PEOPLE

Deliverable D2.1 – PEOPLE Pilots' requirements Specification

Project Acronym:	PEOPLE		
Project Full Title:	Pilot smart urban Ecosystems leveraging Open innovation for Promoting and enablLing future E- services		
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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Document Change Log			
Ed/Rev	Date	Pages	Description of Changes
0.1	12/07/2011	9	Document initialization
0.2	28/07/2011	11	Guidelines improvements
1.0	31/10/2011	198	Integration of all pilots' contributions and finalization of the version 1 of the deliverable
1.1	28/02/2012	201	Preparation of the document for revised version
1.2	18/03/2012	202	Improvements
2.0	04/04/2012	222	Final version of the revised document
2.1	30/09/2012	225	Updated
2.2	31/01/2013	206	Updated

1. Introduction

i. Document purpose

The Pilots' Requirements Specification document aims at providing the functional and non-functional requirements and the technical architecture for each PEOPLE pilots and their services.

From the outcomes of the full scenarios definition document, each pilots provides a full technical description of their entire software pilot structure in this deliverable, jointly with the deliverables D1.3 (PEOPLE Data Model(s) and information flow chart(s)), D1.4 (Report on the deployment of scenario hardware/infrastructure components) and D2.2a (PEOPLE Pilots Security). The "PEOPLE Pilot's requirements Specification" document details functional requirements, non-functional requirements and the technical architecture for PEOPLE Pilots and services. It also mentions the considerations related to the use of OSS. To do so, each pilot has previously defined scenarios and so far, the services have been well documented on their functional aspects. By focusing on the identified services and an operating platform which supports all the services, each pilot were asked to fragment their scenarios in order to provide use-cases which will cover one or more related features. These use-cases should cover all the different functions that the pilots will deliver to the user.

A use-case is a description of how users will perform tasks on services. It has to address three points: the actor (who?), the purpose (what?), the processing steps or actions (how?). So in order to build your use-cases, it is first necessary to define the different actors, i.e. the targeted users of your pilot. One actor represents a group of persons that have the same needs and behaviour (for instance, an "old local man" may not have the same needs than a "young tourist woman" even if they use the same service). Therefore, for each software/service that you may implement in your pilot, identify the purposes that an actor would intend to achieve when using it. Each one of these purposes becomes a use-case. And finally, the use-case will describe the steps that a user will do to accomplish one task on the pilot, and the way that the service should respond to user's actions.

During the elaboration of this document, aspects concerning the scalability, usability, accessibility, interoperability and licensing were considered by the pilots in order to provide the pilots were told to take into account the requirements expressed by the stakeholders, especially on the non-functional requirements.

Therefore, the purpose of this document is to *i)* help each national consortium to get ready to implement and deploy their pilot for the test and validation phases, *ii)* enable the project to found common bases and perspectives, and *iii)* to constitute enough inputs to start building the business models which will be developed during the next phase.

Also, each pilot has to explain how the pilot will handle with the different services and how they will be reachable for the user. From a product vision, the user should be able to access to the services easily through an IHM. Therefore, the use of an operating platform seems to be the best solution to gather all the services available for the user.

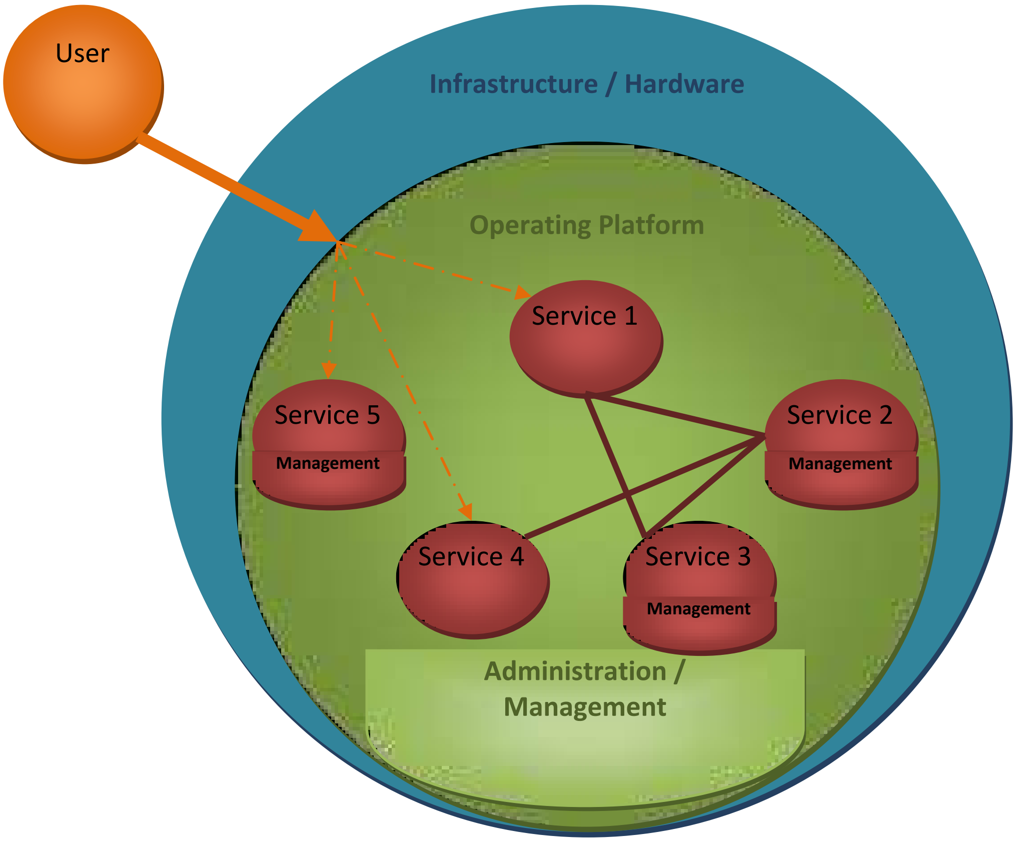

Figure 1. Pilot's Generic architecture proposal

The core of the document is divided in four parts, one per pilot. Each pilot contains sections which are related to the services which will be developed during the project. The section is composed of a description of the service, a list of the actors and their related use cases, and cards detailing each use cases previously stated. At the end of the pilot's division, the requirements are listed in order to give a general overview.

Updates for the revision of the document:

Further information is included in the document in order to clarify some aspects of the services and their requirements, three sections were added for each service providing the kind of information detailed hereafter.

Service release: the deliverable provides information on the dates and way used by the pilot to release the service. In connection with the Open Source Software section, we can know how each pilot will distribute the developed services.

Open Approach method: The Open Approach Methodology is an important and useful means for developing applications that answer to costumers or users' needs. Involving them in the process of creation and development is part of the PEOPLE Project and this section gives details on how the method is used for the development of each service.

Open Source Software and tools for the sustainability of the communities: This last section provides the documentation related to the Open Source methodology and the actions undertaken by each pilot for developing the communities and ensure their sustainability. It gives information such as the license used, the communities expected to be involved in the service and the tools and procedures established towards the communities (online and/or distributed versioning system, bug reports system, tinderbox, dedicated website, announcement procedures, mailing lists, newsgroup archives, …).

ii. Definitions and acronyms

Actor: *An actor specifies a role played by a user or any other system that interacts with the subject* (source: en.wikipedia.org)

Use case: *a use case is a description of steps or actions between a user (or "actor") and a software system which leads the user towards something useful. The user or actor might be a person or something more abstract, such as an external software system or manual process* (source: en.wikipedia.org)

Functional requirements: *a functional requirement defines a function of a software system or its component* (source: en.wikipedia.org)

Non functional requirements: *a non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviours* (source: en.wikipedia.org)

Open Innovation: *Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology. Open Innovation processes combine internal and external ideas into architectures and systems. Open Innovation processes utilize business models to define the requirements for these architectures and systems* (Chesbrough, H.W. (2003). Open Innovation: The new imperative for creating and profiting from technology. Boston: Harvard Business School Publishing: Boston, MA)

2. Bilbao

i. HoyRespiro

Description

This service will provide information about pollen levels, quality of air and meteorological information in the City. The data used are those provided by public authorities.

The service takes advantage of environmental control networks existing along the city and the indicators elaborated by their data. Those networks consist of a number of meteorological stations metering atmospheric variables and those, e.g. related to pollution or level of pollen in the air.

The system uses other data sources in order to provide the user with a complete information overview, including predictions and taking into account predictive simulation and risk models that are being used by some public administrations.

The more relevant features for the model are geo-referenced data sets about:

- Quality of the air in the city and the nearest user area
- Pollen Level
- Other environmental parameters
- Alerts and notices related to the city environment
- Customized alerts on the phone related to user profile and data available

Advices and tricks, campaign information

Service release

First release of the service took place on March, 14th 2012. The service is available via the following url:

http://hoyrespiro.people-project.eu/

In addition, to facilitate the work with end users and get their opinion, assessment and suggestions for innovation, PEOPLE has installed a kiosk in the emblematic building of the Municipal ALHONDIGA.

Citizens can interact with the service and get the information easily and free. Also, through the questionnaire embedded in the application can provide their comments and assessment of the service, following the methodology used for open innovation.

Open Approach method

This service is developed using an Open Approach including three incremental phases, in application of the Methodology defined for the project. First release was delivered within the 1st Innovation Cycle. Forthcoming releases are planned for Second and Third Innovation cycles.

First Innovation Cycle: release on the 14th of March 2012.

Second Innovation Cycle: second release in the middle of September 2012.

Third Innovation Cycle: third release expected in the middle of Jannuary 2013.

In the first release of the service a validation session has been performed with direct interaction with final users. The users have interacted with the application through the kiosk installed in Municipal Building in Bilbao, la Alhondiga. A person from Anova was present during the monitored validation session in order to get direct feedback from users and thus identifying the need of modifications in the program.

In addition, a survey is embedded in the application in order to get feedback from users every time they interact with the service.

This method will be applied in forthcoming releases.

Open Source Software and tools for the sustainability of communities

HOYRESPIRO is an Open Source project with an associated development Community under Sourceforge framework site. The name of the Community is : People Project Development, and the corresponding url is:

http://devel.people-project.eu

The software infrastructure used relies on GNU/Linux server with LAMP (Linux, Apache httpd, MySQL and php5) stack.

HOYRESPIRO is an Open Source project with an associated development Community under Sourceforge framework site. The name of the Community is : People Project Development, and the corresponding url is:

http://devel.people-project.eu

Sources, information and collaborative tools like blog and wiki are hosted by this community, under Sourceforge.

The code is released and stored online on the source code repository of the SorceForge. The project will use the online versioning system of the community, a SVN, for the development of the service.

A website is also built in order to promote the service and its source code. This website will be used as a centralised platform for information, announcements, and anything that might be related to the service and its source code.

We will also use a bug reporting and tracking system hosted by SourceForge. This tool will enhance the communication between the users and the developers and will be beneficial for the community.

Actors

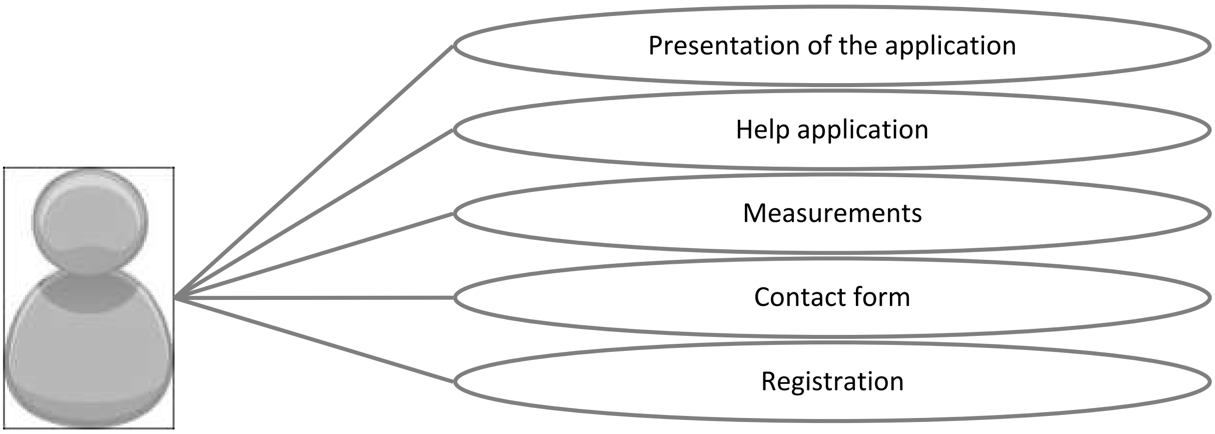

Figure 2. General User

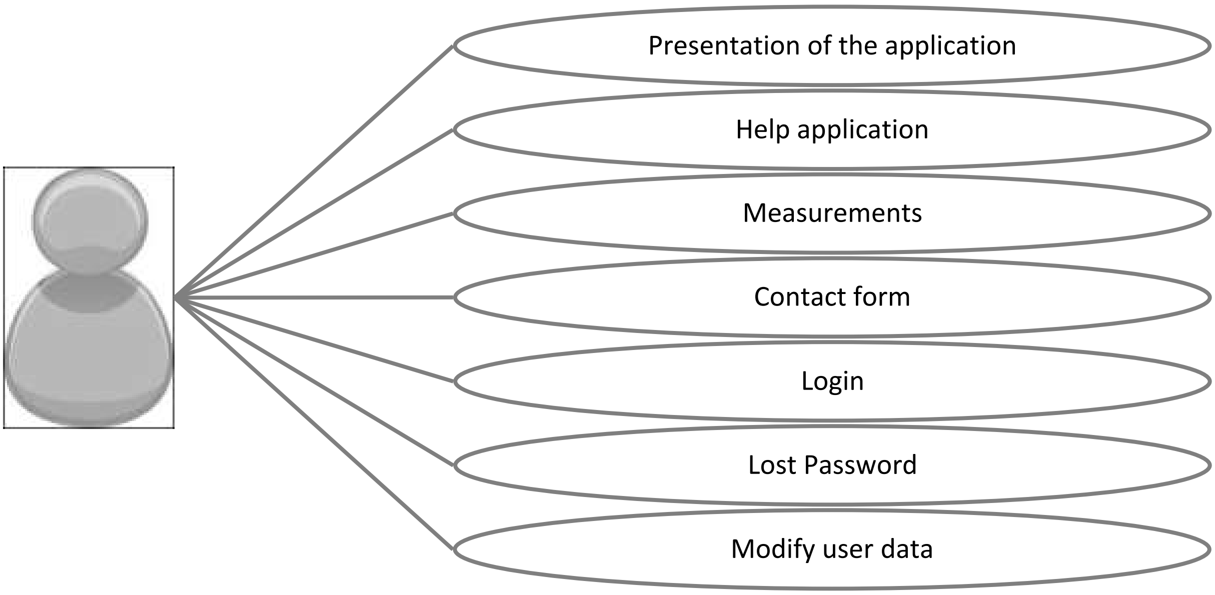

Figure 2. Member

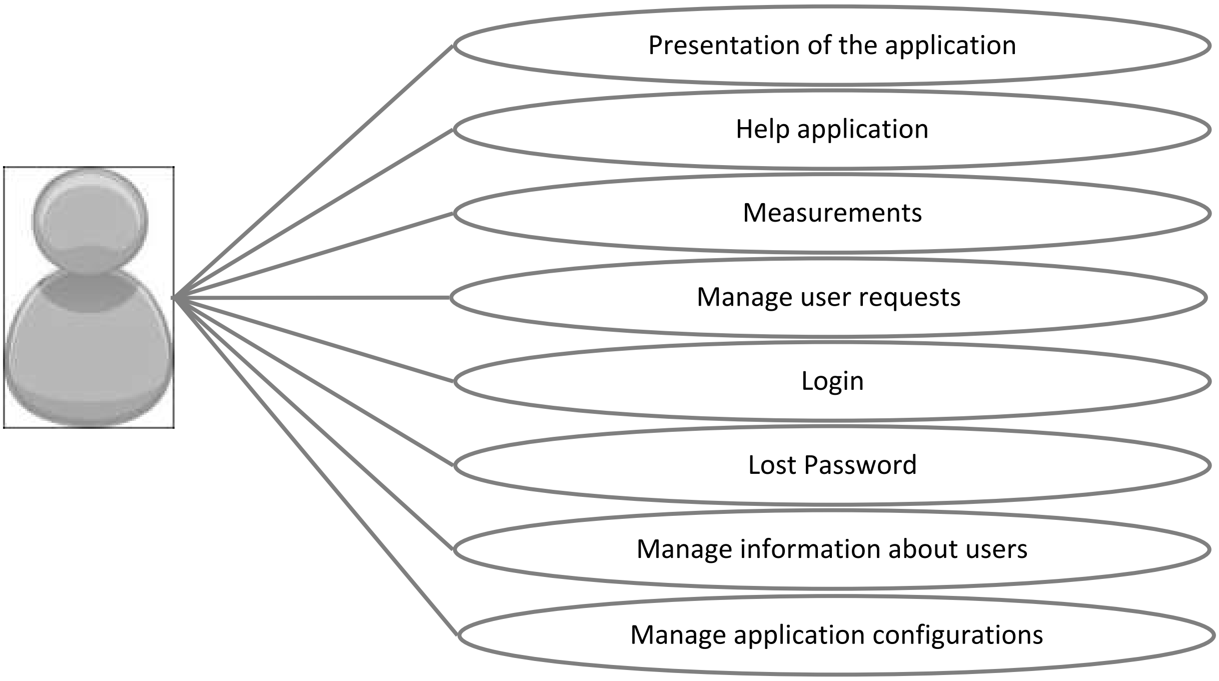
Presentation of the application
Help application
Measurements
Manage user requests
Login
Lost Password
Manage information about users
Manage application configurations

