





# Deusto

**Facultad de Ingeniería**  
Universidad de Deusto

**Ingeniaritza Fakultatea**  
Deustuko Unibertsitatea

## **Grado en Ingeniería Informática** **Informatikako Ingeniaritzako Gradua**

### **Proyecto fin de grado**

### **Gradu amaierako proiektua**

**Auzonet: Diseño e implementación de una  
red social para comunidades de vecinos**

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## **Abstract**

The lifestyle of today's society moves away the traditional contact between neighbors where is promoted the goods, services and information exchange between citizens. In addition, the growth of cities makes more difficult for councils and public institutions being aware of needs and concerns of the inhabitants.

Auzonet as digital platform focused on the residents, provides the perfect solution to neighbors providing a web platform to exchange relevant information and being a reliable data source for public institutions.

## **Keywords**

OpenData, Web, App, Social network.



# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Background and rationale</b>	<b>3</b>
2.1	Background . . . . .	3
2.1.1	Social network for neighborhoods . . . . .	3
2.1.2	Open Data . . . . .	4
2.2	Rationale . . . . .	6
<b>3</b>	<b>Goals and scope</b>	<b>7</b>
3.1	Project definition . . . . .	7
3.1.1	Functionality . . . . .	7
3.1.2	Limitations . . . . .	8
3.2	Description of the embodiment . . . . .	8
3.2.1	Development methodology . . . . .	8
3.2.2	Intermediate products . . . . .	9
3.2.3	Main tasks . . . . .	11
3.3	Organization . . . . .	31
3.3.1	Organizational structure . . . . .	31
3.3.2	Human resources plan . . . . .	32
<b>4</b>	<b>Planning</b>	<b>33</b>
4.1	Precedence diagram . . . . .	34
4.2	GANTT diagram . . . . .	36
4.3	Workload estimation by profile . . . . .	37
<b>5</b>	<b>Budget</b>	<b>39</b>

<b>6</b>	<b>Development</b>	<b>41</b>
6.1	Web application . . . . .	41
6.1.1	Software and Hardware requeriments . . . . .	41
6.1.2	Hardware specification . . . . .	42
6.1.3	Software specification . . . . .	42
6.1.4	Deployment considerations . . . . .	44
6.1.5	Issue management . . . . .	44
6.2	Responsive design and mobility . . . . .	44
6.3	Technology . . . . .	44
6.3.1	Hardware . . . . .	44
6.3.2	Software . . . . .	44
6.4	Tools . . . . .	47
6.4.1	Code editor . . . . .	47
6.4.2	Image editor . . . . .	47
6.4.3	Operating system . . . . .	47
6.4.4	Version control . . . . .	48
6.4.5	Testing . . . . .	48
<b>7</b>	<b>Conclusions and future work</b>	<b>49</b>
7.1	Data mining . . . . .	49
7.2	Conclusions . . . . .	49
7.3	Future lines of work . . . . .	49
<b>8</b>	<b>Bibliography</b>	<b>51</b>
<b>9</b>	<b>Acronyms</b>	<b>53</b>
<b>10</b>	<b>Acknowledgments</b>	<b>55</b>
<b>11</b>	<b>Agradecimientos</b>	<b>57</b>
<b>A</b>	<b>Planning2</b>	<b>59</b>
A.1	Precedence diagram2 . . . . .	60

## List of Figures

### Chapter 2

2.1	Nextdoor . . . . .	3
2.2	Goneighbour . . . . .	4
2.3	5 Star of Open Data . . . . .	5
2.4	WeLive Project . . . . .	5

### Chapter 3

3.1	EDT . . . . .	10
3.2	Task 1 . . . . .	11
3.3	Task 2.1. . . . .	12
3.4	Task 2.2. . . . .	13
3.5	Task 2.3. . . . .	14
3.6	Task 2.4. . . . .	15
3.7	Task 2.5. . . . .	16
3.8	Task 2.6. . . . .	17
3.9	Task 2.7. . . . .	18
3.10	Task 2.8. . . . .	19
3.11	Task 2.9. . . . .	20
3.12	Task 2.10. . . . .	21
3.13	Task 2.12. . . . .	22
3.14	Task 2.13. . . . .	23
3.15	Task 2.14. . . . .	24
3.16	Task 2.15. . . . .	25
3.17	Task 2.16. . . . .	26
3.18	Task 3.1. . . . .	27
3.19	Task 3.2. . . . .	28
3.20	Task 3.3. . . . .	29
3.21	Task 4. . . . .	30

3.22 Organizational schema . . . . .	31
3.23 Template meeting act . . . . .	32
<b>Chapter 4</b>	
4.1 Precedence diagram . . . . .	34
4.2 GANTT diagram . . . . .	36
<b>Chapter A</b>	
A.1 Precedence diagram . . . . .	60



**List of Tables**

**Chapter 3**

3.1 Ticket categories. . . . .	9
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**Chapter 5**

5.1 Budget by profile. . . . .	39
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## **Algorithm Index**



## 1. INTRODUCTION

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The aim of this project is create an online social platform for benefit different parties, on the one hand, the Bilbao's council citizens, building a meeting point in the community for posting warnings or relevant information with other people living in the same neighborhood, and publishing requests or offers to help among them.

On the other hand, the information generated by the platform usage can be a source of high-quality data for council's services improvement, allowing these institutions to take better decisions for improve the life quality of the city.

This project must be developed using resources of European project WeLive [**WeLive**] which DeustoTech [**DeustoTech**] MORElab [**Morelab**] belongs to, using their libraries and programming interfaces for obtaining Bilbao's council Open Data.

WeLive is a web platform to promote OpenData in institutions created by several European entities that provides a range of services for developers and public entities to facilitate Open Data usage in third-party applications.

The main challenges will tackle this project are:

- Create a social web platform easy to use to promote users collaboration.
- Add value to the platform using public datasets.
- Learn to develop a full-stack web and mobile application.

In addition, during the development may be necessary develop new reusable software components for allow WeLive custom integrations and make it available in the application repository of WeLive platform.

This project will need technical and interpersonal skills to achieve good collaboration between WeLive and Auzonet teams to build the best quality software.

To carry out major development of the project, will be used a web framework for building the web application with maximum code reuse and better efficiency, for developing mobile application, a portable version of the web will be embedded using multi-platform deployment tools.

The previously mentioned tools add the challenge of make a web design responsive for adapt all visual components to different smartphone's screen sizes and learn how to communicate applications via API's that requires WeLive to interact with public data.

All phases of development will put in manifest the knowledge acquired during the university degree and require new technical and theoretical skills.

This document describes the project, how has be planned, developed, the objectives and procedures to make good usage of public data released by institutions adding value to services offered by cities to citizens.

## *1. INTRODUCTION*

In the development chapter internal process will be explained in detail, reasoning the tools finally used and the why has been chosen, the project structure and possible functional divisions of software components, design and requirements.

Finally, the last chapter include conclusions found throughout the entire process of creation and improvements to the platform for future updates.

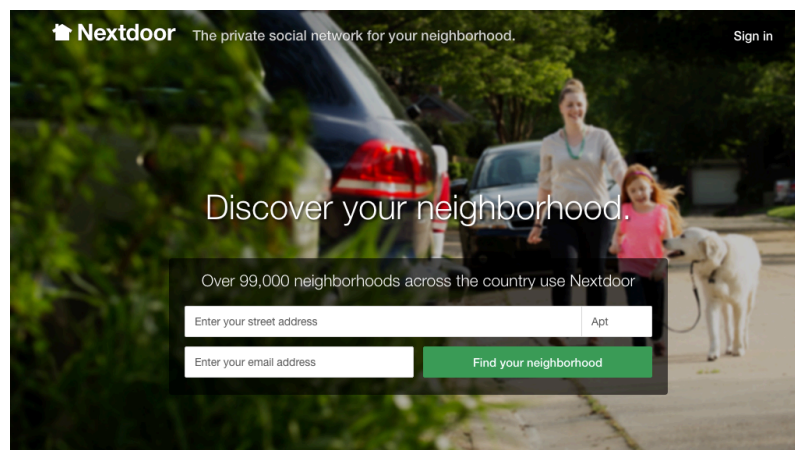
## 2. BACKGROUND AND RATIONALE

### 2.1. BACKGROUND

The aim of this project is create a social network for neighbors, using public data for avoiding error during users registration and making good usage of public datasets, but as can be seen in the following state of art study, this is not the first initiative taken in this field.

