parties

The people involved in this project were a) the customer, b) the team and c) the supervisor. The customer, described in the previous section, was represented by Mr. Helge ... The team consisted of three students from the Department of Computer and Information Science (IDI) at the Norwegian University of Science and Technology (NTNU). The group was supervised by Zhu Meng.

Name	Phone	E-mail
Anders Olsen Sandvik	...	...
Emanuele Di Santo	...	...
Sebastian Zalewski	...	...

Name	Phone	E-mail
Zhu Meng	...	...

1.4 Project drivers

1.5 Problem domain

1.6 Project objective

1.7 Duration

Chapter 2

Project management

2.1 Planning

2.1.1 Work plan

2.1.2 Resources

2.1.3 Limitations

2.1.4 Milestones

2.1.5 Tool selection

This section will describe the different tools we used during this course

Git and GitHub "Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency." [bib]http://git-scm.com/

Sublime Text

Intelijei IDE

Google Docs

Apache Maven

Travis CI

Latex

Balsamiq Mockups

Lucidchart

2.2 Organization

2.2.1 Roles

2.2.2 Weekly schedule

2.3 Quality assurance

2.3.1 Templates

2.3.2 Customer relations

2.3.3 Supervisor relations

2.4 Risk management

Chapter 3

Preliminary Studies

This chapter contains

3.1 Development Methodology

TODO

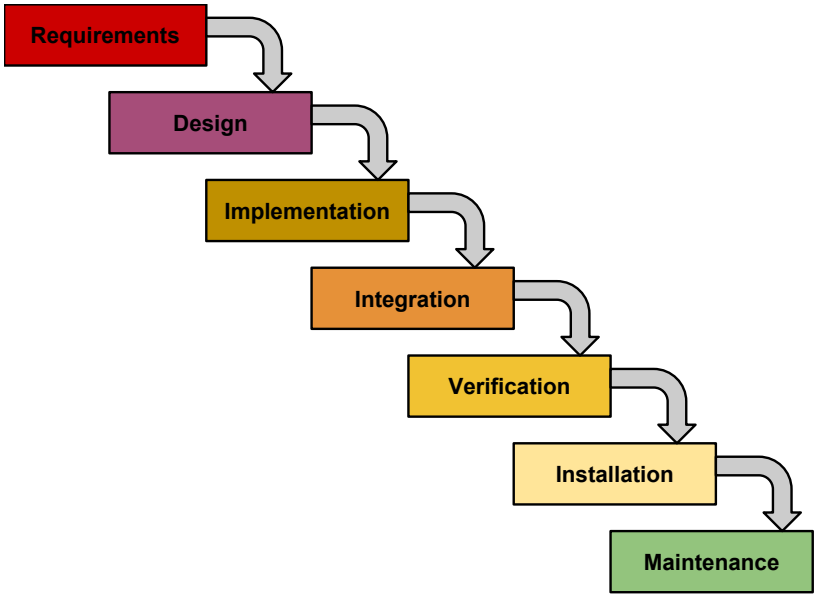
3.1.1 Waterfall Model

The waterfall model is a software development process where each task is performed in a sequential order. Before moving to the next phase the preceding task needs to be finished. The progress of the project is seen as flowing downwards through the different phases, hence the name waterfall. In the original model the phases consisted of seven different tasks:

1. Requirements specification
2. Design
3. Construction (implementation or coding)
4. Integration
5. Testing and debugging

6. Installation

7. Maintenance



Because each phase needs to be perfected and completed before moving to the next phase, this brings up some difficulties if the requirements were to change during the development process. However the model is easily understandable, structured, and disciplined. All the phases are divided into different sections, and this makes it easier to understand the progress of the project. In practice it can be very hard to adapt to this kind of development model. It can be hard for a system designer to predict future implementation difficulties of a type of design, hence the design of the system may change during the process. Another problem is that the customer is not always sure about the system requirements, and often will the customer change them during the development.