Figure 4. Administrator

Use-case cards

Use case 1
User Registration
Summary
Automatic registration of the application user. The user must register to access certain functions of the application.
Actors
General User
Preconditions
Being on the Web page of the application.
Description of main sequence

1. The user accesses the registration form. 2. The user fills in data form and click "OK". 3. The system checks the "Email" field is not empty, have a valid email format and is not registered on the system. 4. The system gives high user registration database, make the user inactive and sends a confirmation email to the account specified by the user. 5. The user accesses the mail account and click the link given sent by the system. 6. The system checks the validity of the link and change the user status to pass to be active
Various 1 (if needed)
The system detects an error in the data entered which shows an error message and remains in the registration screen.

Use case 2
User Login
Summary
User authentication on the system. The user already registered will have to enter his/her details to access certain functions of the application. In case you have forgotten password, the system will forward this information to the email account that is associated with your profile.
Actors
Member, Administrator
Preconditions
Being on the login page
Description of main sequence
1. The user fills the login and password data. 2. The system checks the data. 3. The system sends the user to the home page of the application but the menu options appear restricted

Various 1 (if needed)

The system, in the event of any error, give a warning message to the user and remain at the login screen.

Use case 3

Data Search

Summary

Querying data from the stations.

The user can browse for stations to check the measurements and have the option to consult a map directly to these data.

If necessary have a little help describing the different fields of application.

Actors

General User, Member, Administrator

Preconditions

Being in the measurements page

Description of main sequence

1. The system displays a map with the default locale set in the general configuration of the application.

2. The user selects a location and / or province.

3. The system displays the map of the area near the point position sought and found in the station map.

4. The user clicks on a station to see the associated data.

Various 1 (if needed)

The system cannot find the right spot in the search parameters and displays a warning to the user to redefine the search.

Use case 4

Advanced Data Search

Summary
Querying data from stations with advanced features. The user can search by default positioning by the user and to view current position measurements by locating stations on a map.
Actors
Member
Preconditions
Being in the measurements page
Description of main sequence
1. The system displays a map showing the location set to the user's preferences. a. If the user has permissions to the application to determine its location, the system will attempt to locate your position and display the map in terms of it. b. If the user has permissions to the application to determine your location and set a default location, the system uses it to display in the map. 2. The user chooses the method to search and launch the search action. To do this you have the following search options: current location, default location and town / province. 3. The system displays the map of the area near the point position sought and found in the station map. 4. The user clicks on a station to see the associated data.
Various 1 (if needed)
The user has not set the locale setting on your preferences. The system displays a map with the default locale set in the general configuration of the application.
Various 2 (if needed)
The system cannot find the right spot in the search parameters and displays a warning to the user to redefine the search.

Use case 5
User Management
Summary

Manage user accounts by the administrator.
Actors
Administrator
Preconditions
. User must be registered with administrator profile . The Administrator will have access to user management.
Description of main sequence
1. The administrator selects the option of high, modification or deletion of a user. 2. The system updates the data according to those introduced by the administrator.
Various 1 (if needed)
The system, in the event of any error, gives a warning message to the user.

Use case 6
Management of Data Sources
Summary
Manage data sources used in the application.
Actors
Administrator
Preconditions
. User should be registered with administrator profile . The Administrator will have access to the management of data sources.
Description of main sequence
1. The administrator selects the option of high, modification or deletion of a source. 2. The system updates the data according to those introduced by the administrator.
Various 1 (if needed)

The system, in the event of any error, gives a warning message to the user.

Use case 7
Administration of stations
Summary
Manage stations used in the application. The administrator can manage the stations used in the application.
Actors
Administrator
Preconditions
. The user should be registered with administrator profile . The Administrator will have access to station management.
Description of main sequence
1. The administrator selects the option of high, modification or deletion of a season. 2. The system updates the data according to those introduced by the administrator.
Various 1 (if needed)
The system, in the event of any error, gives a warning message to the user.

ii. GeoCur

Description

This service will provide information on courses and training activities offer available in the City. The data used are those provided by the organizations that are offering the courses and activities.

The citizen can find information about a wide calendar of courses, classified by sectors of activity, and will be able to find places and resources for self-learning (libraries, foundations, schools, e-learning, and technological centers developing learning activities or promoting self-learning resources).

Service release

The service will be released within the Second Innovation Cycle.

Open Approach method

This service is being developed using an Open Approach including incremental phases, in application of the Methodology defined for the project. First release will be delivered within the 2nd Innovation Cycle. Forthcoming releases are planned for Third Innovation cycle.

Second Innovation Cycle: second release in the middle of June 2012.

Third Innovation Cycle: third release expected in the middle of October 2012.

In the first release of the service a validation session will be performed with direct interaction with final users. The users will interact with the application through the kiosk installed in a Municipal Building in Bilbao. A person from Anova will be present during the monitored validation session in order to get direct feedback from users and thus identifying the need of modifications in the program.

In addition, a survey is embedded in the application in order to get feedback from users every time they interact with the service.

This method will be applied in forthcoming releases.

Open Source Software and tools for the sustainability of communities

GEOCUR is an Open Source project with an associated development Community under Sourceforge framework site. The name of the Community is : People Project Development, and the corresponding url is:

http://devel.people-project.eu

The software infrastructure used relies on GNU/Linux server with LAMP (Linux, Apache httpd, MySQL and php5) stack.

GEOCUR is an Open Source project with an associated development Community under Sourceforge framework site. The name of the Community is: People Project Development, and the corresponding URL is:

http://devel.people-project.eu

Sources, information and collaborative tools like blog and wiki are hosted by this community, under Sourceforge.

The project will use the online versioning system of the community, a SVN, for the development of the service.

A website is also built in order to promote the service and its source code. This website will be used as a centralised platform for information, announcements, and anything that might be related to the service and its source code.

We will also use a bug reporting and tracking system hosted by SourceForge. This tool will enhance the communication between the users and the developers and will be beneficial for the community.

Actors

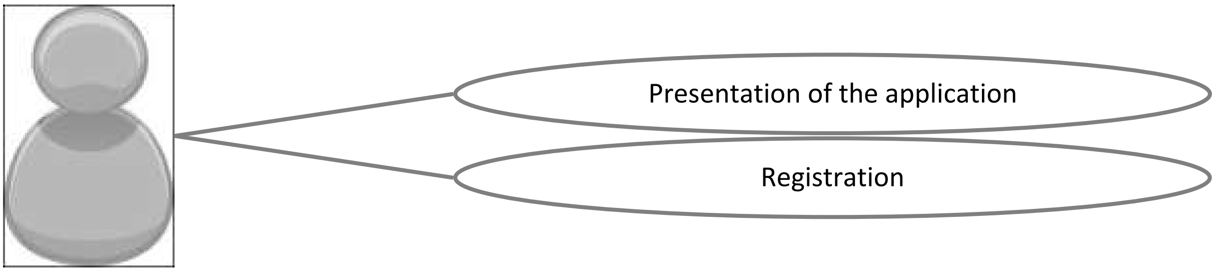

Figure 5. General User

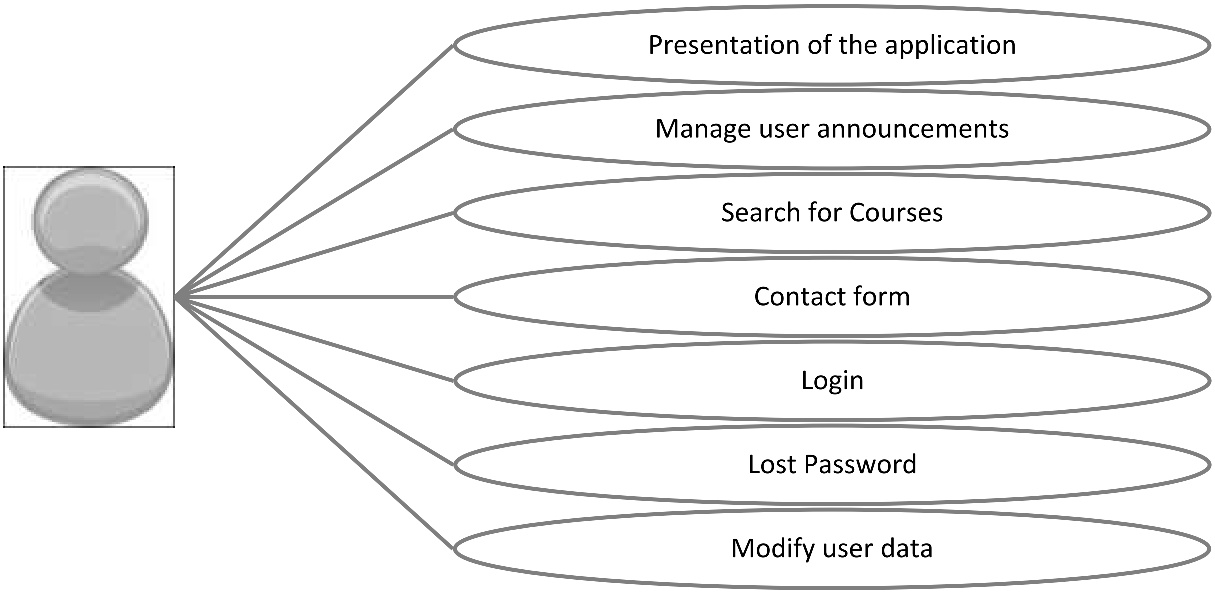

Figure 6. Member

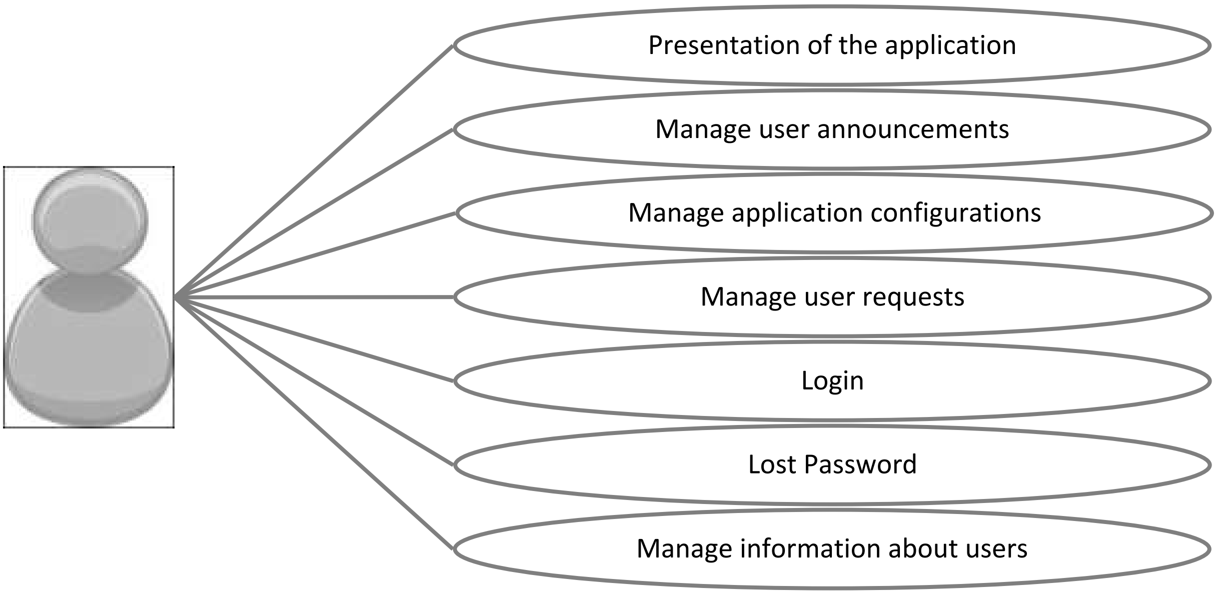
Presentation of the application
Manage user announcements
Manage application configurations
Manage user requests
Login
Lost Password
Manage information about users

Figure 7. Administrator

Use case cards

Use case 1
User Registration
Summary
Automatic registration of the application user. The user must register to access certain functions of the application.
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General User
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Being on the Web page of the application.
Description of main sequence
1. The user accesses the registration form. 2. The user fills in data form and click "OK". 3. The system checks the "Email" field is not empty, have a valid email format and is not registered on the system. 4. The system gives high user registration database, make the user inactive and sends a confirmation email to the account specified by the user. 5. The user accesses the mail account and click the link given sent by the system. 6. The system checks the validity of the link and change the user status to pass to be active
Various 1 (if needed)
The system detects an error in the data entered which shows an error message and remains in the registration screen.

Use case 2

User Login

Summary

User authentication on the system.

The user already registered will have to enter his/her details to access certain functions of the application. In case you have forgotten password, the system will forward this information to the email account that is associated with your profile.

Actors

Member, Administrator

Preconditions

Being on the login page

Description of main sequence

1. The user fills the login and password data.

2. The system checks the data.

3. The system sends the user to the home page of the application but the menu options appear restricted

Various 1 (if needed)

The system, in the event of any error, give a warning message to the user and remain at the login screen.

Use case 3

Application management

Summary

Manage application utilities.

Users must register at the website Once initialized the application, the user will have different options to interact with the application:

+ The user will have an option to search "Courses". In this section the user will have different courses depending on the situation in which the person is. It can be:

- Unemployed.
- Workers.
- Students.
- Entrepreneurs.
- Search for specific courses.

+ The user will have an option to search "Announcements". In this section the user can see announcements related to the courses:

- View ads.
- Top ads / Feedback.
- Remove ads.

Actors

Member

Preconditions

The user should have the application running.

Description of main sequence

1. Users must register through the website.

2. The system checks that the user is discharged from the server.

3. Initialized when the user application can search for courses:

3.1. The user can search for courses for the unemployed.

3.1.1. The user can select a course and see all the information related to the course and facilities

which gives, in the case of not knowing where you are in the center will be displayed in Google Maps.