#### 2.1.1 Social network for neighborhoods

Creating a social network for neighbors in which all members of a portal or community can interact with each other by sharing resources and information is not a new initiative, in other countries like Germany or United States similar projects [larazon] have been developed, internet has extended the creation of communities of all kinds of areas, however, the already existing proposals rarely get benefit of the public entities data, and in many cases, they are the most reliable source of information for building applications and services for citizens.



Nextdoor is the private  
social network for your



Figure 2.1: Nextdoor. Existing alternative in USA.

Nextdoor is a service only for USA neighborhoods created in California working since 2010, and the most remarkable features are:

- Meeting point for find possible babysitters.
- Chats of different topics in each neighborhood.

## 2. BACKGROUND AND RATIONALE

- Exchange point for goods or services.
- Shared garages management.

There is no revenue currently coming from the service and is completely free of charge, the project is supported by venture capital firms and they are still looking for a way of making revenue that benefits both users and creators not specified yet.

Nextdoor has been recommended by many famous publications like New York Times, CNN and Wall Street Journal, what definitely demonstrate the feasibility of these solutions for neighborhoods.

Recently, this platform has extended his coverage expanding to Netherlands, outside of the USA.

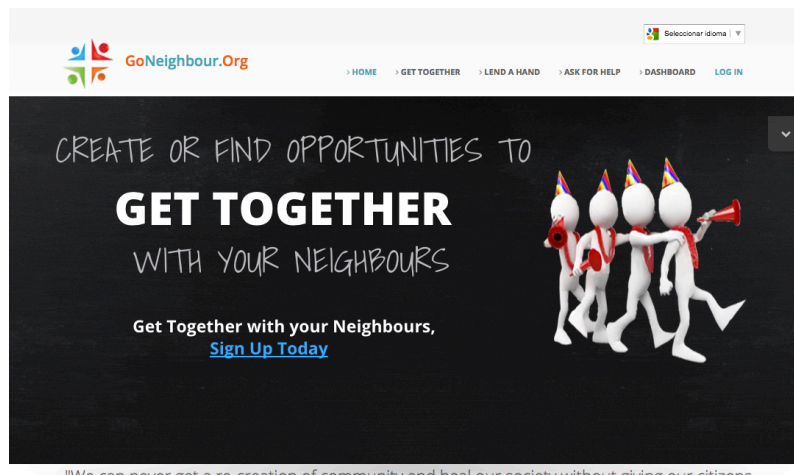


Figure 2.2: Goneighbour, Canadian alternative to Nextdoor

GoNeighbour is another social network with neighborhoods in mind, created in Canada with less market share, and similar features, trying to port the Nextdoor experience exclusive from USA to Canada, but making an emphasis on creating a market of goods by neighbors.

### 2.1.2 Open Data

As we have seen, there are a growing tendency of internet neighborhood communities, but all the previously mentioned use geolocation or has his own database of addresses, this is the essential difference with Auzonet. Auzonet takes advantage of data released by public organizations like Bilbao's council for offering data consistency and provide precise information.

Firstly, is important to analyze how is categorized Open Data. Tim Berners-Lee, the inventor of the Web and Linked Data initiator, suggested a 5-star deployment scheme for Open Data [ODStars].

As we can see in the image 2.3, Open Data is classified by how data is accessible by human or computers. Along this project, the data source is categorized as three stars because is publicly available of Bilbao's council data web platform [Bilbao Open Data] in structured format without proprietary extension<sup>1</sup>.

Although it is true that currently, many public entities make available this data in digital format only by the look of transparency and are unaware of the true value of themselves, is one of the

<sup>1</sup>Bilbao's council data is provided in CSV and later converted to JSON via WeLive API



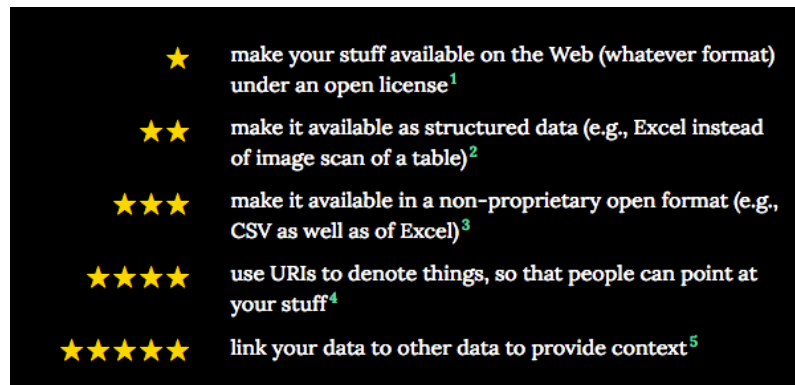


Figure 2.3: 5 Star of Open Data

motivation of this project, in fact, have been moments during the development in which the data found poorly formatted and have had to request modifications to the agencies involved.

The fact that most of datasets that are published by public organizations are not used in systems created by third parties, causes certain unconcern in the status and integrity of them.

## WeLive Project



Figure 2.4: WeLive Project

WeLive is an EU H2020 funded project, addressing ICT-enabled open government – INSO1 topic, about a new concept of public administration based on citizen co-created mobile urban services.

The project is conceived to transform the current approach towards e-government by providing a new open model oriented towards the design, production and deployment of public services based in the collaboration of a quadruple helix, i.e. research organizations, companies, public administrations and citizens. WeLive will provide a novel We-Government ecosystem of tools (Live) built on the Open Data, Open Services and Open Innovation paradigms that is easily deployable in different public administrations and which promotes co-innovation and co-creation of personalized public services through public-private partnership and the empowerment of all the stakeholders to actively take part in the value-chain of a municipality or a territory. **[WeLive]**

The city of Bilbao, is one of the four pilot cities selected for the project, thanks to the process of urban regeneration addressing the physical decline of the city after being highly dependent of shipbuilding and steel industry.

The WeLive initiative in Bilbao is being carried out by several companies and research centers where University of Deusto and DeustoTech are in.

## *2. BACKGROUND AND RATIONALE*

This project, attend one of the proposals made in smart cities context and tries to add value to Bilbao's citizenship experience.

### **2.2. RATIONALE**

Internet social networks are quite common today, and neighborhood based ones are not an exception, this project aims to get the best advantages of social networks and Open Data, creating a platform to exchange goods, services or information among neighbors.

Furthermore, the project brings a high learning value of web applications development and also serve as an example of how based on WeLive project, can be created third party applications getting advantage of public data published by institutions and easily accessed via WeLive platform tools.

The project will face the challenge of creating responsive web applications easily usable on all mobile platforms like smartphones or tablets using modern web technologies and standards.

## 3. GOALS AND SCOPE

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### 3.1. PROJECT DEFINITION

Auzonet must meet the expectations of at least two types of users:

**Citizen:** It is the primary user of the system and the beneficiary of the features offered by the platform and the source of the information that the system creates for later exploitation.

**Public institution:** It who analyze the data generated by the platform for statistics and promoting services that improve the quality of life in cities and people.

To achieve this it will develop:

- A web application where users can register their neighborhood based on existing data published by the council of Bilbao, the rest of neighbors interested can join to it and get benefit from its functions.
- A mobile application that lets you interact with the main functions of the web from a smartphone.