3.1.2 SCRUM Model

The SCRUM model is an agile software development process that is iterative and incremental. It consists of multiple sprints, where a sprint usually lasts from 14-30 days depending on the size of the task. Each sprint is focusing on a set of concrete goals that are in the sprint backlog. The sprint backlog consists of tasks that are chosen from the product backlog. They are usually chosen in the sprint planning meeting that is performed before each sprint. The product backlog consists of all the features the product should contain, and is usually made in the initial phase of the project. It can

however be changed and adjusted during the development of the product. For each day a daily scrum meeting should be performed. Usually a scrum meeting consists of getting to know what each person did yesterday, what they will do today and if they are facing any problems. If there are any problems the Scrum master is responsible to resolve the problem. After each sprint a sprint review meeting should be held. An overview of what goals where achieved and which one where not should be made. The meeting can also consist of a demo of the new features implemented.

3.1.3 Conclusion

We decided to choose the SCRUM model as our development process.

3.2 Existing Solutions

This section contains some of the similar existing solutions that are already created.

3.2.1 HealthVault

TODO

3.2.2 Open eHealth Foundation

TODO

3.2.3 human/api

The human API is a platform for human health data. They have an API that contains multiple different well defined JSON strings for different kinds of human related data. Each JSON string contains all the necessary information that is needed to represent each type of health data. For example heart rate is defined by an id, user id, time, value and unit in the following way:

```
{
```

```
  "id": "string",
  "userId": "string",
  "time": "date",
  "value": "int",
  "unit": "string"
}
```

3.2.4 Conclusion

TODO

3.3 Technologies

This section contains the technologies we used in our prototype.

3.3.1 Server

Java

TODO

Spring Framework

TODO

Apache Tomcat

Apache Tomcat is an implementation of the JSP (JavaServer Pages) and Java Servlet technologies. It makes it possible to deploy and run a web page with its services on a server.

3.3.2 Database

MySQL

MySQL is one of the most widely used relational database management system.

3.3.3 Web Page

HTML5

HTML is the standard World Wide Web's markup language. It is used to structure and visualize web pages on the internet.

CSS3

CSS describes the look and format of a document written in HTML.

JavaScript

JavaScript is an interpreted computer programming language that is run in the browser of the user. It is allowed to make changes in the HTML DOM, interact with the user, control the browser and communicate asynchronously.

jQuery

jQuery is a JavaScript library for manipulating and traversing the HTML DOM. It also makes it easier to communicate with the server through AJAX.

Chart.js

Chart.js is a JavaScript library for creating graphs and charts.

3.3.4 Mobile Technologies

Android SDK

Android SDK contains the tools necessary for developing, debugging and testing an Android app.