3.2 The user can search for courses for workers.

3.2.1. The user can select a course and see all the information related to the course and facilities

which gives, in the case of not knowing where you are in the center will be displayed in Google Maps.

3.3. The user can search courses for students.

3.3.1. The user can select a course and see all the information related to the course and facilities

which gives, in the case of not knowing where you are in the center will be displayed in Google Maps.

3.4. The user can search for Entrepreneurs courses.

3.4.1 The user can select a course and see all the information related to the course and facilities

which gives, in the case of not knowing where you are in the center will be displayed in Google Maps.

3.5. The user may search for specific courses.

4. The user has the "Announcements".

4.1. The user has the option to view ads posted by other users.

4.2. The user has the option to upload the ads.

4.3. The user has the option to remove the ads that he has risen.

5. The user has the option to consult a little help, describing the use of different fields:

- Search for Courses.

+ Courses Unemployed.

+ Courses Workers.

+ Courses Students.

+ Courses Entrepreneurs.

+ Courses.

- Ads

Various 1 (if needed)

The system, if an error occurs, you will get a warning message to the user.

Use case 4

User Announcements management

Summary

Manage the ads uploaded by users.

The user can upload ads, related to the courses will be taught or were taught that you can also upload information useful to others.

Actors

Member

Preconditions

The user should be registered and have the application started, to upload ads.

The user can remove an advertisement must be the creator.

Description of main sequence

1. You have to go to the classified section.

2. The system will see the ads posted by other users. It will have 4 categories when post an ad:

+ Unemployed.

+ Workers.

+ Students.

+ Entrepreneurs.

3. The user has the ability to upload ads and make opinions on other advertisements.

4. If the user is the creator of the notice, you can remove it when convenient.

Various 1 (if needed)

The system, if an error occurs, you will get a warning message to the user.

Use case 5
User Management
Summary
Manage user accounts by the administrator.
Actors
Administrator
Preconditions
. User must be registered with administrator profile . The Administrator will have access to user management.
Description of main sequence
1. The administrator selects the option of high, modification or deletion of a user. 2. The system updates the data according to those introduced by the administrator.
Various 1 (if needed)
The system, in the event of any error, gives a warning message to the user.

Use case 6
Announcements management
Summary
Manage of announcements by the administrator.
Actors
Administrator
Preconditions
. User must be registered with administrator profile . The Administrator will have access to announcements management.
Description of main sequence

1. The administrator will have the option to view ads posted by other users. 1.1. The administrator can upload ads. 1.2. The administrator can remove ads 1.3. The administrator can edit your ads
Various 1 (if needed)
The system, in the event of any error, gives a warning message to the user.

iii. 3D Walking Tour (3D Video)

Description

This is a service based on a 3D production to perform according to an itinerary around Abandoibarra City area, showing the significant buildings that are placed in this area. The service has a high touristic interest.

The 3D production video would be available for download and display in 3D TV screens and last generation Smartphones with 3D capabilities.

Service release

A first release of the service with limited functionality will be released by mid April.

Open Approach method

This service is being developed using an Open Approach including incremental phases, in application of the Methodology defined for the project. First release will be delivered within the 2nd Innovation Cycle. Forthcoming releases are planned for Third Innovation cycle.

Second Innovation Cycle: first release in the middle of April 2012.

Third Innovation Cycle: Two co-design session with a second release expected in the middle of September 2012, and a third release expected in the middle of October 2012.

In the first release of the service a validation session will be performed with direct interaction with final users. The users will interact with the application through the screen installed in a Municipal Building in Bilbao. A person from Anova will be present during the monitored validation session in order to get direct feedback from users and thus identifying the need of modifications in the program.

In addition, the service will redirect users to a specific survey located in the project's web page in order to get feedback from users every time they interact with the service.

This method will be applied in forthcoming releases.

Open Source Software and tools for the sustainability of communities

The service will be released with a Creative Commons license

Any software code to be produced to support the services will have an associated development Community under Sourceforge framework site. The name of the Community is: People Project Development, and the corresponding URL is:

http://devel.people-project.eu

Sources, information and collaborative tools like blog and wiki are hosted by this community, under SourceForge.

The project will use the online versioning system of the community, a SVN, for the development of the service.

A website is also built in order to promote the service and its source code. This website will be used as a centralised platform for information, announcements, and anything that might be related to the service and its source code.

We will also use a bug reporting and tracking system hosted by SourceForge. This tool will enhance the communication between the users and the developers and will be beneficial for the community.

Podemos crear un sitio web específico para publicar información relativa e este servicio o podemos usar la que tenemos en el portal de people-project.

Actors

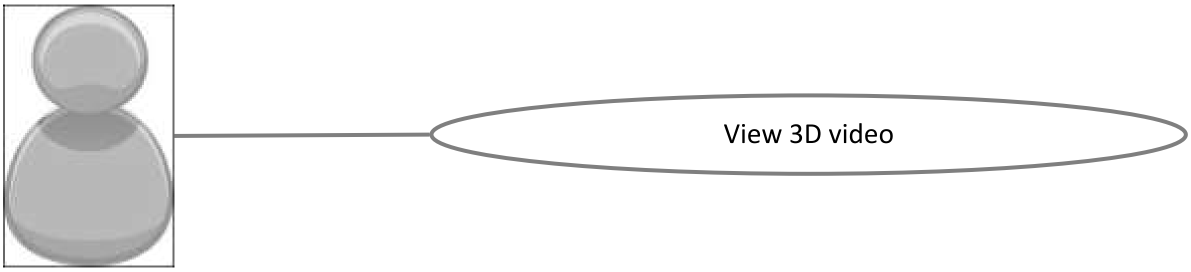


Figure 2. General User

Use cases

Use case 1
View 3D video
Summary
User access the video
Actors
General User

Preconditions
Being on the Web page where the video is published.
Description of main sequence
1. The user accesses the web page where the video is published. 2. Play the video.

Pilot use-cases summary

In the table below are listed all the uses cases that are detailed in the document regarding the services of Bilbao pilot.

Use-case / service	Hoy Respiro	GeoCur	3D video
User registration	X	X	
User Login	X	X	
Data Search	X		
Advanced Data Search	X		
User Management	X	X	
Management of Data Sources	X		
Administration of stations	X		
Application management	X	X	
User Announcements management		X	
User Management	X	X	
Announcements management		X	
3D Walking Tour (3D video)			X

Specifications

Functional requirements

HOYRESPIRO

RF1	The system must allow users to automatically sign up. This will enable a registration screen that asks for a valid email account and password to login.
	The application will display information on the following data types: air quality (CA), pollen levels (NP) and meteorological data (DM). The data shown in each of the types depend on the data sources used in the application.
	- The application will allow users to store and edit your data and your preferences. These data will be: - Email. Used as a username on the system - Key to access the system - Location: ○ Default location ○ Allow the system to find my current location
	The user can query the data from all stations registered in the application. The stations are shown on a map, each in its proper location. You have the following options: • Moving around the map. • Position on the map using the following methods: ○ Indicating or province and / or location and clicking the "Show" ○ only if the user is registered, the application displays up to two more buttons: "Default" and "Current Location". ▪ Defaul location Pressing this button, the system displays the map with the default locale set user preferences. ▪ Current location. If the user has checked the "Allow the system to find out my current location" on your preferences, you will see a button "Current Location" that when pressed, the application will attempt to determine the location of the device used by the user and displays a map with the nearest stations in the surrounding area. If the system can not determine the location of the device, it displays a warning

	message and displays the map with the default locale set by the user. Once the stations located on the map, you can query data from each enabled by clicking on a link for this purpose. Clicking the link will display the information depending on the data format of the station. In this way, we can find the following formats:. ○ XML or CSV. In the same application will display the information in this document based on the fields configured by the administrator for this station. ○ LINK. URL opens in a new window displaying the associated information.
	The application will offer users the option of registering to access your information.
	The user will be able to recover your password to access the system at any time. To do this, you are asked your email address where you send this key .
	The administrator may grant, modify or terminate any user at any time.
	The administrator can manage the data sources used in the application so you can sign up several sources. These sources may be modified or deleted at any time by the administrator.
	The data sources consist of information on measurement points (stations) and their respective links to access information. For each data source may be one or several seasons. A data source must contain the following information: - Name - Description - Stations Per station, the data stored in the application are: - Name - Type (CA, NP, DM). - Direction

	- Location - Province - URL to get the information - Information format: XML, CSV or LINK. If the information is XML or CSV, the system displays an additional section of information which indicate the fields to display, your name and correspondence with the document.
	The application accesses stored information, both failed attempts as correct.

GEOCUR

RF1	The user should register to use the application
	The system will keep user data on the server.
	The user, once registered, to access the application, you must enter your username and password
	The user, once registered, if you forgot your username and password, the system will send the account details to the email address associated with it.
	Once registered the user will have the option to manage your account: - Change username. - Change password. - Change email address. - Enable or disable the option of receiving information in the email.
	The user, once the application is running , can search for the following categories of courses: - Unemployed - Workers - Students - Entrepreneurs

	- Specific
	The user can select a course and see all the information related to the course and institution providing, in the case of not knowing where the center is displayed in Google Maps.
	The user will have the option: “Announcements”
	The user has the option to view announcements posted by other users.
	The user will have the option to upload announcements
	The user has the option to remove the announcements that he has uploaded
	The user has the option to consult a little help, describing the use of different fields: ● Search for Courses ○ Unemployed or Courses. ○ Workers or Courses. ○ Students or Courses. ○ Courses Entrepreneurs. ○ Specific courses. ● Announcements
	The user has the possibility of views on other announcements
	The administrator will have the option to view announcements posted by other users and create edit or delete them.
	The administrator can manage user accounts so you can create, edit or delete them.
	The administrator will have the option to display the errors produced by the system and that have been submitted by users

3D VIDEO

RF1	The user should access the video in a web page

Non functional requirements

HOYRESPIRO

RNF1	The application is developed using the Symfony framework based on the programming language PHP 5.
	The operating system used to host the application will be Linux on any of the following distributions: Fedora, Debian or CentOS.
	For storage of the data manager will use the MySQL 5 database
	The web server used is Apache 2.
	To access certain features of the application, the user must be identified and authorized by the system. These features are: - User data: email and password. - Search for data based on the current location of the device. - Configuration. User configuration parameters.
	The data sources used to obtain the data may be modified through a configuration system. Here are some of the data sources used in the application: - Air quality data from the Basque government.http://opendata.euskadi.net/w79-contdata/es/contenidos/ds_geograficos/red_calidad_aire/es_opendata/adjuntos/estaciones.csv - Data on pollen levels of the Basque government. http://www.euskalmet.euskadi.net/meteorologia/meteorologia_dat/meteodat/polen/BILBAO.pdf - - Weather information provided by AEMET. http://www.aemet.es/xml/municipios/localidad_48020.xml

	There will be three user profiles: • General User. Is any user who enters the application and is not registered. You have access to the following features ○ Presentation of the application. Description of the application. ○ Help application. ○ Measurements. You can get the data from any station looking for local interest and / or province. ○ Registration Form or register on the system. ○ Contact form to express doubts, queries and / or suggestions. ○ Lost Password or (in case you have previously registered and you forgot). • Members. You have access to the same features as the general user, plus the following: ○ Login. ○ Modify or user data. ○ Location of stations in the map by default location and current location. • Administrator. In addition to having access to all features of the registered user, you have access to: ○ Manage application configurations ○ manage information about users
	We will use Google Maps technology to display information about the different meteorological data, air quality and pollen levels.
	It uses the Google Maps API to position the various elements on the map.
	To use Google Maps technology, the device must be able to execute JavaScript code, more specifically, be prepared to run "Google Maps JavaScript API V3." In general, in order to access the application, the only requirement is to have the device installed in

	one of the following web browsers: - IE 7.0 or higher (Windows) - Firefox 3.0 or later (Windows | Mac | Linux) - Safari 4 or later (Mac | iPhone) - Chrome (Windows | Mac | Linux) - Android
	To qualify for the "Allow the system to find my current location" the system should incorporate support for "W3C Geolocation API" which is an interface to retrieve the geographical location information for the client-side device. Below is a list of supported browsers: - On desktop computers: Firefox (since version 3.5), Google Chrome, Opera 10.6, Internet Explorer 9.0 and Safari 5. - On mobile devices: Android (firmware 2.0 +), IOS, and Maemo. The W3C Geolocation API is supported by Opera Mobile Also 10.1 - available for Android and Symbian devices (S60 Generations 3 & 5) since November 24, 2010. If other browsers have, it is possible to have such functionality through plugin "Google Gears". Google Gears geolocation Provides support for older and non-compliant browsers, Internet Explorer 7.0 + Including as Gears plugin, and Google Chrome Which Gears natively implements. It Also Supports geolocation on mobile devices as a plugin for the Android browser (pre version 2.0) and Opera Mobile for Windows Mobile.

GEOCUR

RNF1	The application is developed using the Symfony framework based on the programming language PHP 5.
	The operating system used to host the application will be Linux on any of the following distributions: Fedora, Debian or CentOS.
	For storage of the data manager will use the MySQL 5 database
	The web server used is Apache 2.
	To access the application, the user must be identified and authorized by the system.

	There will be three user profiles: - General User. Is any user who enters the application and is not registered. Have access only to the filing of the application and registration form - Members. You have access to all system functions except the administration. - Administrator. You have access to all functions of administration.
	We will use Google Maps technology to show the location of the centers where the courses .
	It uses the Google Maps API to position the various elements on the map.
	To use Google Maps technology, the device must be able to execute JavaScript code, more specifically, be prepared to run "Google Maps JavaScript API V3." In general, in order to access the application, the only requirement is to have the device installed in one of the following web browsers: - IE 7.0 or higher (Windows) - Firefox 3.0 or later (Windows | Mac | Linux) - Safari 4 or later (Mac | iPhone) - Chrome (Windows | Mac | Linux) - Android

3D VIDEO

RNF1	The web server used is Apache 2.
	The operating system used to host the application will be Linux on any of the following distributions: Fedora, Debian or CentOS.

3. Bremen

The Bremen pilot provides several services (>12). The development follows the concepts of the living lab. Therefore all implementation work is following the user requirements and the user remarks. Development is open to be changed on user demands.

In this report we just provide detailed information about 4 core services, as we do not know the result of the living lab process at this moment for the other services.

i. Stud.IP

Description

The University of Bremen uses Stud.IP as major ICT-infrastructure. Stud.IPis a management tool for educational facilities and organizations. It allows students and university staff (e.g. professors) to organize courses, seminars and exercise units. Participation currently is possible for the members of the university and related research institutes only. Stud.IP Bremen has around 45,000 active events (e.g. courses) tracked and almost 27,000 registered users. It is available in German and English language.

Service release

The software was released in Version 1.0 during the month of February 2012. The app is released and tested, but there is a need to continue the service development

Open Approach method

The Stud.IP service is developed using the Open Approach Methodology.

Students/lecturers can come to the plenum and discuss progress/features.

The pilot also conducts co-Design Sessions with individual Stakeholders.

First Innovation Cycle: the first release was done in the middle of February 2012.

Second Innovation Cycle: a second release is planned at the end of May 2012.

Third Innovation Cycle: The pilot did not plan another version of the service yet for this cycle.

On the 20th of March 2012, the App was tested by 10 user. The result was not good enough to provide it to the broad public. App will be released via “Market” after the next innovation cycle and better results. Advertisement will be done later via Stud.IP, Facebook and project pages.

Development will be continued within the next innovation cycle. Topics are: - Redesign of the user interface according faster access of information - Pre-Storage of data (preferences) to enable faster access. - Storage of group members - Sending of messages to all participants]]

Open Source Software

The Stud.IP is an Open Source project, it is released under the GNU General Public License, version 2.