#### 3.1.1 Functionality

Users can search their portal through an interactive form based on the existing neighbors and streets of the city of Bilbao, for better confirmation of the place, a small map showing the exact situation of the door will be displayed, if the information is correct, a few settings should be configured like the privacy level of the community having the option to protect it with a password or add a few lines of welcome message to new members via mail.

Each user can belong to more than one community of neighbors, considering that they may want to be aware of the community of their usual residence and for example the holidays.

Each neighborhood community represented in the application has its own home page where you can see the cork with warnings or information notes published and a lower table divided into two sections called Requests and Offers where will be displayed the posts created by members of that community.

From the home page of each community, the user can create a request for a product or service or to publish an offer in which can specify whether you want to get paid or offer the service for free.

To ensure some confidence when working with another user, a karma level system represented by a numeric value that is higher or lower by other users' past reviews determine the trust level of each user.

### 3. GOALS AND SCOPE

#### 3.1.2 Limitations

Auzonet never going to manage payments among individuals, beyond the simple fact of a history of interactions between requests and offers between neighbors. Interested parties should agree on a transaction which methods used to pay if they require and have the complete responsibility for ensuring the successful transaction in a legal economic frame.

Will be the users themselves who in case to use the platform will have to register their portal in the section for creating communities to make use of the software functions.

There are no plans to develop applications with the native development kit of each mobile operating system for avoiding multiple processes of simultaneous development during the creation of the mobile application, web technologies to deploy the application available on the market will be used.

## 3.2. DESCRIPTION OF THE EMBODIMENT

### 3.2.1 Development methodology

The realization of Auzonet is separated in two main functional units, first will focus on finalizing the web application and then mobile app.

As can be seen in the figure 3.1 the development phases are going to be the following:

**Requirements:** Analysis of the main functional requirements.

**Design:** Design data and logical structures needed for running the application and approach to the aesthetic design of the solution.

**Web application development:** Implementation process of the main application, with Wlive project integration and "responsive" design for fitting on different screen sizes.

**Mobile application development:** Implementation process of mobile application that get benefits of the "responsive" design of the web application.

**Tests:** Different executions by end users and bug detection on the feature usage processes for debugging, It will try to involve collaborators and friends of the programmer for making real usage of the platform.

Being a project that involves only one developer will not be used agile methodologies that facilitate cooperation and teamwork, instead, a system of lists of tickets with different classifications will be used in a task manager software.

Tasks are classified as follows:

Table 3.1: Ticket categories.

Category	Description
Functional	Features that represent the core of the application.
Not functional	Features that enrich the user experience.
Bug	Faults to debug.
Improvement	Suggestions or new functionalities that add value to the platform.

Sometimes, certain tasks can come from external sources such as suggestions for improvement or major deficiencies found in a test, in that case, they are added to the list with the corresponding label and prioritized according to their importance.

### 3.2.2 Intermediate products

- Web application.
- Public data integrated via WeLive platform.
- Mobile application.

### 3. GOALS AND SCOPE

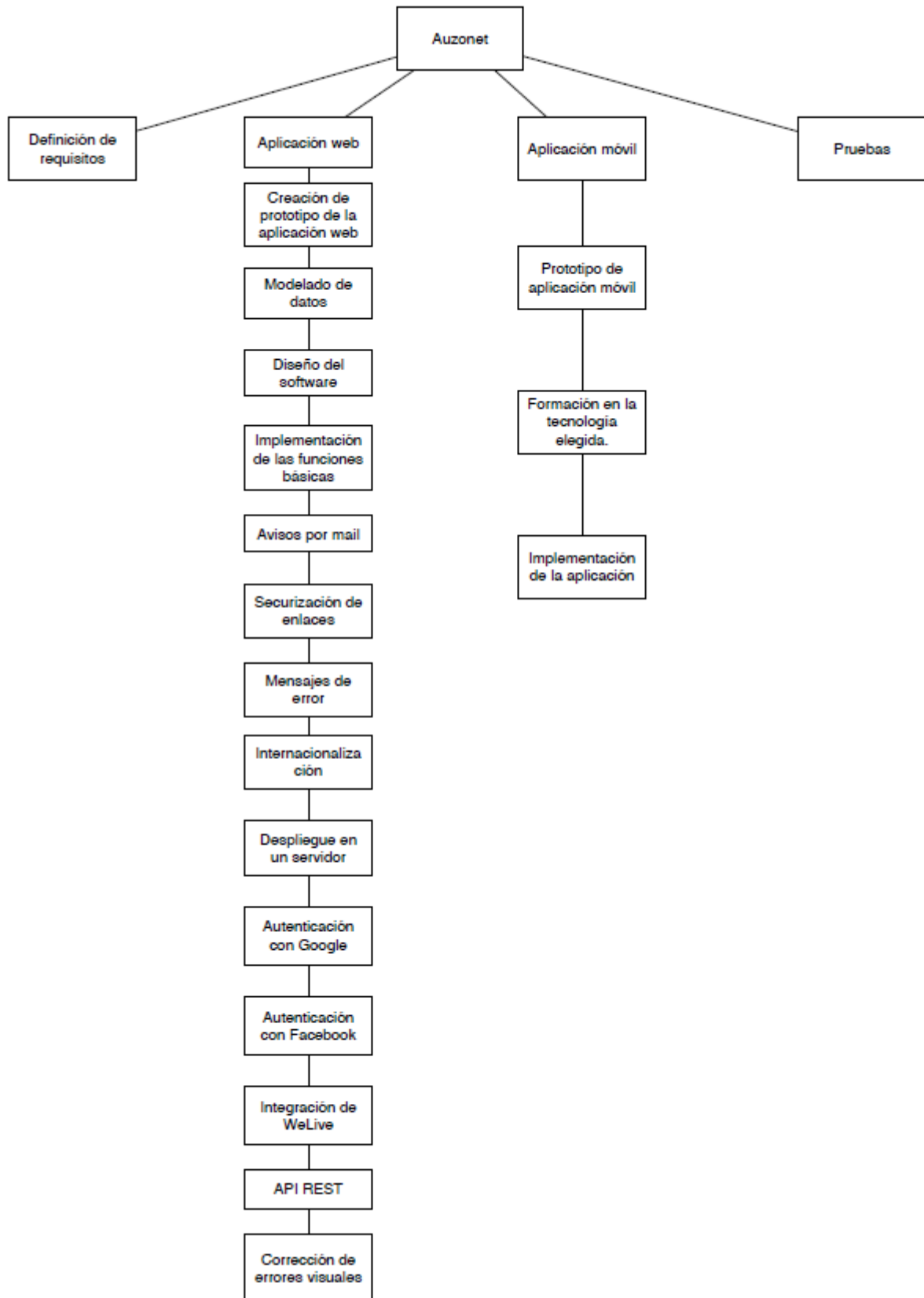


Figure 3.1: EDT

### 3.2.3 Main tasks

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 1  <b>Descripción:</b> Definición de requisitos	<b>Duración:</b> 5 días.
	<b>Esfuerzo:</b> 15 horas.
	<b>Tareas previas:</b>
<b>Criterios de terminación:</b>  Concretar un documento formal donde se incluyan las características que va a cumplir el software y de qué forma van a estar implementadas. Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador _____ _____ _____ _____
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo de aplicaciones web y móviles y almacenamiento en la nube.	

Figure 3.2: Task 1

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea: 2.1</b>  <b>Descripción:</b> Creación de un prototipo de la aplicación web navegable y que muestre todas las secciones que va a disponer una vez acabada.	<b>Duración:</b> 5 días.
	<b>Esfuerzo:</b> 15 horas.
	<b>Tareas previas:</b>  1
<b>Criterios de terminación:</b>  Disponer de un prototipo creado con alguna herramienta de prototipado rápido que permita hacerse una idea de la apariencia final de la aplicación.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador  Software de prototipado
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo de aplicaciones web y móviles y almacenamiento en la nube.	

