

NORWEGIAN UNIVERSITY OF
SCIENCE AND TECHNOLOGY

National Integration Platform for Citizen Centric eHealth in Norway

Authors:

Anders Olsen SANDVIK,
Sebastian ZALEWSKI,
Emanuele DI SANTO

Supervisor:

Meng ZHU

TDT4290 Group 17

Department of Computer and Information Science

November 2013



NTNU – Trondheim
Norwegian University of
Science and Technology



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.

This report is for the main project in the course TDT4290 Customer Driven Project at NTNU.

Contents

Abstract	i
Preface	ii
List of Figures	vi
List of Tables	vii
Abbreviations	viii
1 Introduction	1
1.1 Project description	1
1.2 The client	1
1.3 Involved parties	1
1.4 Problem domain	1
1.5 Project drivers	1
1.6 Available resources	2
1.7 Limitations	2
1.8 Duration	2
2 Project management	3
2.1 Planning	3
2.1.1 Work plan	3
2.1.2 Resources	3
2.1.3 Limitations	3
2.1.4 Milestones	3
2.1.5 Tool selection	3
2.2 Organization	4
2.2.1 Roles	4
2.2.2 Weekly schedule	4
2.3 Quality assurance	4
2.3.1 Templates	4
2.3.2 Customer relations	4
2.3.3 Supervisor relations	4
2.4 Risk management	4
3 Preliminary study	5

3.1	Main Section 1	5
3.1.1	Subsection 1	5
3.1.2	Subsection 2	5
3.2	Main Section 2	6
4	Requirements specification	7
4.1	Funcional requirements	7
4.2	Non-funcional requirements	7
4.2.1	Quality requirements	7
4.2.2	7
4.3	Use cases	7
5	System architecture	8
5.1	Overview	8
5.2	NIPEN	8
5.3	Front-end	8
5.4	Heart rate	8
5.5	Weight	8
6	Sprint 0	9
6.1	Planning	9
6.2	Duration	9
6.3	Goals	9
6.4	Feedback	9
6.5	Problems	9
6.6	Evaluation	9
7	Sprint 1	10
7.1	Planning	10
7.1.1	Expected results	10
7.2	Feedback	10
7.3	Evaluation	10
8	Sprint 2	11
8.1	Planning	11
8.1.1	Expected results	11
8.2	Feedback	11
8.3	Evaluation	11
9	Sprint 3	12
9.1	Planning	12
9.1.1	Expected results	12
9.2	Feedback	12
9.3	Evaluation	12
10	Sprint 4	13
10.1	Planning	13
10.1.1	Expected results	13

10.2 Feedback	13
10.3 Evaluation	13
11 Sprint 5	14
11.1 Planning	14
11.1.1 Expected results	14
11.2 Feedback	14
11.3 Evaluation	14
12 Testing	15
12.1 Main Section 1	15
12.1.1 Subsection 1	15
12.1.2 Subsection 2	15
12.2 Main Section 2	16
13 Conclusion and further work	17
13.1 Main Section 1	17
13.1.1 Subsection 1	17
13.1.2 Subsection 2	17
13.2 Main Section 2	18
14 Reflection	19
14.1 Main Section 1	19
14.1.1 Subsection 1	19
14.1.2 Subsection 2	19
14.2 Main Section 2	20
 A Appendix Title Here	 21
 Bibliography	 22

List of Figures

List of Tables

Abbreviations

API

Application **P**rogramming **I**nterface

App

Application

NIP

National **I**ntegration **P**latform

NTNU

Norges **T**eknisk-**N**aturvitenskapelige **U**niversitet i **T**rondheim

Norwegian University of Science and Technology

Chapter 1

Introduction

1.1 Project description

1.2 The client

helsedirektoratet

1.3 Involved parties

Us and the supervisor. two tables would look neat

1.4 Problem domain

some text

1.5 Project drivers

people

1.6 Available resources

1.7 Limitations

1.8 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

Inteliject 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 study

3.1 Main Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam ultricies lacinia euismod. Nam tempus risus in dolor rhoncus in interdum enim tincidunt. Donec vel nunc neque. In condimentum ullamcorper quam non consequat. Fusce sagittis tempor feugiat. Fusce magna erat, molestie eu convallis ut, tempus sed arcu. Quisque molestie, ante a tincidunt ullamcorper, sapien enim dignissim lacus, in semper nibh erat lobortis purus. Integer dapibus ligula ac risus convallis pellentesque.

3.1.1 Subsection 1

Nunc posuere quam at lectus tristique eu ultrices augue venenatis. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aliquam erat volutpat. Vivamus sodales tortor eget quam adipiscing in vulputate ante ullamcorper. Sed eros ante, lacinia et sollicitudin et, aliquam sit amet augue. In hac habitasse platea dictumst.