The source code is currently hosted on SourceForge website.

The pilot plans to involve two types of Open Source communities. The first one is the community created in the University which is dedicated for this Service, the Stud.IP community. The second one is the Android community as it is the operating system on which the service can run. The developers are expected to take part of the developments.

In order to attract new developers and Open Source communities, we plan to do several actions for communicating around the Project: presentations on conferences, presentation in forums, placing a movie on YouTube.

Actors

Participant

Use-case card 1

Use case name
Participant
Summary
Uses the smartphone to communicate via the Sud.IP Platform. These functions are important, as in a mobile situation there is no place for repeated clicks and selections. An exemplary situation: a lecturer is trapped in a traffic jam and likes to inform all his students that he will arrive 10 Minutes late. Stud.IP provides this function, but only over a web based interface, which requires several selections and input, until the message is sent. This app provides a direct access to this function.
Actors
Participant
Preconditions
Existing account on Stud.IP
Description of main sequence

- sending messages to course participants,
- reading / writing the bulletin board and
- reading / writing news

ii. Group Builder

Description

Students are working mostly in learning groups. A mayor problem is the building of groups and the communication of data between this groups. This procedure can last several weeks from beginning of the semester. An app can simplify this procedure.

The communication with other participants is not longer dependent from the physical position. Goal is the search about a reasonable method of managing small groups using actual technology. The best solution would b a decentralized system, which is not dependent from a central system.

The goal is an App for Android Smartphones. It should take use of Near Field Communication (NFC) which is part of modern smart phones. Additionally E-Mail might be used for communication and synchronization purpose. NFC will also be used for the transmission of simple massages. The App organizes working groups and keeps data of participation relations up to date.

Service release

The software was released in Version 1.0 during the month of February 2012.

Open Approach method

The Group Builder service is developed using the Open Approach Methodology.

Students/lecturers can come to the plenum and discuss progress/features.

The pilot also conducts co-Design Sessions with individual Stakeholders.

First Innovation Cycle: the first release was done in the middle of February 2012.

Second Innovation Cycle: The pilot did not plan another version of the service yet for this cycle.

Third Innovation Cycle: a second release is planned at the end of August 2012.

On the 20th of March, 2012, the app was tested by approximately 10 persons. The feedback indicates that the group builder app might be a helpful app.

To provide a common usable version of the Group Builder App an implementation to Android 4.0 is required. Android provides a much smarter NFC communication method. Android 4.0 doesn't longer contain the old 2.4 Android interfaces. So the existing app is not running on modern 4.0 Android smartphones.

Open Source Software

The Group Builder service is an Open Source project, it is released under the GNU General Public License, version 3.

The source code is currently hosted on SourceForge website.

The pilot plans to involve two types of Open Source communities. The first one is the Android community as it is the operating system on which the service can run. The developers are expected to take part of the developments. The second one is the NFC community, which is the new communication protocol that is used for this service.

In order to attract new developers and Open Source communities, we plan to do several actions for communicating around the Project: presentations on conferences, presentation in forums, placing a movie on YouTube.

Actors

participant, Lecturer

Use-case card 1

Use case name
Partcipant
Summary
Uses the smartphone to exchange information with other participants
Actors
Participant
Preconditions
No preconditions
Description of main sequence

- The lecturer announces his lecture at the lecture university calendar, on his homepage or in the Stud.IP (Lecture management system). Or he gives the name and ID of the lecture at the beginning of the first lecture. The lecturer is also asked to generate a QR-Code with the ID of his lecture.
- At least one student of a group needs to enter the name / ID of the lecture to his smartphone. This can be done by entering it by hand, photographing the QR-Code, or by reading in an RFID tag.
- Learning groups are established just by holding smartphones together. During this process information like lecture name, person name, phone number and email address are communicated between participants.
- Students without NFC smartphones are involved by email. Also students which have a smartphone but without NFC are contacted by email. The user can respond the email and accepts the involvement into a learning group.
- For consistency reasons al other group members are informed by email about the change of the group status.
- Only one participant of a learning group needs to hold his NFC smartphone nearby to the NFC smartphone of the lecturer. He keep with a list of participants.
- At the end of the process the lecturer keeps with a list with all participants and their membership to working groups, email-addresses and phone numbers.

Use-case card 2

Use case name
Lecturer
Summary
Giving Information about Lecture Receiving list of participants
Actors
Lecturer
Preconditions
entered lecture Name
Description of main sequence

- Publishing lecture name
- Receiving list of participants

iii. LBS (Location Based services)

Description

LBS provide information access on a map based system. By selecting the e.g. the Restaurant symbol you get information regarding the daily changing dishes. By selecting the bus stop you get information about busses and delays within the next half an hour.

Service release

The software was released in Version 1.0 during the month of February 2012. The app is released, tested, service development will be continued.

Open Approach method

The LBS service is developed using the Open Approach Methodology.

Students/lecturers can come to the plenum and discuss progress/features.

The pilot also conducts co-Design Sessions with individual Stakeholders.

First Innovation Cycle: the first release was done in the middle of February 2012.

Second Innovation Cycle: a second release is planned in the middle of May 2012.

Third Innovation Cycle: a third release is planned in the middle of October 2012.

On the 20 of March, 2012, a co-design session was done and the users said that the app is very nice and got a good rating from the users (stakeholder). The App was demonstrated to 100 conference participants. Several of them said “we like to have it for our campus”. The App was tested by more than 20 users.

Development will be continued within the next innovation cycle. Topics are: - Links and phone numbers can be opened by the browser/phone - Localization to other campuses. An application is developed, which allows the editing of POIs on other University campuses.

Open Source Software

The LBS service is an Open Source project, it is released under the GNU General Public License, version 3.

The pilot plans to involve two types of Open Source communities. The first one is the Android community as it is the operating system on which the service can run. The developers are expected to take part of the developments. The second one is the Google Maps community because the service is based on this Google service. Developers from this community are then invited to join the project.

In order to attract new developers and Open Source communities, we plan to do several actions for communicating around the Project: presentations on conferences, presentation in forums, placing a movie on YouTube.

Actors

User, administrator for setting up localisations and POIs for other campuses

Use-case card

Use case name
User
Summary
User, Administrator tool for setting up localizations and POIs for other campus
Actors
User
Preconditions
No preconditions
Description of main sequence
• Selecting a POI, • reading related information

Use-case card 2

Use case name
administrator for setting up localisations and POIs for other campus
Summary
This use case card defines the procedure to adapt LBS service for updated information or for new places other campus)
Actors

administrator
Preconditions
No preconditions
Description of main sequence
• defining POIs • entering related information • setting up method for accessing dynamic information

iv. Bulletin Board

Description

The Physical and Electronic Bulletin Board provides a public interactive screen, which can be used in different ways. The first version of the system was released on December. Second version End of March.

The first version provides advertisement of the institutes. Main Problem was the section of the place, walking through the burocracy, and fixing the system on the wall. A first version of the software is running. It was tested with visitor. Development will continue during the next innovation cycle.

The actual version integrates a Kinect, which provides gesture control.

Service release

The software was released in Version 2.0 on the 15th of February, 2012. It was also deployed the same day in the lobby of a research building (TZI and other institutes) of the University of Bremen.

Open Approach method

The Bulletin Board service is developed using the Open Approach Methodology.

Students/lecturers can come to the plenum and discuss progress/features.

The pilot also conducts co-Design Sessions with individual Stakeholders.

First Innovation Cycle: the first release was done in the middle of December 2012.

Second Innovation Cycle: a second release is planned in the end of April 2012.

Third Innovation Cycle: a third release is planned in the end of July 2012.

On the 20th of March, 2012, The service was submitted to a co-design session for tests and validation with visitors. Development will continue during the next innovation cycle. The service was used by 100 of persons, which used the service daily.

Early user feedback suggested that a next version could integrate a Kinect, which provides gesture control.

Open Source Software

The software will be released in Open Source (without Microsoft SDK Parts).

We will continue with development and releases.

The pilot plans to involve two types of Open Source communities. The first one is the Android community as it is the operating system on which the service can run. The developers are expected to take part of the developments. The second one is the NFC community, which is the new communication protocol that is used for this service.

In order to attract new developers and Open Source communities, we plan to do several actions for communicating around the Project: presentations on conferences, presentation in forums, placing a movie on YouTube.

Actors

participant, Lecturer

Use-case card 1

Use case name
Partcipant
Summary
Read Information on the Board.
Actors
Participant
Preconditions
No preconditions
Description of main sequence
• Reading information on the screen • Select information by body movement (gesture control)
Various 1 (if needed)

Various 2 (if needed)

Pilot use-cases summary

In the table below are listed all the uses cases that are detailed in the document regarding the services of Bremen pilot.

Use-case / service	Group Builder	Indoor Navigation	Single Sign-On	Digital Blackboard	…
Use case 1	X	X	X		
Use case 2	X	X		X	
Use case 3		X		X	

Specifications

Functional requirements, non functional requirements and technical architecture

Considering these aspects, we are going through each service and describe the functional and non functional requirements.

No.	Aspect	NFC Smartphone based Student Group Builder
1.	Actors	Regular students, university newcomer, lecturer
2.	Purpose	To help organizing the students into groups
3.	Operating platform	Smart phones (Android)
4.	Processing steps	Students often have problems setting up student learning groups. After the students found adequate group members the lecturer needs information about active group members. This service finally provides the lecturer with the required participant list. Our service takes use of modern smart phones and NFC communication in order to atomize this laborious process. By holding two NFC phones together the two users indicate to work in a group. Other persons who hold their smart phones to one of the smart phones of those first group members are also entering this learning group. Finally, one of the group members need to hold his smart phone near the smart phone of the lecturer. With this gesture he gets a complete list with all names from all participants and its group membership. Participants who have no adequate smart phone can enter their name on a friend’s smart phone. Participants which are not present can provide their names later by email.
5.	Functional input	Students just have to enter their names into the group builder app.
6.	Functional output	The lecturer ends with a list of groups, group members and participants
7.	Administration activity	There should be no administration activity. The lecturer has to announce his lecture by name, QR-Code or NFC. The participants have to enter their names into the smart phone App. Information is exchanged via NFC or via email.
8.	Availability of the product	The app will be announces via special web-pages and via the Google market.
9.	Programming languages	Java
10.	Hardware requirements	Regular smart phones
11.	Environment	Email via WiFi or UMTS
12.	usage	The service can be used by all kind of persons.
13.	Scalability	As the service does not rely on central services it is scalable.
14.	Interoperability	All communicated data are coded using the XML format
15.	Security aspects	As the navigation of persons in buildings is something private, it is not allowed to trace the movements of persons. The measurement of the distance to base stations should not be logged. There are no other security issues.

16.	Licensing	The service is free of charge and can be used by other partner.

No.	**Aspect**	**Indoor Navigation**
1.	Actors	Regular students, university newcomer, scientific researchers, lecturer, guests
2.	Purpose	To help organizing the students into groups
3.	Operating platform	Smart phones (Android)
4.	Processing steps	As inside of buildings GPS does not work well. Therefore we are using QR Codes for position determination instead. We need to place QR-Codes on several places. By taking a photo with the smart phone and reading the code it knows it location. Indoor navigation also takes usage of WiFi base stations or Bluetooth base stations in order to measure its position.
5.	Functional input	The goal of navigation: coordinate, name, or room number During usage the smart phone measures the distances to WiFi base stations.
6.	Functional output	A map, which shows the way of navigation to the goal. Presenting actions which guides you to the goal.
7.	Administration activity	There should be no administration activity. Every participant uses this service alone.
8.	Availability of the product	The app will be announces via special web-pages and via the Google market.
9.	Programming languages	Java
10.	Hardware requirements	Regular smart phones
11.	Environment	WiFi Hot spots, QR-Codes on places
12.	usage	The service can be used by all kind of persons.
13.	Scalability	As the service does not rely on central services it is scalable.
14.	Interoperability	There is no communication. Maps are provided in an open format.
15.	Security aspects	As the navigation of persons in buildings is something private, it is not allowed to trace the movements of persons. The measurement of the distance to base stations will not be logged by the infrastructure as it cannot be distinguished from internet access. On the smart phone at one goal guidance there have to be some information about the goal, needless to say. After reaching the goal and ending the session there are no longer any stored data about previous goals. For convenient reasons the user should be able to store recent goals. When starting a new guidance the user might be able to select his goal out of former goals. The user should be able to disable this function. No data are communicated to the market, the Google mail account or to other cloud services. There are no other security issues.
16.	Licensing	The service is free of charge and can be used by other partner.

No.	Aspect	Single Sign-On for a PC-pool
1.	Actors	Regular students, university newcomer, scientific researchers, lecturer, guests
2.	Purpose	To help organizing the students into groups
3.	Operating platform	Smart phones (Android)
4.	Processing steps	By holding a smart phone beside a PC we get access to the system and the services. PCs are required to be equipped with NFC Card reader and some security software.
5.	Functional input	A keyword stored on the smart phone.
6.	Functional output	Access granted or denied.
7.	Administration activity	There should be no administration activity. By setting up a regular user account the presence of the smart phone should provide access to his account.
8.	Availability of the product	The app will be announces via special web-pages and via the Google market.
9.	Programming languages	Java
10.	Hardware requirements	Regular smart phones with NFC
11.	Environment	There are software installations required on selected stations.
12.	usage	The service can be used by all kind of persons.
13.	Scalability	As the service does not rely on central services it is scalable.
14.	Interoperability	There is some communication between the PC and the smart phone. All communicated data are encrypted in order to provide security.
15.	Security aspects	Security is here a key issue. The user password has to be protected again spy out attempt. There is a need for
16.	Licensing	The service is free of charge and can be used by other partner.

Requirements related to the use of open-source system (OSS)

The project uses mostly open source. As the used operation system (android) widely comes as an open source system. Exceptions are special hardware driver and additional software. Compiler and SDK are open source. For NFC some special closed source driver software is used. But this circumstance causes no effect the usage of the project result. Within the indoor navigation system maps are used. The project uses own maps or imports them from open street map.

Operating Platform and operating system

Within the smart phones everything is carried out as an app. It can be loaded from web pages or via the market. The operating system that can run the application is the Android version 2.2, 2.3, 2.4, 4.0. For Single Sign-On, a special application is required on the used PC. It is running as a background demon under the Linux system or can also be used on Windows 7.

4. Thermi

i. Environmental Pollution Monitoring System

Description

The proposed service aims in the on-line monitoring of the atmospheric solution in the City of Thermi via a wireless sensor network. Monitoring atmospheric pollution can lead and promote in one hand public awareness about the environment and ways to reduce greenhouse emissions and in the other hand to help on the decision making for actions that can reduce these emissions by the City of Thermi. The proposed system will consist of a small number of atmospheric pollution measurement stations placed throughout the City of Thermi. Each station will be a node of an overall wireless sensor network. A number of sensors will be connected to each node or station and sensor measurement data will be directed through the node and a gateway to a server were they will be saved, analyzed and used to present levels of atmospheric solution through a web interface. The wireless interface between each node and the gateway will be based on the ZigBee 802.15.4 protocol and between the gateways and the main server will be based on the Wi-Fi IEEE 802.11b/g protocol. The system will use the existing Wi-Fi network of the City of Thermi and thus the gateway will be installed in one of the hot spots that are in operation. As the ZigBee protocol supports a specific distance between nodes and between nodes and gateway, there might be a condition where extra gateways to serve as repeaters will need to be installed given the geographical dispersion of the City.

Service release

At the moment, the municipality of Thermi runs a tender for the creation of the service. The first version is expected to be released during August 2012.

Open Approach method

The service will be partly developed using open approach. This refers to the front end of the application (the way that the information from the sensors is presented to the public.)