Figure 3.3: Task 2.1.



HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.2  <b>Descripción:</b> Modelado de datos en un esquema relacional.	<b>Duración:</b> 3 días.
	<b>Esfuerzo:</b> 9 horas.
	<b>Tareas previas:</b>  1
<b>Criterios de terminación:</b>  Confeccionar un esquema de base de datos relacional donde se especifiquen todas las entidades que se van a emplear en el software.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de bases de datos relacionales.	

Figure 3.4: Task 2.2.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea: 2.3</b>  <b>Descripción:</b> Diseño del software.	<b>Duración:</b> 5 días.
	<b>Esfuerzo:</b> 15 horas.
	<b>Tareas previas:</b> 3 4
<b>Criterios de terminación:</b>  Confeccionar esquemas UML de la interacción de las clases de código en la aplicación.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de UML.	

Figure 3.5: Task 2.3.

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.4  <b>Descripción:</b> Implementación de las funciones básicas del portal. <ul style="list-style-type: none"> <li>- Publicar peticiones.</li> <li>- Publicar necesidades.</li> <li>- Establecer acuerdos de colaboración entre usuarios.</li> <li>- Creación de página de perfil de usuario.</li> </ul>	<b>Duración:</b> 15 días.
	<b>Esfuerzo:</b> 45 horas.
	<b>Tareas previas:</b> 5
<b>Criterios de terminación:</b>  Disponer de una aplicación web ejecutada en un servidor de desarrollo con las funciones previamente descritas.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.6: Task 2.4.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.5  <b>Descripción:</b> Creación de un sistema de usuarios capaz de generar perfiles personales y datos asociados a cada cuenta.	<b>Duración:</b> 6 días.
	<b>Esfuerzo:</b> 18 horas.
	<b>Tareas previas:</b> 5 6
<b>Criterios de terminación:</b>  Acceso a las funciones del portal bajo usuario y contraseña garantizando seguridad en las acciones.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.7: Task 2.5.

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.6  <b>Descripción:</b> Implementación de notificaciones por email de las acciones en la web relativas a cada usuario.	<b>Duración:</b> 3 días.
	<b>Esfuerzo:</b> 9 horas.
	<b>Tareas previas:</b> 7
<b>Criterios de terminación:</b>  Que la aplicación sea capaz de enviar emails debidamente formateados a los usuarios informando de la actividad en sus publicaciones.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.8: Task 2.6.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.7  <b>Descripción:</b> Securización de enlaces, de forma que un usuario ajeno a un acuerdo, no pueda interferir él ni realizar modificaciones alterando los enlaces del navegador.	<b>Duración:</b> 1 día.
	<b>Esfuerzo:</b> 3 horas.
	<b>Tareas previas:</b>  6
<b>Criterios de terminación:</b>  Haber establecido una comprobación en todas las acciones del portal acerca del usuario que está registrado en cada momento.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.9: Task 2.7.

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.8  <b>Descripción:</b> Mensajes de error en las situaciones de excepción de forma que el usuario sepa en todo momento el comportamiento de la aplicación.	<b>Duración:</b> 1 día.  <b>Esfuerzo:</b> 3 horas.
<b>Criterios de terminación:</b>  Controlar todos los casos en los que un usuario puede producir una situación de error en el sistema y mostrar un mensaje acorde.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Tareas previas:</b>  6
	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.10: Task 2.8.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea: 2.9</b>  <b>Descripción:</b> Internacionalización, localizar todas las cadenas de texto en español y en inglés habilitando un portal multilingüe.	<b>Duración:</b> 2 días.
	<b>Esfuerzo:</b> 6 horas.
	<b>Tareas previas:</b> 10 8 6
<b>Criterios de terminación:</b>  Disponer de un control para cambiar el idioma de la aplicación y poder leer la interfaz en al menos dos idiomas.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.11: Task 2.9.



HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea: 2.10</b>  <b>Descripción:</b> Despliegue en el servidor en la nube accesible a internet.	<b>Duración:</b> 4 días.
	<b>Esfuerzo:</b> 12 horas.
	<b>Tareas previas:</b> 6 8 11
<b>Criterios de terminación:</b>  Disponer de una dirección web accesible en internet donde esté alojada la aplicación de forma definitiva.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web y herramientas en la nube.	

Figure 3.12: Task 2.10.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.12  <b>Descripción:</b> Autenticación con Google.	<b>Duración:</b> 2 días.
	<b>Esfuerzo:</b> 6 horas.
	<b>Tareas previas:</b>  6
<b>Criterios de terminación:</b>  Habilitar la opción de registrarse nuevos usuarios con una cuenta de Google existente.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web y APIs de seguridad.	

Figure 3.13: Task 2.12.

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.13  <b>Descripción:</b> Autenticación con Facebook.	<b>Duración:</b> 2 días.
	<b>Esfuerzo:</b> 6 horas.
	<b>Tareas previas:</b> 6
<b>Criterios de terminación:</b>  Habilitar la opción de registrarse nuevos usuarios con una cuenta de Facebook existente.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web y APIs de seguridad.	

Figure 3.14: Task 2.13.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.14  <b>Descripción:</b> Integración con la plataforma WeLive para ganar acceso a la información de portales de Bilbao.	<b>Duración:</b> 2 días.
	<b>Esfuerzo:</b> 6 horas.
	<b>Tareas previas:</b>  6
<b>Criterios de terminación:</b>  Poder disponer de un selector de las comunidades existentes en Bilbao de vecinos en la hoja de registro de la comunidad.  Validado por: Diego López-De-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web y API de WeLive.	

Figure 3.15: Task 2.14.

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.15  <b>Descripción:</b> Creación de una API para la comunicación con una aplicación móvil.	<b>Duración:</b> 4 días.
	<b>Esfuerzo:</b> 12 horas.
	<b>Tareas previas:</b>  6  12
<b>Criterios de terminación:</b>  Disponer de una serie de direcciones desde donde un usuario móvil pueda interactuar con la plataforma.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web y REST.	

Figure 3.16: Task 2.15.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 2.16  <b>Descripción:</b> Corrección de errores visuales en pantallas de alta densidad.	<b>Duración:</b> 1 día.
	<b>Esfuerzo:</b> 3 horas.
	<b>Tareas previas:</b> 12
<b>Criterios de terminación:</b>  Disponer de una correcta disposición de los elementos de la interfaz incluso en pantallas de alta densidad de píxeles. Validado por: Aitor Brazaola (Analista) Responsable: Diseñador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo web.	

Figure 3.17: Task 2.16.

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 3.1  <b>Descripción:</b> Prototipo de la aplicación móvil.	<b>Duración:</b> 1 día.
	<b>Esfuerzo:</b> 3 horas.
	<b>Tareas previas:</b> 1
<b>Criterios de terminación:</b>  Disponer de un prototipo rápido de funcionamiento de una aplicación móvil para manejar las funciones principales del portal.  Validado por: Diego López-de-Ipiña (Jefe de proyecto) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador  Software de prototipado
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo móvil.	

Figure 3.18: Task 3.1.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 3.2  <b>Descripción:</b> Formación en la tecnología elegida para el desarrollo de la versión móvil.	<b>Duración:</b> 4 días.
	<b>Esfuerzo:</b> 12 horas.
	<b>Tareas previas:</b> 21
<b>Criterios de terminación:</b>  Realización completa de un tutorial corto de introducción a la herramienta.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo móvil.	

Figure 3.19: Task 3.2.



HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario <b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 3.3  <b>Descripción:</b> Implementación de la aplicación móvil.	<b>Duración:</b> 15 días.
	<b>Esfuerzo:</b> 45 horas.
	<b>Tareas previas:</b> 22
<b>Criterios de terminación:</b>  Aplicación instalada en un dispositivo de pruebas con las funciones requeridas funcionando.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Programador  Smartphone de pruebas
<b>Competencias, conocimientos y notas:</b> (3)  Conocimientos de desarrollo móvil.	