3.1.2 Subsection 2

Morbi rutrum odio eget arcu adipiscing sodales. Aenean et purus a est pulvinar pellentesque. Cras in elit neque, quis varius elit. Phasellus fringilla, nibh eu tempus venenatis, dolor elit posuere quam, quis adipiscing urna leo nec orci. Sed nec nulla auctor odio

aliquet consequat. Ut nec nulla in ante ullamcorper aliquam at sed dolor. Phasellus fermentum magna in augue gravida cursus. Cras sed pretium lorem. Pellentesque eget ornare odio. Proin accumsan, massa viverra cursus pharetra, ipsum nisi lobortis velit, a malesuada dolor lorem eu neque.

3.2 Main Section 2

Sed ullamcorper quam eu nisl interdum at interdum enim egestas. Aliquam placerat justo sed lectus lobortis ut porta nisl porttitor. Vestibulum mi dolor, lacinia molestie gravida at, tempus vitae ligula. Donec eget quam sapien, in viverra eros. Donec pellen-
tesque justo a massa fringilla non vestibulum metus vestibulum. Vestibulum in orci quis felis tempor lacinia. Vivamus ornare ultrices facilisis. Ut hendrerit volutpat vulputate. Morbi condimentum venenatis augue, id porta ipsum vulputate in. Curabitur luctus tempus justo. Vestibulum risus lectus, adipiscing nec condimentum quis, condimentum nec nisl. Aliquam dictum sagittis velit sed iaculis. Morbi tristique augue sit amet nulla pulvinar id facilisis ligula mollis. Nam elit libero, tincidunt ut aliquam at, molestie in quam. Aenean rhoncus vehicula hendrerit.

Chapter 4

Requirements specification

4.1 Funcional requirements

4.2 Non-funcional requirements

4.2.1 Quality requirements

4.2.2

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

6.1 Planning

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

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam ultricies lacinia euismod. Nam tempus risus in dolor rhoncus in interdum enim tincidunt. Donec vel nunc neque. In condimentum ullamcorper quam non consequat. Fusce sagittis tempor feugiat. Fusce magna erat, molestie eu convallis ut, tempus sed arcu. Quisque molestie, ante a tincidunt ullamcorper, sapien enim dignissim lacus, in semper nibh erat lobortis purus. Integer dapibus ligula ac risus convallis pellentesque.

12.1.1 Subsection 1

Nunc posuere quam at lectus tristique eu ultrices augue venenatis. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aliquam erat volutpat. Vivamus sodales tortor eget quam adipiscing in vulputate ante ullamcorper. Sed eros ante, lacinia et sollicitudin et, aliquam sit amet augue. In hac habitasse platea dictumst.

12.1.2 Subsection 2

Morbi rutrum odio eget arcu adipiscing sodales. Aenean et purus a est pulvinar pellentesque. Cras in elit neque, quis varius elit. Phasellus fringilla, nibh eu tempus venenatis, dolor elit posuere quam, quis adipiscing urna leo nec orci. Sed nec nulla auctor odio

aliquet consequat. Ut nec nulla in ante ullamcorper aliquam at sed dolor. Phasellus fermentum magna in augue gravida cursus. Cras sed pretium lorem. Pellentesque eget ornare odio. Proin accumsan, massa viverra cursus pharetra, ipsum nisi lobortis velit, a malesuada dolor lorem eu neque.

12.2 Main Section 2

Sed ullamcorper quam eu nisl interdum at interdum enim egestas. Aliquam placerat justo sed lectus lobortis ut porta nisl porttitor. Vestibulum mi dolor, lacinia molestie gravida at, tempus vitae ligula. Donec eget quam sapien, in viverra eros. Donec pellentesque justo a massa fringilla non vestibulum metus vestibulum. Vestibulum in orci quis felis tempor lacinia. Vivamus ornare ultrices facilisis. Ut hendrerit volutpat vulputate. Morbi condimentum venenatis augue, id porta ipsum vulputate in. Curabitur luctus tempus justo. Vestibulum risus lectus, adipiscing nec condimentum quis, condimentum nec nisl. Aliquam dictum sagittis velit sed iaculis. Morbi tristique augue sit amet nulla pulvinar id facilisis ligula mollis. Nam elit libero, tincidunt ut aliquam at, molestie in quam. Aenean rhoncus vehicula hendrerit.

Chapter 13

Conclusion and further work

13.1 Main Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam ultricies lacinia euismod. Nam tempus risus in dolor rhoncus in interdum enim tincidunt. Donec vel nunc neque. In condimentum ullamcorper quam non consequat. Fusce sagittis tempor feugiat. Fusce magna erat, molestie eu convallis ut, tempus sed arcu. Quisque molestie, ante a tincidunt ullamcorper, sapien enim dignissim lacus, in semper nibh erat lobortis purus. Integer dapibus ligula ac risus convallis pellentesque.

13.1.1 Subsection 1

Nunc posuere quam at lectus tristique eu ultrices augue venenatis. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aliquam erat volutpat. Vivamus sodales tortor eget quam adipiscing in vulputate ante ullamcorper. Sed eros ante, lacinia et sollicitudin et, aliquam sit amet augue. In hac habitasse platea dictumst.