Second Innovation Cycle: First release expected during August 2012.

Third Innovation Cycle: Second release expected during October 2012.

Users will be contacted regarding design and functionality decisions. A few lead users will also be involved.

Open Source Software and tools for the sustainability of communities

This service is an Open Source software and it will be released under GPL v3.0 open source license.

It is expected that the two following types of communities will follow the project and actively support the service:

- The community of developers that build applications for smart cities
- The community of developers that build applications using sensors

The following open source infrastructures will be used:

- **Github** for the code repository, version control, issue tracking/project management & developers wiki
- **URENIO website** for the dedicate website, blog, development blog, documentation & support
- **Google Groups** for the Community Mailing List
- **UserVoice**, **Google Moderator** and **LimeSurvey** for Users Feedback
- **Transifex** web service for collaborative translation
- **Google Analytics** for Usage Statistics

Actors

There are two types of users or actors of the specific service: the citizens or tourists visiting the City and the City officials. For each of the two types of users there are different requirements related to the way that they use and they are informed of the service and different requirements of the privileges they have regarding the management and the administration of the service.

Use cases

a) **Use Case 1**: Citizens or city visitors using the air quality information. A citizen can be informed about the service through the City’s public announcements either via the press or via printed announcements placed on City buildings or facilities. An effort must be placed after the installation and start of operation of the system for the citizens to be informed and reminded of the availability of the service and the methods and ways that they can use it. The service will be available through the internet from either dedicated web-site or from the official City of Thermi website. One will be able to access the data for the air quality by using his/hers smart phone, PDA, ipad, laptop or any other mobile device that has the ability to connect to the web. Neither the citizens nor the visitors will have any administrative or management privileges for the service but a communication channel must exists so that comments and questions can be directed to the administration. This will be done electronically by using a simple fill-in form or by electronic mail or other means. The service to be presented and used by citizens and visitors will only require web browser and nothing else. The service will be an informative channel of the air quality of the City, presenting data that can be increase environmental awareness and help on the everyday actions taken by the citizens to improve their quality of living. One must note that given the nature of the service one cannot differentiate the citizens and visitors in sub-groups based on their age, sex, and other characteristics as the need for the service is common for all.

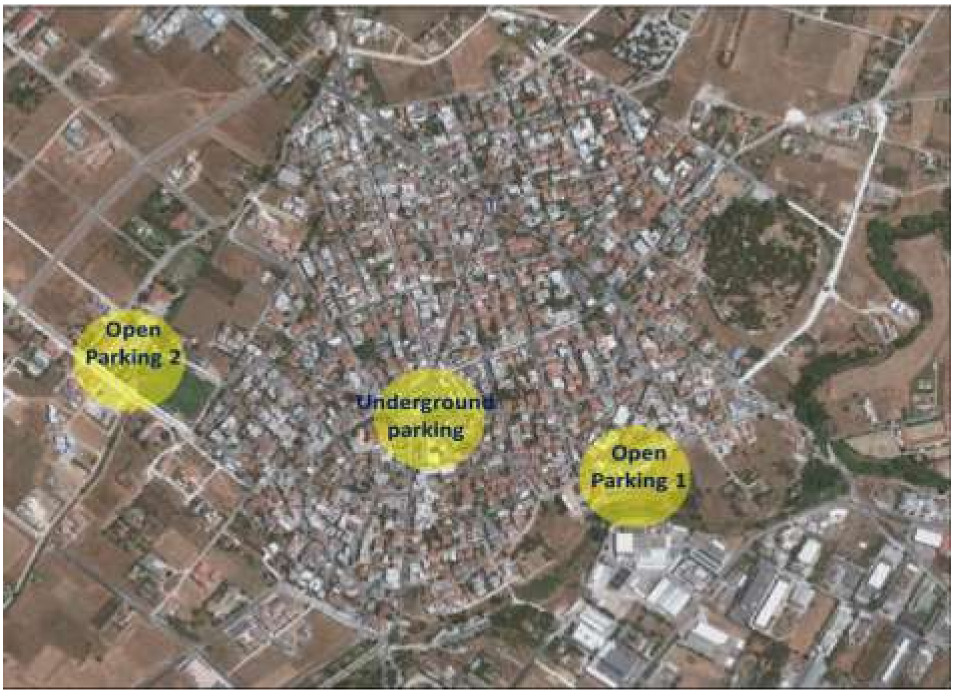
b) **Use Case 2**: City Officials using the service. The City officials using the service can focus their attention into more action related issues. Monitoring air pollution and more specifically monitoring the levels of specific gases such as CO_2, CO and NO_2 can help them introduce other services such as increased public transportation, reduce car usage in the City center, introducing toll in congested areas, and others to help them reduce emissions and be compliant with the treaty of 20% reduction in emitted greenhouse gases. The City officials will be responsible for the administration and management of the service. This will be an easy task which will not require heavy human and financial resources, as the service is designed in such a way that after hardware and software installation can run indefinitely if properly maintained.

ii. Parking Spaces Availability

Description

Parking Spaces Availability provides real-time parking for garages in city's center. The application can be accessed through the web or a Smartphone application. The website refreshes regularly to keep up with the latest information available, so that visitors will know the geographic position of parking spaces availability and a numerical update for the number of spaces available. The smartphone application provides location based service to mobile users and displays the current parking spaces availability of the closest parking station. The information will be also shown in three smart display panels located at key points in the city.

More specifically, the application will provide real time information a) for the number of spaces available in the underground parking situated at the city center and b) information for the existence of two other open parking spaces, one on Mandritsa road (open parking 1) and one next to the lyceum of Thermi, on Rafailou Papadaki Kyriakou road (open parking 2) (Picture 1). At later stages of development the service could be connected to on-street parking seats that are metered by pay-and-display devices of the Municipality. It should be mentioned that all parking areas connected to the application are public (owned by the municipality of Thermi).



Picture 1. Location of the Underground and the Open parking areas.

A set of sensors at each of the electro hydraulic crossing barriers at the entry and the exit point of the underground parking at the city center will provide information to the central system about the incoming and outgoing vehicles and the system will calculate the number of available parking spaces according to the predetermined -by the administrator- capacity. The system stores incoming data to a recording database and updates the application's website as well as the display panels that are located at several places in the city center with the new spaces available. At this stage of development, information on the two open parking areas will be restricted to their presentation on a map. The application will benefit the drivers (citizens or visitors) as they will not need to search for a parking space, saving their time and fuel, but also the whole society by reducing useless traffic and CO_2 emissions.

Service release

At the moment, the municipality of Thermi runs a tender for the creation of the service. The first version is expected to be released during August 2012.

Open Approach method

The service will be partly developed using open approach. This refers to the front end of the application (the way that the information about free parking space is presented to the public).

Second Innovation Cycle: First release expected during August 2012.

Third Innovation Cycle: Second release expected during October 2012.

Users will be contacted regarding design and functionality decisions. A few lead users will also be involved.

Open Source Software and tools for the sustainability of communities

The Parking Spaces Availability is an Open Source Software and it will be released under GPL v3.0 open source license.

It is expected that the two types of communities will follow the project and actively support the service:

- The community of developers that build applications for smart cities
- The community of developers that build applications using sensors

The following open source infrastructures will be used:

- **Github** for the code repository, version control, issue tracking/project management & developers wiki
- **URENIO website** for the dedicate website, blog, development blog, documentation & support
- **Google Groups** for the Community Mailing List
- **UserVoice**, **Google Moderator** and **LimeSurvey** for Users Feedback
- **Transifex** web service for collaborative translation

- **Google Analytics** for Usage Statistics

Actors

There are five types of actors of the specific service: a) citizens, b) drivers/mobile users, b) city officials, particularly the municipal traffic police and the technical service of the city, c) the system and d) the administrator. These actors are involved in a number of use cases that are described below.

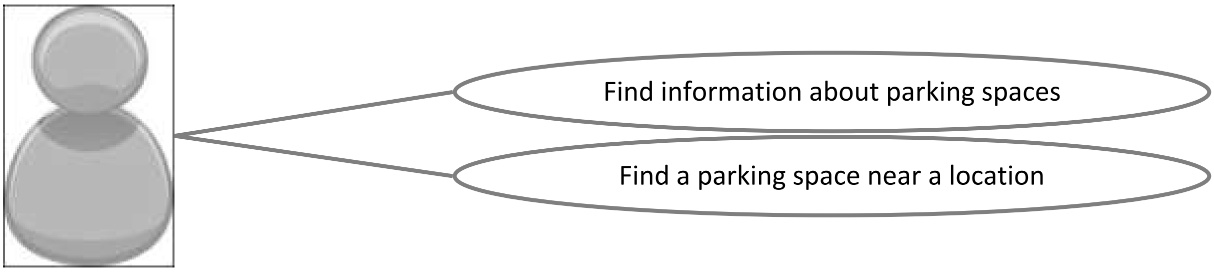

Find information about parking spaces
Find a parking space near a location

Figure 1. Citizens

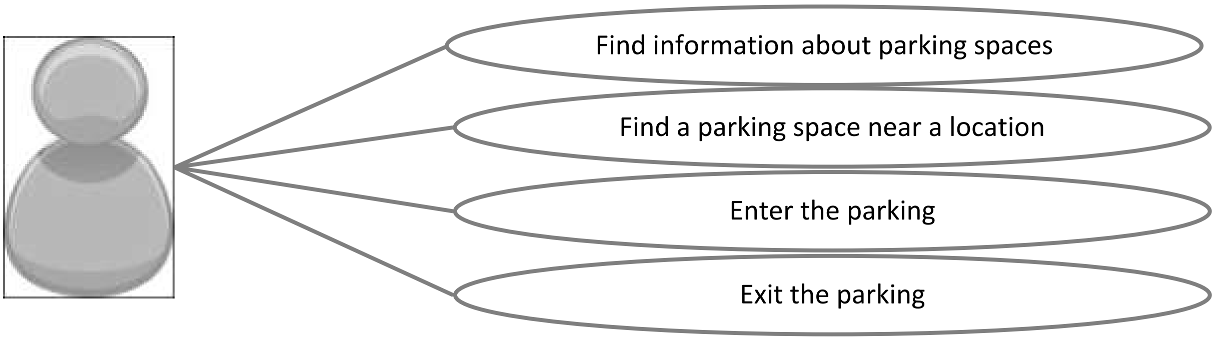

Find information about parking spaces
Find a parking space near a location
Enter the parking
Exit the parking

Figure 2. Drivers/Mobile users

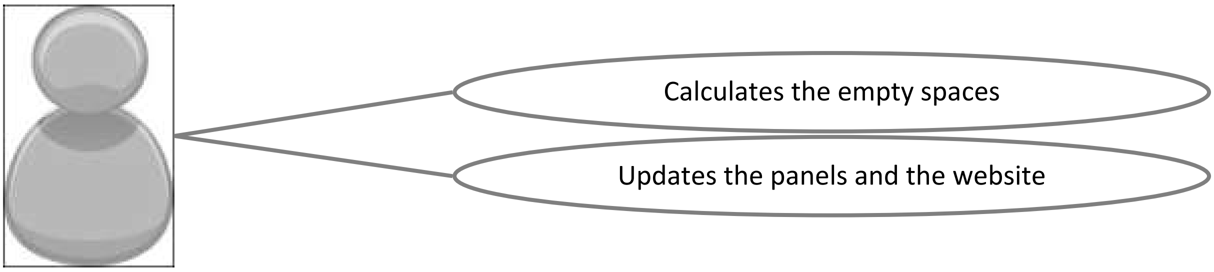

Calculates the empty spaces
Updates the panels and the website

Figure 3. System

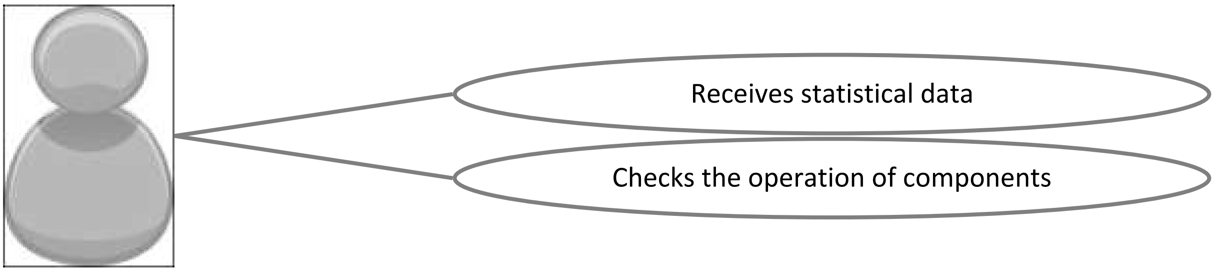


Figure 4. Administrator

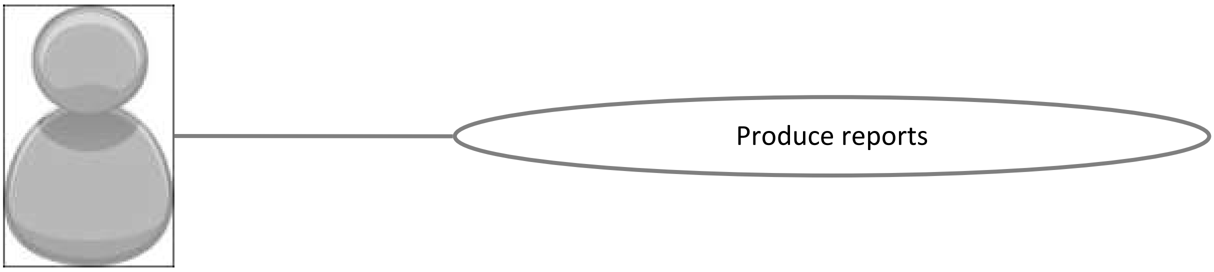


Figure 5. City officials

Use-case cards

Use case name
Find information about parking spaces
Summary
Before departure - or while driving - the driver has the possibility to find information on parking spaces in the city of Thermi. Additional information, such as the number of available spaces in each parking area, can be also provided.
Actors
Primary actors: citizen, mobile user/driver Secondary actor: the system
Preconditions
Main sequence: The user has installed the smart-phone application or the user visits the homepage of the application website. Alternative sequence: The driver will pass by a point where a display panel is located
Description of main sequence
1. The user enters the application 2. The user watches the map with available parking spaces 3. The user selects a parking place to find additional information 4. The user can see the parking spaces availability
Alternative 1
1. The driver passes by a display panel at one of the city entrances 2. The driver receives information on existing parking spaces and availability of parking places.
Postconditions
The driver has found information about parking spaces.

Use case name
Find a parking near location
Summary
Before departure - or while driving - the driver has the possibility to check parking availability near a destination or his/her location. Additional information, such as the number of available spaces in each parking area, can be also provided.
Actors

Primary actor: citizen, mobile user/ driver

Secondary actor: the system

Preconditions

Main sequence: The user has installed the smart-phone application or the user visits the homepage of the application website.

Alternative sequence: The driver will pass by a point where a display panel is located

Description of main sequence

1. The user enters the application
2. The user selects ‘find parking near destination’ link
3. The user submits the destination (an address or a point of interest) or selects a point on the map (drag and drop feature)
4. The system provides the closest garages
5. The user can see the parking spaces availability

Alternative 1

1. The mobile user launches the application
2. The user selects ‘find a parking near me’ link
3. The system checks the user’s position
4. The system presents on a map the parking spaces that are located near the user

Alternative 2

1. The driver passes by a display panel at one of the city entrances
2. The driver receives information on existing parking spaces and availability of parking places.

Postconditions

The driver has found information about parking spaces near a point of interest/location

Use case name

A driver enters the parking

Summary

The driver has information that the parking has available parking spaces. He/she enters the parking and parks the car. A parking space has been occupied.