Figure 3.20: Task 3.3.

### 3. GOALS AND SCOPE

HOJA DE TAREAS	
<b>Nombre:</b> (1) Aitor Brazaola Vicario	
<b>Fecha:</b> (2) 11/01/2016	
<b>Identificación de Tarea:</b> 4  <b>Descripción:</b> Pruebas de la aplicación móvil y la aplicación web.	<b>Duración:</b> 4 días.
	<b>Esfuerzo:</b> 12 horas.
	<b>Tareas previas:</b> 2 20 17
<b>Criterios de terminación:</b>  Ofrecer usar las aplicaciones a al menos tres personas ajenas al desarrollo.  Validado por: Aitor Brazaola (Analista) Responsable: Programador	<b>Recursos:</b> (4)  Ordenador portátil  Smartphone de pruebas
<b>Competencias, conocimientos y notas:</b> (3)  Experiencia durante el desarrollo del producto para identificar los posibles fallos que aparezcan.	

Figure 3.21: Task 4.

### 3.3. ORGANIZATION

#### 3.3.1 Organizational structure

The organization as can be seen in the figure 3.22, is composed by the Project manager, and the student who perform the roles of programmer and designer.

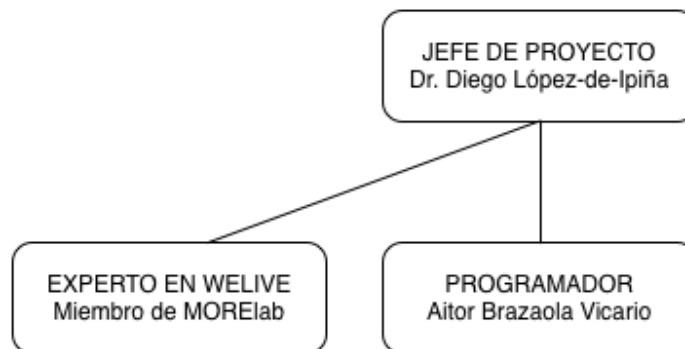
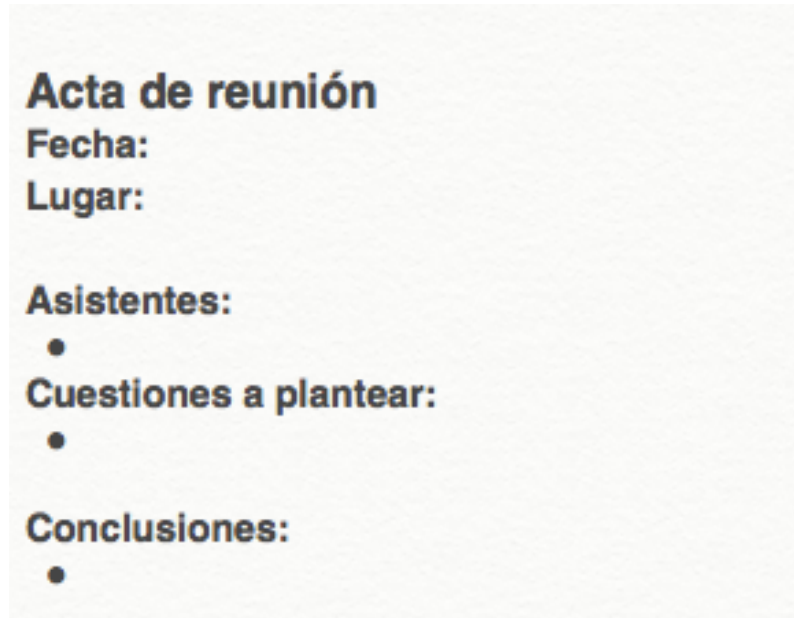


Figure 3.22: Organizational schema

Every two weeks there will be a session for reviewing the work done and the necessary changes will be assessed and if the product is already to consider as a functional unit.

### 3. GOALS AND SCOPE

The main assistants will be the programmer and the project manager, the details exposed will be gathered in the meeting act, the template used for this proposal can be seen in the figure 3.23, and will be prioritized over the rest of the features in the pipeline, avoiding develop in an incorrect way.



The image shows a template for a meeting act (Acta de reunión) on a light gray background. The text is in a bold, dark blue font. The sections are: 'Acta de reunión', 'Fecha:', 'Lugar:', 'Asistentes:' followed by a bullet point, 'Cuestiones a plantear:' followed by a bullet point, and 'Conclusiones:' followed by a bullet point.

Figure 3.23: Template meeting act

#### 3.3.2 Human resources plan

The student will be the unique physical person in the development team but will be necessary the acquisition of various roles along the project, it is true that un punctual cases can be helped by other mates of the laboratory where is working on, but the most of the project is developed by him. Following, there are listed the main roles played by the student:

**Programmer:** It is responsible for creating all the logic of the program and perform the different configurations in the devices responsible for the platform work. Its functions also cover the early stages of software design, data schema creation and conduct appropriate tests to detect errors.

**Designer:** It is commissioned to design a user interface that fits all available screens and make the application accessible to people with disabilities and ensure a satisfactory user experience and consistent navigation between different sections of the web.

In addition to the student, the project has its project manager who is responsible for approving all changes and proposals that the student considers interesting to improve the product, will be present at the meetings and will be responsible for marking the milestone dates.



## 4. PLANNING

#### 4.1. PRECEDENCE DIAGRAM

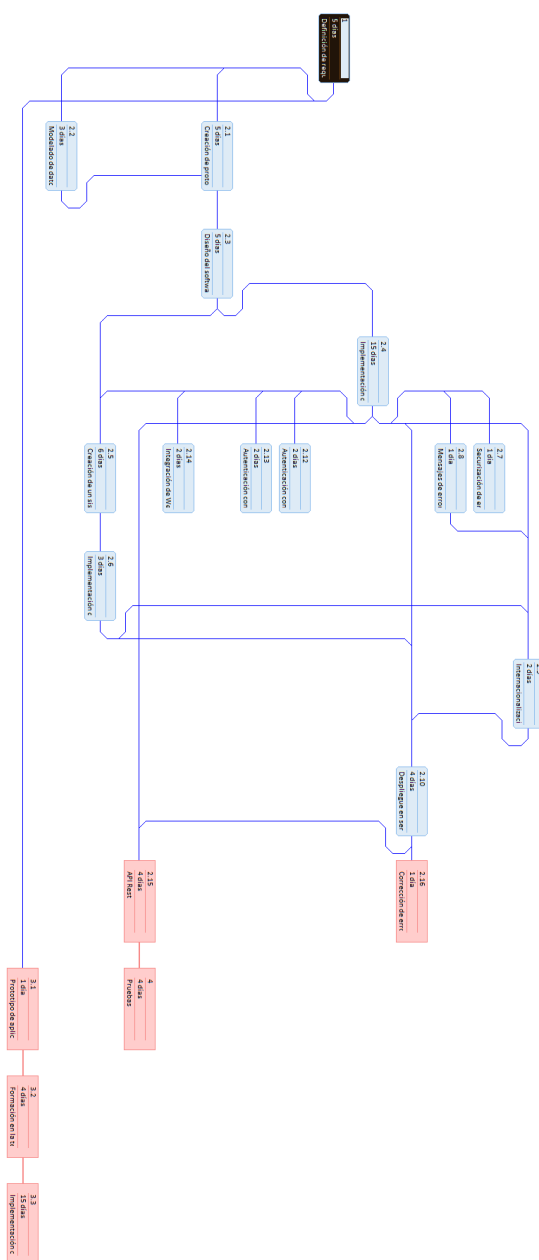


Figure 4.1: Precedence diagram

The project development is going to happen during the working time in DeustoTech MORElab of 4 daily hours, and the team will be formed by the following actors:

**Programmer:** Person in charge of programming the control structures of the platform.

**Designer:** Person in charge of the final appearance with the end user will interact.

**Project manager:** Person in charge of monitoring the progress of the project and its organization.

**Experto en plataforma WeLive:** MoreLab team member participating in the development of technical advice WeLive platform for the team.