3.3.5 Conclusion

TODO

3.4 Testing

TODO

3.4.1 JUnit

TODO

3.4.2 Conclusion

3.5 Summary

TODO

Chapter 4

Requirements specification

4.1 Funcional requirements

4.2 Non-funcional requirements

4.2.1 Quality requirements

4.3 Use cases

Chapter 5

System architecture

5.1 Overview

5.2 NIPEN

5.3 Front-end

5.4 Heart rate

5.5 Weight

Chapter 6

Sprint 0

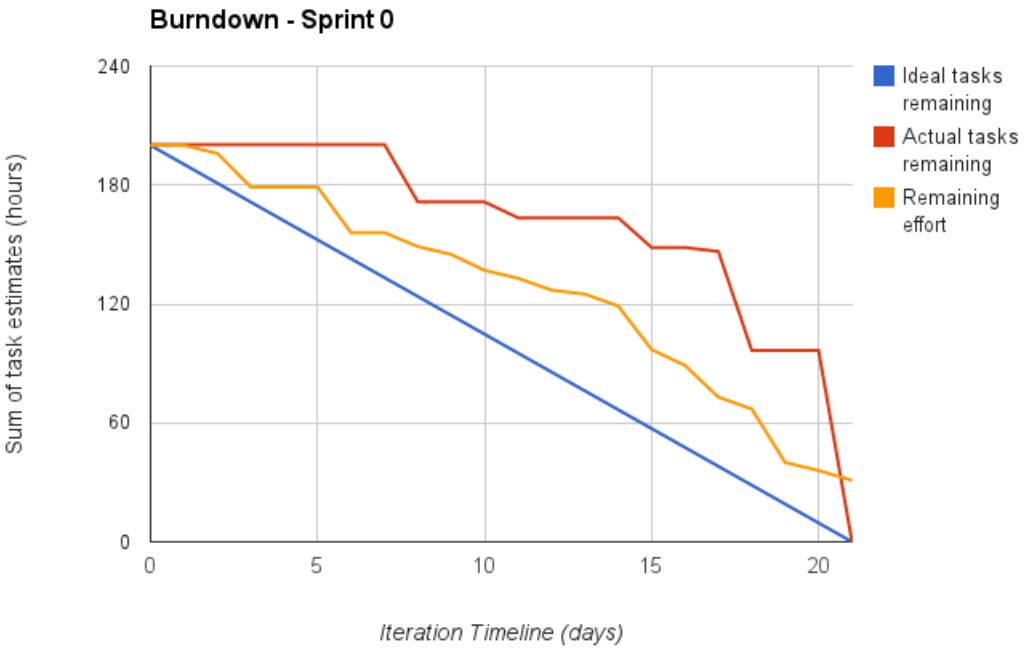
This chapter is meant to give an overview of sprint 0. Section 9.1 gies and overview of the planning. Section 9.2

6.1 Planning

** We planned to have 2 weeks sprint but in the middle of the sprint we changed the first sprint to a 3 week sprint. That makes some of our numebrs inconsistent. Refering to the status reports and the weekly meetings. We usually estimated 60 hours per week of work but the first sprint ended up beeing estimated at 200 hours for 3 weeks**

what we planned to do shall we include some data from scrumdo? definitely a chart..

6.2 Duration



6.3 Goals

what did we expect to achieve by the end of this sprint (general progress in the project)

6.4 Feedback

from customer, from supervisor

6.5 Problems

6.6 Evaluation

our thoughts about this sprint

Chapter 7

Sprint 1

7.1 Planning

what we planned to do shall we include some data from scrumdo? definitely a chart..

7.1.1 Expected results

what did we expect to achieve by the end of this sprint (general progress in the project)

7.2 Feedback

from customer, from supervisor

7.3 Evaluation

our thoughts about this sprint

Chapter 8

Sprint 2

8.1 Planning

what we planned to do shall we include some data from scrumdo? definitely a chart..

8.1.1 Expected results

what did we expect to achieve by the end of this sprint (general progress in the project)

8.2 Feedback

from customer, from supervisor

8.3 Evaluation

our thoughts about this sprint

Chapter 9

Sprint 3

9.1 Planning

what we planned to do shall we include some data from scrumdo? definitely a chart..

9.1.1 Expected results

what did we expect to achieve by the end of this sprint (general progress in the project)

9.2 Feedback

from customer, from supervisor

9.3 Evaluation

our thoughts about this sprint

Chapter 10

Sprint 4

10.1 Planning

what we planned to do shall we include some data from scrumdo? definitely a chart..

10.1.1 Expected results

what did we expect to achieve by the end of this sprint (general progress in the project)

10.2 Feedback

from customer, from supervisor

10.3 Evaluation

our thoughts about this sprint

Chapter 11

Sprint 5

11.1 Planning

what we planned to do shall we include some data from scrumdo? definitely a chart..

11.1.1 Expected results

what did we expect to achieve by the end of this sprint (general progress in the project)

11.2 Feedback

from customer, from supervisor

11.3 Evaluation

our thoughts about this sprint

Chapter 12

Testing

12.1 Main Section 1

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12.1.2 Subsection 2

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12.2 Main Section 2

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Chapter 13

Conclusion and further work

13.1 Main Section 1

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13.1.2 Subsection 2

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13.2 Main Section 2

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Chapter 14

Reflection

14.1 Main Section 1

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14.1.1 Subsection 1

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Appendix A

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