Actors

Primary actor: Mobile user/ driver

Secondary actor: system

Preconditions
Main sequence: The user has been informed about the availability of parking spaces Alternative sequence: The drivers has been informed about the location of the open parking spaces
Description of main sequence
1. The driver enters the parking 2. The sensor sends the information that a car has entered to the 'hub' 3. The 'hub' communicates to the system and the system re-calculates the number of available parking seats in the specific parking 4. The system sends the new information to the display panels and updates the online application 5. The user parks his/her car in an empty spot 6. An empty spot has been occupied
Alternative 1
1. The driver enters the open parking 2. The driver parks his/her car 3. An empty spot has been occupied
Postconditions
The driver has parked his/her car and a parking space has been occupied.

Use case name
A driver exits the parking
Summary
The driver walks in the parking where his/her car is. He/She pays for the staying and drives out the car. A parking space has been emptied.
Actors
Primary actor: Mobile user/driver Secondary actor: system
Preconditions
The driver has paid for the staying at the underground garage.
Description of main sequence

1. The driver takes the car and exits the parking 2. The sensor sends the information that a car has exited to the 'hub'. 3. The 'hub' communicates to the system and the system re-calculates the number of available parking seats in the specific parking 4. The system sends the new information to the display panels and updates the online application 5. The parking has one empty parking spot
Alternative 1
1. The driver exits the open parking 2. A parking space has been emptied
Postconditions
The driver has taken his/her car and a parking space is emptied.

Use case name
Calculate empty spaces
Summary
The system calculates the number of empty spaces according to the information that receives from the sensors and the level of availability set by the administrator.
Actors
Primary actor: System Secondary actor: administrator
Preconditions
The administrator has set the level of parking availability, i.e. the number of empty spots that exist in the underground parking.
Description of main sequence
1. The administrator sets the number of available spots 2. The system receives data on entering/exiting cars from the hub located in the underground parking 3. The system calculates changes in the parking availability 4. The system updates the application and the information on display panels.
Postconditions
The number of empty parking spots has been updated according to the information received to the system.

Use case name
Receive statistical data
Summary
Administrator is able to receive statistical information on the number of entries/exits of cars and on the peak hours in parking finder.
Actors
Administrator
Preconditions
The system should store data for a determined period of time.
Description of main sequence
1. The system stores data for at least a month time period 2. The administrator enters the administrator interface and exports the data for a specific period of time 3. The administrator sends the data to the city officials responsible for traffic regulation and mobility management.
Postconditions
Statistics on the system have been extracted and can be used for fuelling indicators and statistical reports.

Use case name
Check operation of components
Summary
The administrator can check the operation of the different components and the communication between them, as part of monitoring the application.
Actors
Administrator
Preconditions
The administrator has logged in to the system
Description of main sequence

1. The administrator logs in to the system 2. The administrator clicks on the 'spaces available' link. 3. The administrator checks consistency with the underground parking operation system 4. The administrator selects 'message on display panels' and checks consistency with the previous two.
Postconditions
The administrator has checked the operation of the system.

Use case name
Produce reports
Summary
City officials and particularly, the traffic police and the technical service of the city can access information from the system about the peak hours in finding parking and adjust policies and practices for better mobility management within the city. The information retrieved will provide insight on the peak hours per day/week, the percentage of filled spots per hour etc.
Actors
City officials
Preconditions
The system should store data for a determined period of time and the administrator extracts the data.
Description of main sequence
1. The administrator exports the data for a specific period of time and sends it to the city officials 2. The city officials elaborate the data and produce reports with tables and figures 3. The information is used in policy making
Postconditions
City officials have produced reports based on the system's data.

iii. City Fix Application

Description

City Fix enables residents to report local problems such as discarded trash, burned lighting, broken tiles on sidewalks, illegal advertising boards, etc. The application can be accessed through the web or a Smartphone application. The tool is centered on a web-based map that displays all user comments. Users may add comments, suggest solutions for improving the environment of their neighbourhood, or add video and pictures and they can be informed about the solving stage of the reported issue. E-mail alerts are also available.

More specifically, CityFix is a Joomla based component to allow community and citizens reporting issues, in a highly transparent manner, about their city and municipality. Problems are organized in categories listed in a drop-down menu which may include trash collection, street furniture repairs, such as playground equipment or lighting, road problems, water utilities etc. The location of the issue reported is depicted either by selecting a point on a map or by submitting an address. The status of the issue solving process can be described as filed, read-proceeded, under repair/construction, solved. Citizens can submit their requests after registering. The request for service is form-based and it is automatically sent to the appropriate department for settlement. After filling and submitting the form with the problem, the citizen can be informed about its solving process by an e-mail that will be automatically sent by the system with the problem's status update. The application also includes polls, discussion forum and comments regarding solutions to community problems. Therefore, it gives the step for citizens not only to discover other citizens' concerns but also to allow them building conversations around community issues and even vote so as to alert municipality and people to take action.

Service release

A prototype of the application was made available during the month of October 2011. The first version of the application was installed in the official server of the Municipality of Thermi on 01/02/2012 (http://www.dimosthermis.gov.gr/smartcity/improve/). Due to server problems the application moved to a new server on 12/03/2012 (http://smartcity.thermi.gov.gr/improve/). The service was released under GPL v3.0 open source license on 01/03/2012 (https://github.com/icos-urenio/Improve-my-city). It is also released for the citizens of Municipality on 02/04/2012.

Open Approach method

The service will be developed using open approach. This refers both to the front end and back end of the application.

First Innovation Cycle: A prototype was deployed on October 2012. The first release of the service was done on the 1st of February, 2012.

Second Innovation Cycle: This Innovation Cycle is expected to include two releases: the first one on April 2012 and the second one is expected to be available on July 2012.

Third Innovation Cycle: Second release expected during October 2012.

A new version is expected after the end of each innovation cycle.

In the first innovation cycle the functionality of the prototype was testing by URENIO's developers. A lot of improvements arisen from this process. The prototype was demonstrated to the Mayor of Thermi who was very positive on the service. Later the prototype was presented to the Department of Strategic Planning. From employees comments emerged a lot of changes regarding the names of the issues' categories and the information flows. In the end, the first version was presented to the employees that will be the administrators of the service. Their comments led to some usability improvements in the administration back end.

During the 2nd innovation cycle the service will be tested with citizens and lead users. Administrators will be the lead users together with the citizens that express their interest during the validation survey. During the 2nd and 3rd cycle it is expected the involvement of developers from Joomla community.

Open Source Software and tools for the sustainability of communities

The City Fix Application is an Open Source Software and it was released under GPL v3.0 open source license.

As the application is a Joomla component it is expected that the community of Joomla developers will follow and support the project. Moreover, the community of developers that build applications for smart cities could be actively involved in the support of the service.

The following open source infrastructures will be used:

- **Github** for the code repository, version control, issue tracking/project management & developers wiki
- **URENIO website** for the dedicate website, blog, development blog, documentation & support
- **Google Groups** for the Community Mailing List
- **UserVoice**, **Google Moderator** and **LimeSurvey** for Users Feedback
- **Transifex** web service for collaborative translation
- **Google Analytics** for Usage Statistics

Actors

There are four types of actors of the specific service: a) citizens/users , b) city officials in municipal departments, c) the system and d) the administrator. These actors are involved in a number of use cases that are described below.

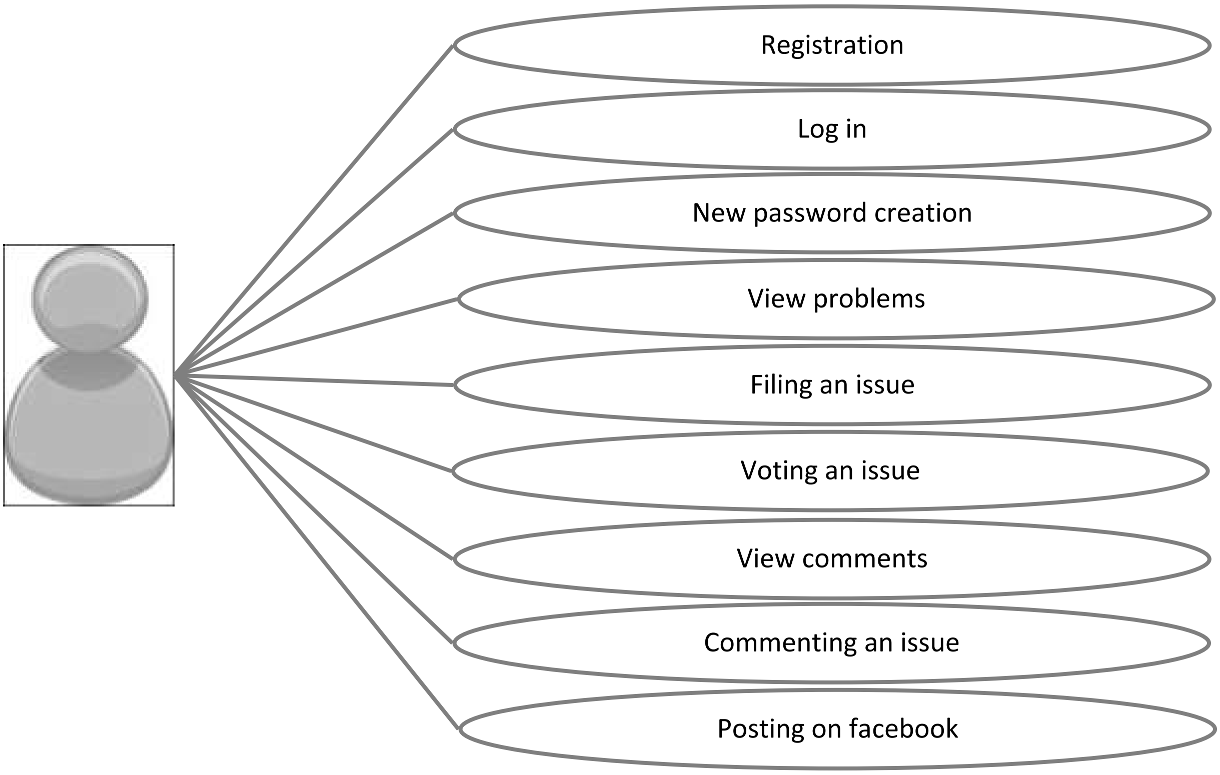


Figure 1. User

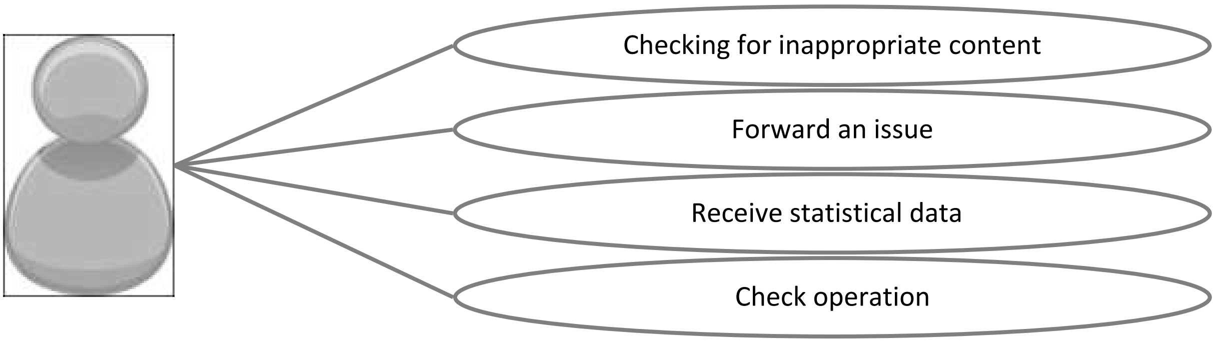


Figure 2. Administrator

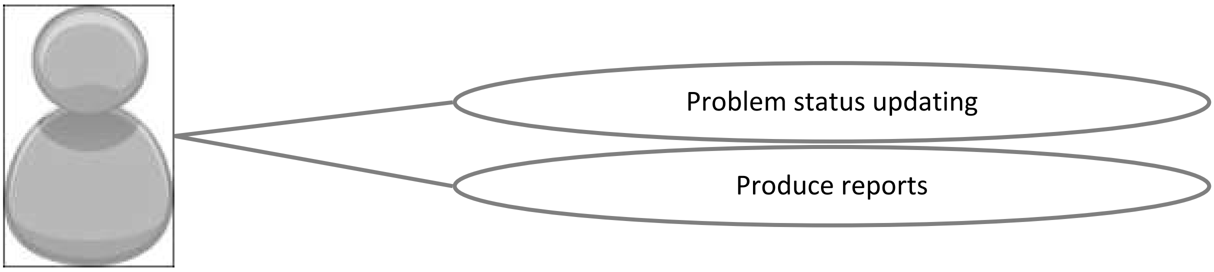


Figure 3. City officials

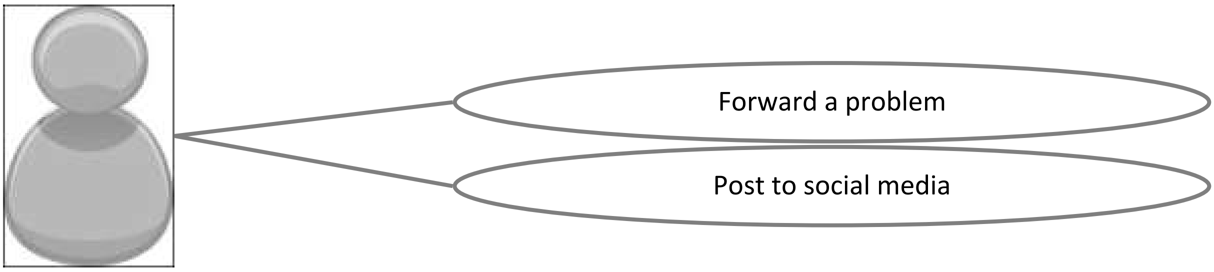


Figure 4. System

Use case name
User registration
Summary
The citizen enters the application for the first time and submits his/her personal information. Registration is a prerequisite for using the application and primarily consists of creating a username and a password.
Actors
Primary actor: User Secondary actor: system
Preconditions
The user is human and not a registered member of the website.
Description of main sequence
1. The user navigates to the homepage and selects "registration" link 2. The system displays the registration form 3. The user enters an e-mail address, a username and a password (and a confirmation password) and the CAPTCHA word. 4. The system checks CAPTCHA word and if the e-mail already exists. 5. The system checks if the username and password correspond to the specifications set (number and type of characters) 6. The system creates a new member profile and sends a confirmation link to the user's e-mail. 7. The user checks his/her e-mail and selects the confirmation link sent by the system. 8. The system accepts the confirmation link and requests the user to log in submitting his/her username and password
Alternative 1
1. The user navigates to the homepage and selects "registration" link 2. The system displays the registration form 3. The user enters an e-mail address, a username and a password (and a confirmation password) and the CAPTCHA word. 4. The system checks CAPTCHA word and if the e-mail already exists. 5. The e-mail already exists. 6. The system informs the user that the e-mail address belongs to a registered user.

Alternative 2
1. The user navigates to the homepage and selects "registration" link 2. The system displays the registration form 3. The user enters an e-mail address, a username and a password (and a confirmation password) and the CAPTCHA word. 4. The system checks CAPTCHA word and if the e-mail already exists. 5. The CAPTCHA word is incorrect 6. The system recognizes the user as not human and does not allow registration. 7. The system displays the registration form again.
Alternative 3
1. The user navigates to the homepage and selects "registration" link 2. The system displays the registration form 3. The user enters an e-mail address, a username and a password (and a confirmation password) and the CAPTCHA word. 4. The username or the password do not correspond to the specifications set (number and type of characters) 5. The system presents with red letters an indication on how the username password must be 6. The users corrects the username/ password 7. The system creates a new member profile and sends a confirmation link to the user's e-mail. 8. The user checks his/her e-mail and selects the confirmation link sent by the system 9. The system accepts the confirmation link and requests the user to log in submitting his/her username and password
Postconditions
The user is now a registered member and can log in.