## 4. PLANNING

### 4.2. GANTT DIAGRAM

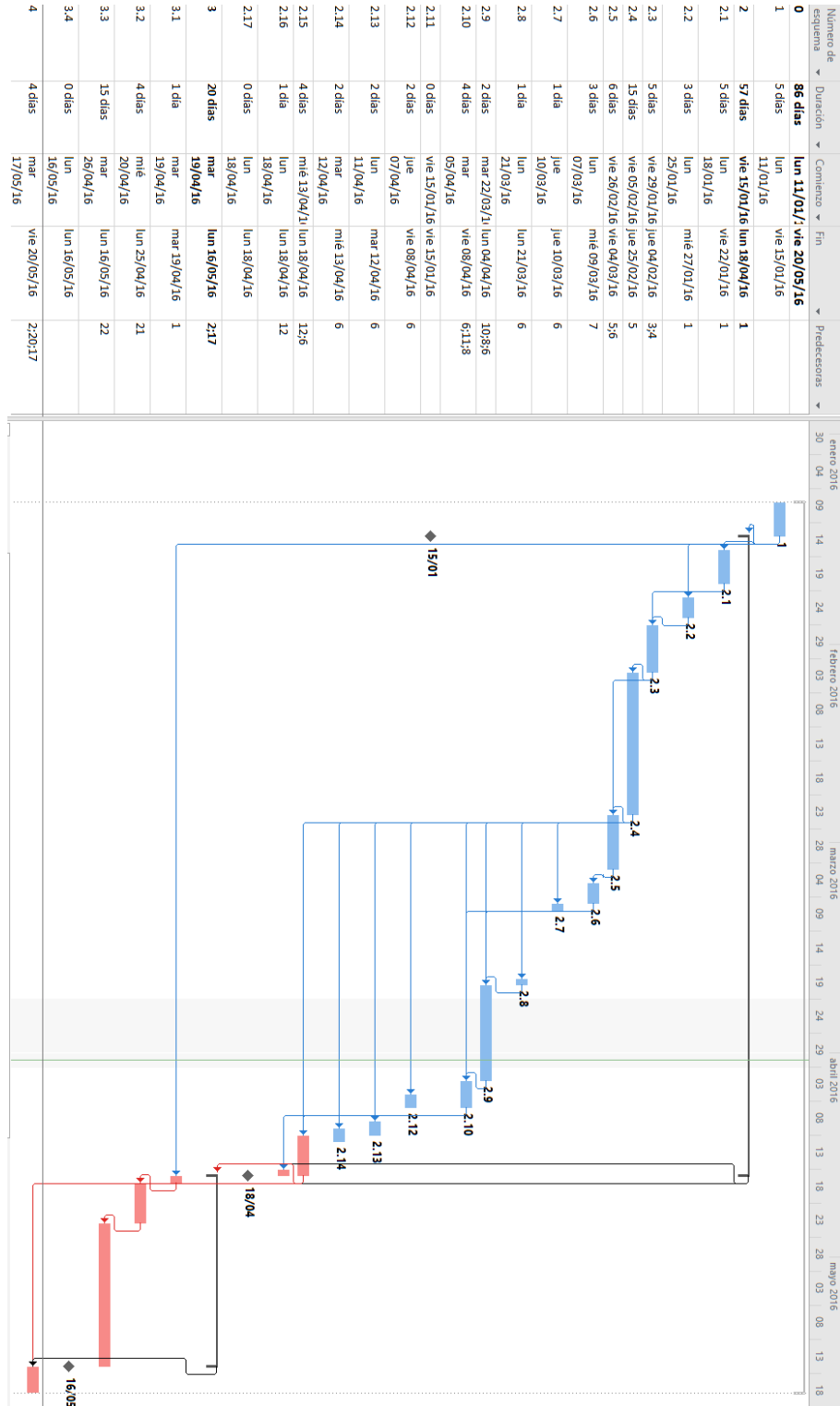


Figure 4.2: GANTT diagram



### 4.3. WORKLOAD ESTIMATION BY PROFILE

The following estimation is based on the different profiles of the total 255 hours:

**Programmer:** 215 hours.

**Designer:** 22 hours.

**Project manager:** 15 hours.

**WeLive platform expert:** 3 hours.

- 1. Requirements definition: 15 hours.
- 2. Web application: 168 hours.
  - 2.1. Web application prototype: 15 hours.
  - 2.2. Data modeling: 9 hours.
  - 2.3. Software design: 15 hours.
  - 2.4. Implementation of the core features: 51 hours.
  - 2.5. Users system creation: 18 hours.
  - 2.6. Implementation of mail notifications: 15 hours.
  - 2.7. Link security checks: 3 hours.
  - 2.8. Friendly error messages: 3 hours.
  - 2.9. Internationalization: 6 hours.
  - 2.10. Server deployment: 12 hours.
  - 2.13. Visual customization and logo: 6 hours.
  - 2.14. WeLive API integration: 12 hours.
  - 2.16. High density displays visual fixes: 3 hours.
- 3. Mobile application: 60 hours.
  - 3.1. Mobile application prototype: 3 hours.
  - 3.2. Learning the selected technology for development: 12 hours.
  - 3.3. Mobile app implementation: 45 hours.
- 4. Tests: 12 hours.



## 5. BUDGET

The budget will take into account only the hours of work because the necessary equipments are already owned by the programmer and DeustoTech facilities where the project is located.

Table 5.1: Budget by profile.

<b>Profile</b>	<i>Workload</i>	<i>Cost</i>	<i>Price</i>
Programmer	255 h.	9€/h.	2295€
Designer	22 h.	9€/h.	198€
Project manager	12 h.	50€/h.	600€
WeLive platform expert	3 h.	6€/h.	18€
<b>TOTAL</b>			<b>3.111€</b>



## 6. DEVELOPMENT

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The main section of the development is going to be for the web application, the part of the project with more effort, and technologies involved in development, then, the mobile application as a derivative product from the web app will be explained in detail reasoning the technologies used with their advantages and drawbacks.

Both products has been submitted to testing with collaborators and the process of the tests will be detailed, finally a user manual will be included for helping to use all functionality implemented by the platform.

### 6.1. WEB APPLICATION

#### 6.1.1 Software and Hardware requeriments

The application must have a good user interface, allowing users from all ages for using it with less effort, furthermore, the application must make a good usage of the public data of the Bilbao's council provide using WeLive platform.

##### Software requirements

- All communities existing on Bilbao must be available for register in the platform.
- The communities must have a common place to exchange information among members.
- The users information must be protected with security measurements for avoiding data stealing or spam.
- Users can post or attend offers among them.
- Users can post or attend requests among them.
- Users can set an access password to communities for avoid external viewers.
- Users can belong to more than once community.
- There have to exist a way for measure the trustfulness of each user in the community, a reputation system.
- There have to exist a mail notification system in real time for the activity in each community.
- The look and feel of the platform should fit to different sizes of screen.

##### Hardware requirements

- The application must run on MORElab servers.

## 6. DEVELOPMENT

- The performance of the application must be smooth and fast on every web browser.
- The platform must have a smartphone application.
- The platform must be able to manage a huge quantity of request concurrently with no fault.
- No new hardware than the already existing on MORElab must be need.