13.1.2 Subsection 2

Morbi rutrum odio eget arcu adipiscing sodales. Aenean et purus a est pulvinar pellentesque. Cras in elit neque, quis varius elit. Phasellus fringilla, nibh eu tempus venenatis, dolor elit posuere quam, quis adipiscing urna leo nec orci. Sed nec nulla auctor odio

aliquet consequat. Ut nec nulla in ante ullamcorper aliquam at sed dolor. Phasellus fermentum magna in augue gravida cursus. Cras sed pretium lorem. Pellentesque eget ornare odio. Proin accumsan, massa viverra cursus pharetra, ipsum nisi lobortis velit, a malesuada dolor lorem eu neque.

13.2 Main Section 2

Sed ullamcorper quam eu nisl interdum at interdum enim egestas. Aliquam placerat justo sed lectus lobortis ut porta nisl porttitor. Vestibulum mi dolor, lacinia molestie gravida at, tempus vitae ligula. Donec eget quam sapien, in viverra eros. Donec pellen-
tesque justo a massa fringilla non vestibulum metus vestibulum. Vestibulum in orci quis felis tempor lacinia. Vivamus ornare ultrices facilisis. Ut hendrerit volutpat vulputate. Morbi condimentum venenatis augue, id porta ipsum vulputate in. Curabitur luctus tempus justo. Vestibulum risus lectus, adipiscing nec condimentum quis, condimentum nec nisl. Aliquam dictum sagittis velit sed iaculis. Morbi tristique augue sit amet nulla pulvinar id facilisis ligula mollis. Nam elit libero, tincidunt ut aliquam at, molestie in quam. Aenean rhoncus vehicula hendrerit.

Chapter 14

Reflection

14.1 Main Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam ultricies lacinia euismod. Nam tempus risus in dolor rhoncus in interdum enim tincidunt. Donec vel nunc neque. In condimentum ullamcorper quam non consequat. Fusce sagittis tempor feugiat. Fusce magna erat, molestie eu convallis ut, tempus sed arcu. Quisque molestie, ante a tincidunt ullamcorper, sapien enim dignissim lacus, in semper nibh erat lobortis purus. Integer dapibus ligula ac risus convallis pellentesque.

14.1.1 Subsection 1

Nunc posuere quam at lectus tristique eu ultrices augue venenatis. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aliquam erat volutpat. Vivamus sodales tortor eget quam adipiscing in vulputate ante ullamcorper. Sed eros ante, lacinia et sollicitudin et, aliquam sit amet augue. In hac habitasse platea dictumst.

14.1.2 Subsection 2

Morbi rutrum odio eget arcu adipiscing sodales. Aenean et purus a est pulvinar pellentesque. Cras in elit neque, quis varius elit. Phasellus fringilla, nibh eu tempus venenatis, dolor elit posuere quam, quis adipiscing urna leo nec orci. Sed nec nulla auctor odio

aliquet consequat. Ut nec nulla in ante ullamcorper aliquam at sed dolor. Phasellus fermentum magna in augue gravida cursus. Cras sed pretium lorem. Pellentesque eget ornare odio. Proin accumsan, massa viverra cursus pharetra, ipsum nisi lobortis velit, a malesuada dolor lorem eu neque.

14.2 Main Section 2

Sed ullamcorper quam eu nisl interdum at interdum enim egestas. Aliquam placerat justo sed lectus lobortis ut porta nisl porttitor. Vestibulum mi dolor, lacinia molestie gravida at, tempus vitae ligula. Donec eget quam sapien, in viverra eros. Donec pellen-
tesque justo a massa fringilla non vestibulum metus vestibulum. Vestibulum in orci quis felis tempor lacinia. Vivamus ornare ultrices facilisis. Ut hendrerit volutpat vulputate. Morbi condimentum venenatis augue, id porta ipsum vulputate in. Curabitur luctus tempus justo. Vestibulum risus lectus, adipiscing nec condimentum quis, condimentum nec nisl. Aliquam dictum sagittis velit sed iaculis. Morbi tristique augue sit amet nulla pulvinar id facilisis ligula mollis. Nam elit libero, tincidunt ut aliquam at, molestie in quam. Aenean rhoncus vehicula hendrerit.

Appendix A

Appendix Title Here

Write your Appendix content here.

Bibliography

- [1] A. S. Arnold, J. S. Wilson, and M. G. Boshier. A simple extended-cavity diode laser. *Review of Scientific Instruments*, 69(3):1236–1239, March 1998. URL <http://link.aip.org/link/?RSI/69/1236/1>.
- [2] Carl E. Wieman and Leo Hollberg. Using diode lasers for atomic physics. *Review of Scientific Instruments*, 62(1):1–20, January 1991. URL <http://link.aip.org/link/?RSI/62/1/1>.
- [3] C. J. Hawthorn, K. P. Weber, and R. E. Scholten. Littrow configuration tunable external cavity diode laser with fixed direction output beam. *Review of Scientific Instruments*, 72(12):4477–4479, December 2001. URL <http://link.aip.org/link/?RSI/72/4477/1>.