Use case name
User log in
Summary
The user provides username and password to log in and use the application.
Actors
User, system
Preconditions

The user is not logged in but he/she is a member of the website.
Description of main sequence
1. The user navigates to the application and click the “log in” button 2. The system displays the log in screen 3. The user enters the username and password and clicks the “log in” button 4. The system authenticates the user 5. The information is valid and the system navigates the user to the homepage of the application
Alternative 1
1. The user navigates to the application and click the “log in” button 2. The system displays the log in screen 3. The user enters the username and password and clicks the “log in” button 4. The information provided by the user is invalid 5. The system denies access to the application
Postconditions
The user is logged in and can use the application

Use case name
New password creation
Summary
The registered user tries to log in but has forgotten his/her username or password. The system allows the user to create a new password.
Actors
Primary actor: user Secondary actor: system
Preconditions
The user is a registered member and has not logged in.
Description of main sequence

1. The user navigates to the homepage of the application and click the “log in” button 2. The system displays the “log in” screen 3. The user has forgotten his/her password and selects the “Forgot your password?” link 4. A new confirmation link is sent to the e-mail of the user 5. The user checks his/her e-mail and selects the confirmation link 6. The system accepts the confirmation link and requests the user to log in submitting a new username and password 7. The user has created a new password and can now log in to the application
Postconditions
The user has created a new password and can now log in to the application

Use case name
View issues
Summary
The user can visit the application and see issues that have been filed by registered users. Issues can be viewed on the map and filtered by category, chronological order, geographical boundaries at a radius from a point of interest set on the map, according to the number of votes etc.
Actors
User
Preconditions
The user has to launch the application.
Description of main sequence
1. The user enters the application 2. The user sees the list of issues reported and the status 3. The user selects an issue and views more details
Postconditions
The user has vied the issues reported

Use case name
Filing an issue
Summary

The user submits an issue/ request to the application within a problem category. He/she specifies location of the issue and adds extra material (if needed) such as a photo or a video.
Actors
User
Preconditions
The user has logged in and has selected a category of issues.
Description of main sequence
1. The user navigates to the “report an issue” tab 2. The system displays the filing form 3. The user selects an issue category from a drop down list and describes the issue. 4. (optional) The user uploads a picture 5. The user specifies the location of the issue 6. The system receives the information, sends an e-mail to the administrator and forwards the request to the responsible municipal authorities. 7. The system publishes the request on the “Fix my city” tab.
Postconditions
An issue has been reported

Use case name
Voting an issue
Summary
All users can see issues reported but only registered are able vote the ones that think of most significant. The voting system will be a tool for setting priorities in municipal problem solving.
Actors
User
Preconditions
The user has logged in.
Description of main sequence

1. The user logs in 2. The user navigates to the homepage 3. The user views the issues reported 4. The user votes an issue on a 1-5 scale 5. After checking the desirable number the user selects the button “send”. 6. The system calculates again the total votes and presents the voting results next to the issue
Postconditions
The user has voted an issue which considers significant.

Use case name
View comments
Summary
The user can visit the application and view comments that have been filed by registered users in relation to issues reported.
Actors
user
Preconditions
The user has to launch the application.
Description of main sequence
1. The user enters the application 2. The user sees the list of issues reported and the list of comments at each one of them 3. The user selects a comment and views more details
Postconditions
The user has viewed comments on reported issues

Use case name
Comment an issue
Summary
All visitors of the application will be able to see the issues reported but registered ones will be able also to comment on them.
Actors

User
Preconditions
The user has logged in and the problem is still open.
Description of main sequence
1. The user navigates to the homepage 2. The user views the issues reported 3. The user adds a comment in the form under the last comment/ under the problem description 4. The user presses the button “submit”. 5. The system posts the comment under the issue or under the last comment, including username information and time and date of submission.
Postconditions
The user has posted a comment on an issue

Use case name
Posting an issue on Facebook
Summary
Registered users are able to see reported issues and post on facebook the ones that think of most significant. Posting on facebook will allow more publicity to an issue and can create a conversation about it outside the city fix application.
Actors
User
Preconditions
The user has registered. The user has a Facebook account that is connected to the same e-mail with the one given for registration to the service.
Description of main sequence
1. The user navigates to the homepage 2. The user views the filed problems 3. The user clicks on the post link under one issue 4. The system connects to the Facebook account of the user and posts the issue
Postconditions
The user has posted an issue to his/her Facebook profile

Use case name
Checking for inappropriate content
Summary
The application will be managed by the administrator which will remove any inappropriate content that has been inserted by a user.
Actors
Administrator
Preconditions
The administrator has received an e-mail from the system about a new registration.
Description of main sequence
1. The system receives a comment for a reported issue 2. The system publishes the comment 3. The system sends an e-mail notification to the administrator about the new comment 4. The administrator reads the comment 5. The administrator considers the content appropriate and performs no further action
Alternative 1
1. The system receives a comment for a reported issue 2. The system publishes the comment 3. The system sends an e-mail notification to the administrator about the new comment 4. The administrator reads the comment 5. The administrator considers the content inappropriate and removes it from the forum 6. The system sends a notification to the registered user in his/her e-mail that the content previously submitted has been removed for security reasons.
Postconditions
The administrator has checked and removed inappropriate content (if any)

Use case name
Forward an issue
Summary
The issues submitted by users are forwarded to the responsible municipal department for settlement, according to the category that the citizen has selected.
Actors

System, administrator
Preconditions
The problem has been submitted by the user and the system has accepted the request.
Description of main sequence
1. The registered user has reported an issue and the system has accepted it 2. The system matches the issue with the category that was selected by the user 3. The system forwards the issue to the responsible municipal department for settlement.
Alternative 1
1. In case where the issue is indicated as 'other' the system forwards the request to the administrator 2. The administrator recognizes the responsible authority/department for the issue and forwards the request to it
Postconditions
The administrator or the system has forwarded the problem to the responsible department for arrangement.

Use case name
Problem status updating
Summary
The status of the problems solving process can be described as open, acknowledged, and closed. The responsible authority informs the administrator by an e-mail that the problem has changed status and the administrator updates the status.
Actors
Administrator, city officials
Preconditions
The system updates the status of a request only after receiving formal respond by the municipal authority (in the form of an e-mail, a fax, a formal document).
Description of main sequence

1. The user files a problem 2. The system accepts and publishes the problem. 3. The system updates the problem status as “filed”. 4. The system forwards the problem to the responsible municipal department (according to the problem category specified) along with a request of proof of reception. 5. The municipal department system receives the request and sends a notification to the system 6. The system updates the problem status as read/proceeded.
Alternative 1
1. In case where the problem has been indicated as ‘other’ and the system forwards it to the administrator. 2. The administrator is responsible to deliver the request to another, non-registered to the system, authority.
Postconditions
The status of issue reported has been updated

iv. Tourism and Recreation Facilities Guide

Description

The application supports the creation of virtual tours of recreation facilities using interactive maps, 360° panoramas, video and three-dimensional images. It will be accessed through PCs, smartphones, screens and quick response (QR) codes embedded in the physical space of the city. It can be complemented by a series of sub-applications that present exhibitions and guide to exhibits of the Center for Science & Technology Museum on Smartphones.

An interactive map of the city will be enhanced with the superposition of points of interest such as: public buildings, monuments, parks etc. The service will be available through the web, and can be complemented with additional smartphone applications. Considering panoramas, the most common formats are Apple QuickTimeVR, jpeg and Adobe Flash, while in many cases, videos can be used instead. There is no need for special external devices interacting with the application.

The application will also support the creation virtual tours inside buildings (i.e. Museum of Science and Technology)

Access to “Tourism and Recreation Facilities Guide” application will be made through PCs, mobile phones, large touchscreens and quick response (QR) codes embedded in the physical space of the city centre.

Service release

A prototype of the application was made available during the month of October 2011. The first version of the application was installed in the official server of the Municipality of Thermi on 1/2/2012 (http://www.dimosthermis.gov.gr/smartcity/improve/index.php/infomap). Due to server problems the application moved to a new server on 12/3/2012 (http://smartcity.thermi.gov.gr/improve/infomap/). The service was released under GPL v3.0 open source license on 5/3/2012 (https://github.com/icos-urenio/Virtual-City-Tour-360). It is expected to be released for the public when the initial content (text and 360o panoramas) about the Points of Interest will be added.

Open Approach method

The service will be developed using open approach. This refers both to the front end and to the back end of the application.

First Innovation Cycle: A prototype was deployed on October 2012. The first release of the service was done on the 1st of February, 2012.

Second Innovation Cycle: This Innovation Cycle is expected to include two releases: the first one on April 2012 and the second one is expected to be available on July 2012.

Third Innovation Cycle: Second release expected during October 2012.

A new version is expected after the end of each innovation cycle.

In the first innovation cycle the functionality of the prototype was testing by URENIO's developers. A lot of improvements arisen from this process.

During the 2nd innovation cycle the service will be tested with citizens and lead users. During the 2nd and 3rd cycle it is also expected the involvement of developers from Joomla community.

Open Source Software and tools for the sustainability of communities

The Tourism and Recreation Facilities Guide is an Open Source Software and it was released under GPL v3.0 open source license.

As the application is a Joomla component it is expected that the community of Joomla developers will follow and support the project. Moreover, the community of developers that build applications for smart cities could be actively involved in the support of the service.

The following open source infrastructures will be used:

- **Github** for the code repository, version control, issue tracking/project management & developers wiki
- **URENIO website** for the dedicate website, blog, development blog, documentation & support
- **Google Groups** for the Community Mailing List
- **UserVoice**, **Google Moderator** and **LimeSurvey** for Users Feedback
- **Transifex** web service for collaborative translation
- **Google Analytics** for Usage Statistics

Actors

For the creation of use cases for "Tourism and Recreation Facilities Guide" service we have identified nine actors: 1) Generic Visitor, 2) Mobile Visitor, 3) Active Visitor, 4) Project Partner, 5) City Official, 6) Content Manager, 7) Administrator and 8) System. For each of them a number of use cases are defined.

Use cases visual list

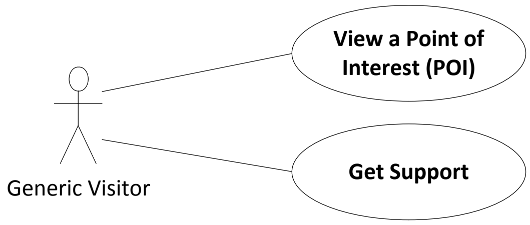


Figure 3 – Use cases involving the "Generic Visitor" Actor

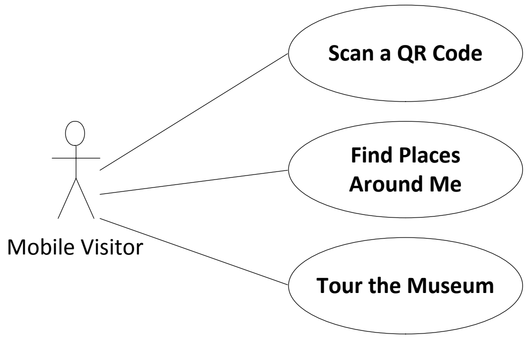


Figure 4 – Use cases involving the “Mobile Visitors” Actor

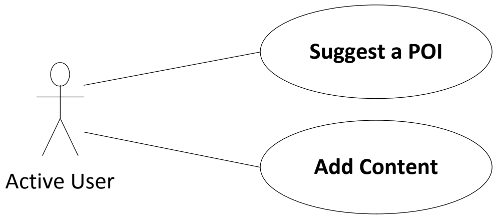


Figure 5 – Use cases involving the “Active User” Actor

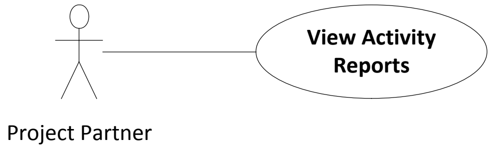


Figure 6 – Use cases involving the “Project Partner” Actor

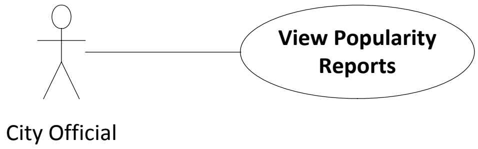


Figure 7 – Use cases involving the “City Official” Actor

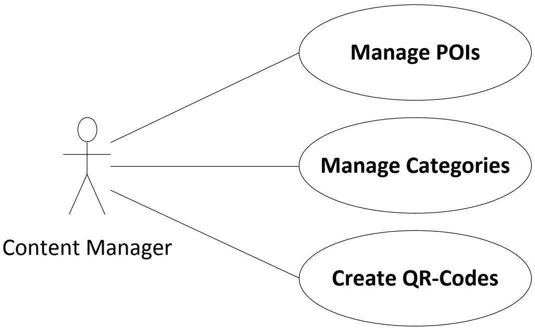


Figure 8 – Use cases involving the “Content Manager” Actor

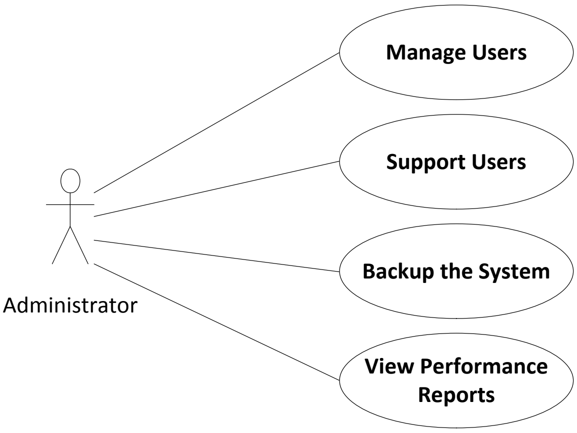


Figure 9 – Use cases involving the “Administrator” Actor

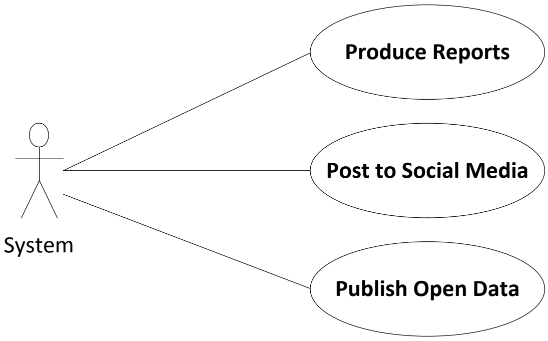


Figure 10 - – Use cases involving the “System” Actor

There are also two inclusion use cases: 1) Login user and 2) Check User’s Position. Inclusion use cases are determined to identify common sequences of interactions in several use cases, which can then be extracted and reused.

Use-case cards

Use case name
View a Point of Interest (POI)
Summary
The visitor navigates to the city via the map and view one or more Points of Interest.
Actors
Generic Visitor
Preconditions
The visitor visits the homepage of the application
Description of main sequence
1. The system displays all POIs on the city's map using different icons for different POI types. 2. The user clicks on "filters" button in order to view POIs from specific categories 3. The system displays the available filters. 4. The user selects one or more categories/subcategories. 5. The system displays POIs that belong to the selected categories on the map, as well as a list. 6. The user clicks on "large map" button. 7. The system enlarges the map so it covers all the available browser area. This makes the presentation of POIs more user friendly. 8. The user hovers over an entry on the map. 9. The system displays a pop-up window containing the name of the POI. 10. The user clicks on the name of the entry (either on the map or on the list). 11. The system displays a pop up window that contains a short description of the POI along with images, videos and panoramas. 12. The user click on a photo, video or panorama. 13. The system displays in a separate window a large version of photo, video or panorama.
Alternative 1
Step 2: The customer uses the search box located on the homepage by typing the name of a POI. The system displays the results or "not found".
Alternative 2
Step 4: The user selects also the "Most Popular" button. The system displays the ten most visited POIs in each category.
Postconditions

The visitor has view one or more POIs. He/she has read the information and viewed images, videos and panoramas.