### 6.1.2 Hardware specification

For fulfilling the previous requirements and taking advantage of the web server technology already available on MORElab, the server where the application is deployed belongs to the laboratory and the same domain of MORElab applications is used. The application is accessible on <http://apps.morelab.deusto.es/auzonet>

The hardware requirements are going to fit the existing hardware shared for other applications developed on MORElab, specifically, in the server called "Olentzero" with the following specifications:

- Intel(R) Xeon(R) CPU E5-2430 @ 2.20GHz
- 16 GB RAM
- 1TB Hard disk

Deploying here the application where already have available a complete software environment of web dependencies save time reusing already existing modules.

### 6.1.3 Software specification

The web application running on "Olentzero" server must have the following software installed for correct performance:

**Ubuntu Server 14.04.4 LTS:** Open Source operating system running on "Olentzero" server.

**Python 2.7 or newer:** Python is a widely used high-level, general-purpose, interpreted, dynamic programming language.

**Django framework 1.9:** Develop the web application

**gunicorn:** Python WSGI HTTP server for UNIX to serve the web application

**nginx:** A free, Open-Source, high-performance HTTP server and reverse proxy for serve the static and media files.

**pip:** A python package manager for install python packages in the virtual environment.

**supervisord:** A client/server system to monitor and control processes on UNIX-like operating systems for monitoring the gunicorn instance that serves the web application.

**virtualenv:** A tool to create isolated python environments for create an isolated environment for developing and deploying purposes, without library conflicts.

**virtualenvwrapper:** A set of extensions to virtualenv for ease the use of virtualenv through the command line.

**MySQL:** For storing the data.

Django is a modular web framework extensible via applications, which are basically plugins that add to the core functionality of Django special features, in Auzonet development, has been installed the following ones:

**django-bootstrap:** For native integration of front-end library Twitter Bootstrap.

**django-bower:** For manage all the front-end packages and libraries.

**django-favicon:** For generating and inject the appropriate sizes of favicons in different browsers.

TODO: A schema of how the software layers are on top o the other.

## Back-end

Auzonet, has some administration functionality on a separate web in the same server, accessible in the URL <http://apps.morelab.deusto.es/auzonet/admin> with an admin account, there are the management console in which is possible to manage all tables on the database schema.

Some features considered advanced, are only possible to perform here, contacting with the admin of the site. For example:

- Setting new categories for requests and offers.
- Change details of already registered users and communities.
- Remove user accounts.
- Resetting passwords.

In the last chapter are included ways to implement some of the mentioned options in the public user interface, but by the moment, only the features that has been considered essential has been implemented.

## User registration process

When a new user is registered in Auzonet, a tiny wizard starts asking him if is searching an already created community or wants to register one for the first time, in case of registering a new one, the form displayed will gather data directly from Bilbao's council public data for showing the neighbors selection drop downs.

A set of subsequent AJAX calls to WeLive REST API are performed for obtaining the data.

TODO: Show the code responsible of getting WeLive Data.

During the registration process, an email is sent to the user for confirming the set up of the new account and another one is sent when the community process creation has finished and the user belongs to it automatically.

After the portal selection process, the user can set a password to the community, that password is stored in the community table of the database and is necessary for allowing others to join into community.

## 6. DEVELOPMENT

From the user perspective that joins into a existing community, can select the community at the beginning of the process after registering from a drop down showing all registered ones, if the community is private, a password will be prompt, once the join process is finished, will receive an email with a custom welcome message set by the creator of the community.

TODO: Add a chart of the registration flow process.

### 6.1.4 Deployment considerations

As any other Django developed application, some steps have to be followed for setting a clean installation of Auzonet in a server

TODO: Put a network map

During the development on the student's laptop, the application has been using an SQLite database running on a local server, this type of database is inadequate because the technical limitations of performance, for ensuring a fast and reliably data access a MySQL database.

"Olentzero" as previously mentioned already have installed typical software used by Web Applications, and there is no need to install a new instance of it, only creating an specific schema for Auzonet and configure the settings file for accessing it is required.

### 6.1.5 Issue management

All changes and requests received during the development process of the project will be managed through the following procedure:

1. Communication via electronic support of the requested modification.
2. Request meeting with the project manager for decide if the change has to be implemented.
3. If so, assess the technical changes required on the platform before deploying.
4. If the changes are technically feasible and fit the budget and schedule, proceed to implementation.
5. Modify the work plan and budget.

## 6.2. RESPONSIVE DESIGN AND MOBILITY

## 6.3. TECHNOLOGY

### 6.3.1 Hardware

### 6.3.2 Software

The software involved in the development of this project is structured in the following blocks:

- Web application
  - Front-end
  - Back-end



- Mobile application

## **Web application: Front-end**

### **HTML5**

One of the requirements of the project was guarantee the maximum compatibility with the most common web browsers, because of that, for writing the views of the user interface, the last version of the HyperText Markup Language has been selected, HTML5 contain several improvements in the syntax that makes easier to develop and better for indexing in search engines, performance in rendering rich elements like videos and more.

HTML5 also come with more improvements that makes the template code cleaner easier to maintain, and provide certain characteristics that improve the smartphone page viewing, specially in this project, because of the technologies used for deploying in mobile devices, ensuring the best performance on smartphones is priority.

### **CSS3**

For achieving a clear structure in the front end code, taking account the importance of getting an attractive design, the code responsible of all the visuals has separated in different external CSS files, actually, the most part of the CSS classes belongs to Twitter Bootstrap front end framework, but in some parts of the web like the landing page, it was necessary to develop custom classes in custom files.

The decision to select version 3 of CSS is because as with HTML, this project also serve as learning proposal of the latest technologies for developing the future web, although is already know some feature incompatibilities in some browsers, the advantages in number of lines of code saving and new effects has taken more in account.

### **JavaScript**

Being the language most extended on web development, the election of this technology ensure maximum compatibility with almost every device on the market. All the logic placed on client side is programmed with this language, from the AJAX calls, to controlling the user interface animations along the application.

JavaScript makes easy to manage dynamically any element on the pages, and thanks to dynamic panels fired by JavaScript events has been saved a handle of HTML pages on this project.

The following JavaScript libraries has been used for improve the language capabilities:

**jQuery** To simplify most used web development JavaScript operations.

**jQuery UI** For adding a toolkit of user interface elements.

**jQuery numeric** For helping to avoid non-numeric input in some forms.

**Chart.js** For drawing charts.

### **Twitter Bootstrap**

Twitter Bootstrap is an easy way to provide good user experience through good user interface already built in CSS classes already created by experts in design, moreover, all their CSS classes

## 6. DEVELOPMENT

are responsive and prepared for represent contents in wide variety of screen sizes using media queries.

Some parts of the application are fully designed by the student, like the landing page or logo, but getting benefit of all the CSS classes designed by professionals in Twitter Bootstrap framework, help to get a more sophisticated and advanced look to the application.

TODO: logo de Twitter Bootstrap

### Bower

Today, the amount of libraries involved in a web development is huge, and keep the latest versions of each is a nightmare for programmers, with Bower, the libraries can be managed from repositories, and be installed, updated or removed with one command line.

As similar UNIX tools like apt-get on Linux, Bower unify the package dependence for web developments providing a same file structure for avoiding library reference errors in the HTML pages and keep a detailed log of all the operations related.

TODO: logo de Bower

### Web application: Back-end

Unlike the front-end there are high variety of programming languages and frameworks for server side, the most extended is PHP but the learning proposal of the project was learn building a real application a new language and framework for web development, PHP is a language with the student already had used during the degree and researching on internet, others with high capabilities are growing.

Along the research, the following technologies were taken account:

- Python with Django
- JavaScript with AngularJS
- Ruby with Ruby on rails
- Java with Spring

Finally, Python was selected because the clean syntax and the philosophy of Django framework to avoid repetition in the most used web tasks and their solid community.

TODO: Django logo

The documentation site of Django framework is clear and well structured and provides API's for all the common needs for every web development like an ORM for database mapping or security features, moreover, is possible to build your own custom functionalities on top of them.

### Mobile application

For providing a native environment to Auzonet in mobile platforms the native SDK of each platform was desestimated due the limited resources for developing the project, thanks to web technologies and the responsive user interface designed in the web application, Apache Cordova framework has been used for provide a native look and feel on the common mobile operating systems.

Apache Cordova is a framework for create mobile applications using HTML, CSS and JavaScript gaining access to native features of the hardware like accelerometer or camera, as project from Apache Foundation, is licensed under Apache license that authorizes to use free of charge the software.

TODO: Apache logo

Apache Cordova allows to get advantage of all the existing software written in the web application and port the experience to a native application distributable via mobile stores and porting to Android, iOS or Windows Phone.

For creating the application, has been necessary create artworks for different screen sizes and device orientations of the icon and splash screen.

TODO: Put Apache Cordova logo.

## **6.4. TOOLS**

### **6.4.1 Code editor**

TODO: Put an image of atom The code editor used along the project for writing Python code and HTML front-end is Atom by GitHub.

Atom is an application built with web technologies and open source that allow to be modified by the community, because of that, the wide variety of plug-ins such as language syntax support or Git integrations is huge.

Before this project, the student had experience with other privative tools like Sublime Text but at the beginning of the development, the student made a small research for a new tool to learn for improve productivity in the programming phase.

Atom features like embedded browser and terminal, has become a huge productivity boost during the development.

### **6.4.2 Image editor**

Though most of the visual assets are provided by Twitter Bootstrap, others like logo and mobile icons and splash screens has been created using a image editor.

TODO: Pixelmator image

Pixelmator is a Mac application based on the popular Adobe Photoshop with less features but enough to design and prepare the visual assets used in Auzonet. Was selected because the student already owned a license and is easy to use.

### **6.4.3 Operating system**

TODO: FOTO OSX All the development process has take place on an Apple MacBook Pro of early 2011, property of the student with OS X El Capitan version 10.11, the UNIX solid architec-

## 6. DEVELOPMENT

ture and good user experience became the perfect choice for being the main computer used for programming.

The UNIX-like capabilities of this operating system has become an advantage for running almost every tool involved in a web development process.

### 6.4.4 Version control

TODO: LOGO GIT Git has been the software responsible of keep version control of all the files of the application. Git is an open-source software developed by Linus Torvalds widely used in the industry, allows to keep a central repository and create branches separated from the main development code.

TODO: GITHUB LOGO GitHub is a service created for hosting Git repositories and allow store public and private code, thanks to the student pack offered by the company, code has been hosted in a private repository for free that, otherwise would be needed a paid subscription.

### 6.4.5 Testing

All the tests performed has been focused y the end user perspective, along two weeks the application was released under beta status to a closed group of people closer to the student for making a simulation of real usage.

The proposed tests starts with the creation of a new account by the user without any assistance watching the usability problems that the user have, and taking notes of how the user navigate through the app.

The proposed workflow for the test are always the same:

1. Register a new account.
2. Register a new community with password.
3. Create a new offer in the community.
4. Create a new request in the community.
5. Post a new advice on the community board.
6. Post a new info message on community board.
7. Logout
8. Create another account
9. Joining to the previously created community
10. Hire the offer created by the previous user and finish the agreement voting each other
11. Attend the request created by the previous user and finish the agreement voting each other
12. Enter in profile view and check the recent activity and karma.
13. Logout.

Same process with the mobile application.

All faults and user experience suggestions were gathered in the task manager software and tagged for fixing as soon as possible.

## **7. CONCLUSIONS AND FUTURE WORK**

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This project has developed a full-stack platform for citizens using Open Data very similar to already existing, well-known applications of every day life, in this chapter some conclusions and future lines of work will be presented.

### **7.1. DATA MINING**

### **7.2. CONCLUSIONS**

Today, we are surrounded by services that centralize the logic and data on cloud servers, smart-phones quickly became the angular piece for interacting with them, having the knowledge of creating the full-stack technologies involved in these solutions is essential for every computer engineer.

The aim of learning a full stack technologies creating a real application based on social interaction and Open Data has achieved successfully, today, more than ever, we have a huge variety of technologies available, select the appropriate ones for a service a provide a good user experience is more difficult.

As can be seen, this project ended successfully achieving all the major objectives proposed from the beginning and implemented all the MORElab requested requirements with WeLive platform. A mobile application has been created at the same time, bringing all the core functionality to different mobile operating systems and only latest web technologies has been used for proving the maturity of these solutions.

Both applications, mobile and web are fully functional, running on servers hosted in DeustoTech and ready to deploy in bigger environment with small tweaks. In the other hand, data mining purposes of user's data could not be tested or developed, due time limitations but the software architecture is totally prepared for future data analytics features.

### **7.3. FUTURE LINES OF WORK**

Although the application is fully functional and complete, there are some features that could be interesting to develop in further releases:

- User profile customization by the end user.
- Facebook, Twitter and Google login integration.
- Native mobile apps.
- Public REST Api for allowing third party integrations.

## *7. CONCLUSIONS AND FUTURE WORK*

- Full featured data analysis portal for public institutions.
- Automatic community detection using HTML5 geolocation API.
- Implement a search field for offers and requests.
- Add support for more cities and extend the scope of the posts.

All these features are really plausible to implement due the actual architecture of the platform.

## **8. BIBLIOGRAPHY**

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## 9. ACRONYMS

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**label** description



## 10. ACKNOWLEDGMENTS

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## 11. AGRADECIMIENTOS

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### A. PLANNING2

### A.1. PRECEDENCE DIAGRAM2

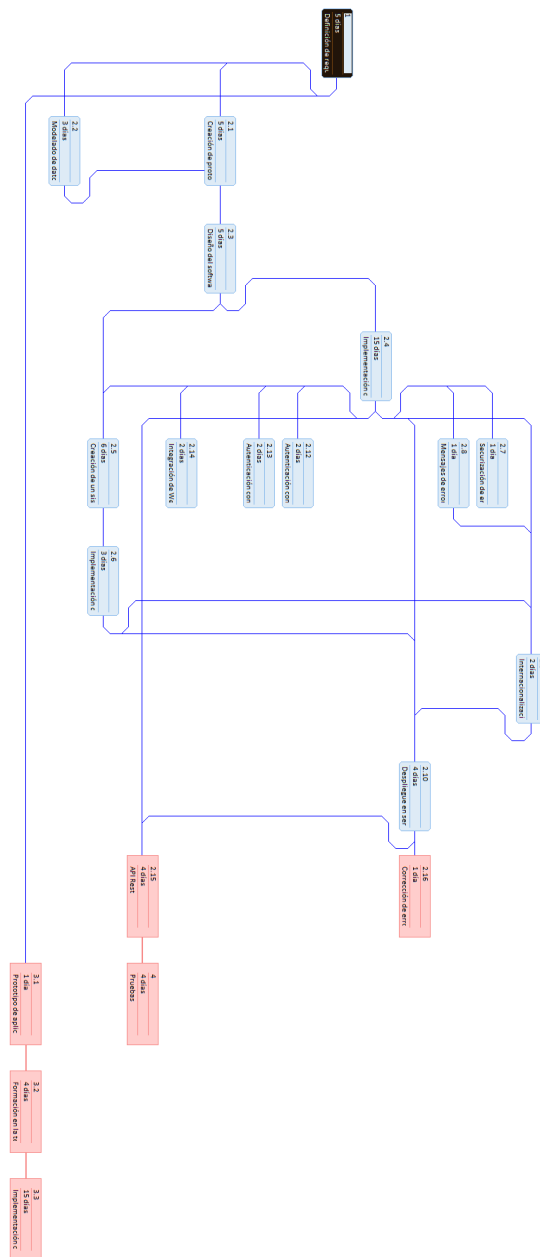


Figure A.1: Precedence diagram