Use case name
Get support
Summary
The visitor finds answers to common issues. Moreover, he/she contacts support team regarding problems encountered using the application.
Actors
Generic visitor
Preconditions
The visitor visits the homepage of the application.
Description of main sequence
1. The visitor clicks on "Get Support" button. 2. The system displays a page with information about how the visitor could use the application. In the same page it is also displayed a web form where the visitor can write a message for the support team. 3. The visitor describes the problem or makes a suggestion. He/she provides some personal details such as name and email. Optionally he/she can provide additional information regarding the problem. 4. The system confirms the submission of information. A support ticket is sent to support team (content manager & administrator) or to the related retailer.
Postconditions
The customer either has found an answer to the problem by using the provided information; either has submitted a request for support. The system has created a support ticket.

Use case name
Scan a QR-Code
Summary
A visitor who stands in front of a Point of Interest scans a QR code with his/her smartphone. The code is a shortcut for the webpage of this POI.
Actors
Mobile visitor

Preconditions
The visitor has a smartphone with a code reader application installed (The majority of smartphones have these applications preinstalled).
Description of main sequence
1. The visitor discovers a sign with a QR code next to POI. 2. The visitor launches a QR-Code reader application on his/her smartphone and scans the sign with phone's camera. 3. The QR –Code is converted to a web shortcut. 4. The visitor connects to the Internet through city's free Wi-Fi network. 5. The browser of the smartphone loads the shop's webpage where the visitor can find related information.
Alternative 1
Step 1: The visitor scans a QR-Code located on a stand in the city centre. This code is a shortcut for a webpage where the user can download smartphone applications for the services of Thermi's pilot.
Postconditions
The mobile visitor has find information about the location which he visits.

Use case name
Find Places Around Me
Summary
The mobile visitor is looking for nearby POIs
Actors
Mobile Visitor
Preconditions
The mobile visitor launches the Thermi's "Tourism and Recreation Facilities Guide" application or approaches one of the large touchscreens that are located in selected public buildings.
Description of main sequence

1. The mobile launches the application. 2. The system checks the user’s position. 1. The system presents on the city map the POIs that are located near the user. 3. The user filters information by “Category”. 4. The user touches a POI on the map. 5. The system displays name and address of the POI as well as a link for more information. 6. The user touches the link. 7. The system displays the page of the selected POI.
Postconditions
The visitor has found information about nearby POIs. The provided information are similar with the ones of the web application.

Use case name
Tour the Museum
Summary
The mobile visitor can view an interactive tour of the Science Center and Technology Museum "NOESIS" in his smartphone.
Actors
Mobile Visitor
Preconditions
The mobile visitor visits NOESIS or the homepage of the application.
Description of main sequence
1. The mobile user launches the application and selects the “Tour the Museum” option. 2. The system presents a number of available option such as: “About Noesis”, “The Museum”, “Exhibitions”, “Events”, “Services”, “Science & Technology Education”, etc. 3. The mobile user selects one of the available sections. 4. The system presents the information that is available under that section. 5. The user explores all sections using menu item.
Alternative 1
Step 1: The mobile user downloads the application either directly from Thermi pilot homepage either when he is visiting Noesis by scanning a QR-Code located inside the museum. This code is a shortcut for a webpage where the user can download the application.
Postconditions

The mobile visitor has browsed Noesis attractions. He found information about exhibitions, events, services, etc.

Use case name

Suggest a POI

Summary

A user suggests a POI to be added to application.

Actors

Active User

Preconditions

The suggested POI should not be available in the application.

Description of main sequence

1. The user hasn't found a POI that in his opinion is valued.
2. The user clicks the "Suggest a POI" button.
1. The system displays a web form where the user can insert basic information about the specific POI such as name, category & subcategory, and description. He also indicates it location on the city map.
3. The system confirms the submission of information.
4. The system stores the information to the database and makes it available to content manager.

Postconditions

A new POI has been suggested by a user.

Use case name

Add Content

Summary

A user can submit new content about an existing POI.

Actors

Active User

Preconditions

The user views a specific POI

Description of main sequence
1. The user clicks the “Add your Content” button available in the end of each POI presentation window. 2. The system displays a web form where the user can insert additional information about the specific POI. He/she is also able to upload photos, videos and panoramas. 2. The system confirms the submission of information and informs user that the submitted information will be published after its validation from content manager. 3. The system stores the information to the database and makes it available to content manager.
Postconditions
Additional information or new images, videos and panoramas have been submitted by a user.

Use case name
View Activity Reports
Summary
A project’s partner has access to statistics regarding overall activity in the “Tourism and Recreation Facilities Guide” application.
Actors
Project Partner
Preconditions
The project partner has logged in to his/her account.
Description of main sequence
1. The system displays a special page to the logged in project partner with statistics related to overall activity in the application. 2. The project partner chooses a time period. 3. The system shows statistics only for this period.
Postconditions
The project partner has a clear view about overall activity in the “Tourism and Recreation Facilities Guide” application.

Use case name
View Popularity Reports
Summary

A city official has access to statistics regarding users' activity in the "Tourism and Recreation Facilities Guide" application.
Actors
City Official
Preconditions
The city official has logged in to his/her account.
Description of main sequence
1. The system displays a special page to the logged in city officials with statistics related to overall business activities in the application. 2. The city official chooses a time period. 3. The system shows statistics only for this period.
Postconditions
The city official has a clear view about users' activity in the "Tourism and Recreation Facilities Guide" application.

Use case name
Manage POIs
Summary
The content manager uses a special section of the system in order to manage the registered POIs.
Actors
Content Manager
Preconditions
The content manager has logged in to administration area of the system.
Description of main sequence

1. The content manager accesses the administration panel and clicks the “Manage POIs” button. 2. The system displays a table with the available POIs. The table’s columns include basic information (ID, name, category, and status (published/un-published)) and a number of actions such as edit, change status, QR-Code and delete. There are also buttons for creation of a new POI and management of categories. 3. The content manager clicks on the name of a POI. 4. The system displays a web form where the content manager can change/insert information about the selected POI. There are also available a number of actions such as save, change status, preview, and delete. 5. The content manager inserts the information about the selected POI and clicks save. 6. The system stores the entry in the database and if its status is published it appears on the web.
Alternative 1
Step 3, Step 4: The content manager clicks the “Delete” button. A warning window is displayed. If he confirmed the action the selected shop will be moved on the recycled bin.
Alternative 2
Step 3: The content manager clicks the “Add New” button. The system displays a web form where he can add the required information about a new POI.
Postconditions
The content manager has added new, changed or deleted POIs.

Use case name
Manage Categories
Summary
The content manager uses a special section of the system in order to manage the registered POIs.
Actors
Content Manager
Preconditions
The content manager has logged in to administration area of the system
Description of main sequence

1. The content manager accesses the administration panel and clicks the “Manage Categories” button. 2. The system displays a table with the available categories. The table’s columns for each category include ID, name, status (published/un-published)) and a number of actions such as edit, change status and delete. The hierarchy of categories/subcategories is also presented. A button for creation of a new category is available. 3. The content manager clicks on the name of a category. 4. The system displays a web form where the content manager can change/insert information about the selected category. There are also available a number of actions such as save, change status, preview, and delete. 5. The content manager inserts the information about the selected category and clicks save. 6. The system stores the entry in the database.
Alternative 1
Step 3, Step 4: The content manager clicks the “Delete” button. A warning window is displayed. If he confirmed the action the selected category will be moved on the recycled bin. POIs that belong to the deleted category are not deleted but marked as “uncategorized”.
Alternative 2
Step 3: The content manager clicks the “Add New” button. The system displays a web form where he can add the required information about a new category.
Postconditions
The content manager has added new, changed or deleted categories.

Use case name
Create a QR-Codes
Summary
The Content Manager creates and prints QR-codes in order to be placed next to physical POIs.
Actors
Content Manager
Preconditions
The content manager has logged in to administration area of the system.
Description of main sequence

1. The content manager accesses the administration panel and clicks the “Manage POIs” button. 2. The system displays a table with the available POIs. 3. The content manager clicks on the “QR-Code” button that is located next to each POIs name. 4. The system presents the predefined available sizes for the QR-code (small, medium, large and extra-large). 5. The content manager selects the size according to QR-code usage (i.e. extra-large for the shop window, medium for an advertisement.) 6. The system creates the code and displays it as an image in png format. 7. The content manager prints the image or saves it for future use.
Postconditions
The content manager has created and printed a QR-code for each POI.

Use case name
Manage Users
Summary
The administrator uses a special section of the system in order to manage the registered users.
Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.
Description of main sequence
1. The administrator accesses the administration panel and clicks the “Manage Users” button. 2. The system displays a table with the registered users. The table’s columns include basic information such as: name, type (user types are similar to actors) and email. Next to each user there are three buttons which represents Activate, Edit and Delete actions. An option for the creation of new user is also available. 3. The administrator clicks on the name of a user or the “Edit” button. 4. The system displays a web form where the administrator can edit user’s profile. The information that is available for each user is related to user’s type. 5. The administrator makes the necessary changes and clicks “Save”. 6. The system stores the information in the database.

Alternative 1
Step 3: The administrator clicks the “Activate” button. The user is now active and is able to use the system.
Alternative 2
Step 3: The administrator clicks the “Delete” button. A warning window is displayed. If he confirmed the action the selected user will be deleted.
Alternative 3
Step 3: The administrator clicks the “Add New” button. The system displays a web form where he can add basic information (username, email and password) about the user. The system notifies the user by email about his new account.
Postconditions
The administrator has successfully managed existing users or created new.

Use case name
Support Users
Summary
The administrator uses a special section of the system in order to provide support to the users of application.
Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.
Description of main sequence
1. The administrator accesses the administration panel and clicks the “Open issues” button. 2. The system displays a list of the open issues created by users. 3. The administrator clicks on a issue title. 4. The system displays the user’s comment or request. 5. The administrator makes the necessary actions in order to solve the reported problem. 6. The administrator sends an email to the user with a solution to his/her problem. 7. The administration changes the status of the issue to “solved”. 8. The system removes closed issues into archive.
Postconditions

The administrator has successfully addressed a problem submitted by a user.

Use case name
Backup the System
Summary
The administrator uses a special section of the system in order to take a backup.
Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.
Description of main sequence
1. The administrator clicks the “Backup” button. 2. The system creates a copy of its current state. This copy includes all files as well as the database tables. 3. The system prompts the administrator to download the backup file in zip format. 4. The administrator saves the file in his computer.
Alternative 1
Step 1: The administrator clicks the “Restore” button. The system requires from the administrator to upload the backup file. The administrator uploads the file and the system executes the restore procedure.
Postconditions
The administrator has successfully backup or restore the system.

Use case name
View Performance Reports
Summary
The administrator has access to statistics regarding overall performance of the application
Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.

Description of main sequence

1. The administrator clicks the “Statistics” button
2. The system displays a special page with statistics related to overall performance of the application.
3. The administrator chooses a time period.
4. The system shows statistics only for this period.

Postconditions

The administrator has a clear view about overall performance of the “Tourism and Recreation Facilities Guide” application.

Use case name

Produce Reports

Summary

The system produces activity and performance reports for project partners, city officials and administrators.

Actors

System

Preconditions

The interested users click the “Statistics” button.

Description of main sequence

1. A, project partner, city official and administrator requests a report based on statistics collected during the system’s operation.
2. The system presents to project partners, city officials and administrators reports tailored to their needs.

Postconditions

The system has produced the reports.

Use case name

Post to Social Media

Summary

The system shares its content to most popular social media sites.

Actors

System
Preconditions
The content manager adds a new POI or a user views a POI.
Description of main sequence
1. The contact manager adds new a new POI to the database. 2. The system automatically posts the new content to pilot’s accounts on Facebook and Twitter.
Alternative 1
1. The contact manager adds new a new POI to the database. 2. The system automatically posts the new content to pilot’s accounts on Facebook and Twitter.
Postconditions
The system has shared the content to social networks.

Use case name
Publish Open Data
Summary
The system publishes part of its content in form of open data.
Actors
System
Preconditions
A number of open datasets has been created.
Description of main sequence
1. A user downloads an open dataset.
Alternative 1
Step 1: An external system connects to web service and retrieves an open dataset.
Postconditions
Part of the system’s data can be reused by other people or systems.

v. Virtual Marketplace and Crowd-Media

Description

The service aims to sustain the local marketplace and local businesses. It will consist of four subsystems / applications:

1. A **business directory** which will present the local businesses and professionals (about 400) on the city map. The information will be classified using a number of categories (hotels, restaurants, clothing stores, real estate, doctors, lawyers, etc.). Each entry will present a minimum amount of information about the specific store or professional, whereas the owners can add additional information about his/her company, products and services.
2. A **virtual representation of the local marketplace and shops** where the local storekeepers will be able to present their stores using text, photos and video.
3. A **coupon site containing promotional codes**, from local retailers and professionals, offering discounts to specific products and services. The visitors should print the coupons or store them to their mobile phones and bring them to local shops.
4. A **virtual supermarket** based on open data available from the relative price watch system of the Greek Ministry of Regional Development and Competitiveness. The system will enable users to compare consumer goods from local supermarkets in one central place, through the creation of a "personal basket of goods". Based on the price watch systems the basket will propose best prices and most suitable local store for purchases.
5. A **review engine** that assists customers in gathering local shopping information, posting reviews and opinions of local shopping-related content. The system will allow users to contribute different kinds of content, including reviews, photos, votes, quick tips and more. As result, a local social shopping network will be created.

The five subsystems will be interconnected allowing relevant information to flow among them. For example, the user who visits a store's page in the business directory will also have access to store's promotions and reviews (and vice versa).

Access to Virtual Marketplace will be made through PCs, mobile phones, large touchscreens and quick response (QR) codes embedded in the physical space of the city centre.

Service release

The first version of the service is expected to be released during the April 2012.

Open Approach method

All the components of the service will be developed using open approach.

Second Innovation Cycle: The first release of the service is expected to be delivered on April 2012. This Innovation Cycle is also expected to include a second release of the service on July 2012.

Third Innovation Cycle: Second release expected during October 2012.

During the first innovation cycle the concept of the application was presented to the members and council of the Association of Professional Traders of the Municipality of Thermi. The participants completed a questionnaire regarding the application. Their comments were very positive. In the 2nd innovation cycle the users will be actively involved in the design of the functionality of the application. The overall development will be done also in cooperation with the professional trades of Thermi.

Open Source Software and tools for the sustainability of communities

The Virtual Marketplace and Crowd-Media the service will be released under GPL v3.0 open source license.

It is expected that the community of developers that build applications for smart cities could be actively involved in the support of the service.

The following open source infrastructures will be used:

- **Github** for the code repository, version control, issue tracking/project management & developers wiki
- **URENIO website** for the dedicate website, blog, development blog, documentation & support
- **Google Groups** for the Community Mailing List
- **UserVoice**, **Google Moderator** and **LimeSurvey** for Users Feedback
- **Transifex** web service for collaborative translation
- **Google Analytics** for Usage Statistics

Actors

For the creation of use cases for “Virtual Marketplace and Crowd-Media” service we have identified nine actors: 1) Customer, 2) Mobile User, 3) Business Owner or Professional, 4) Retailer, 5) Project Partner, 6) City Official, 7) Content Manager, 8) Administrator and 9) System. For each of them a number of use cases are defined.

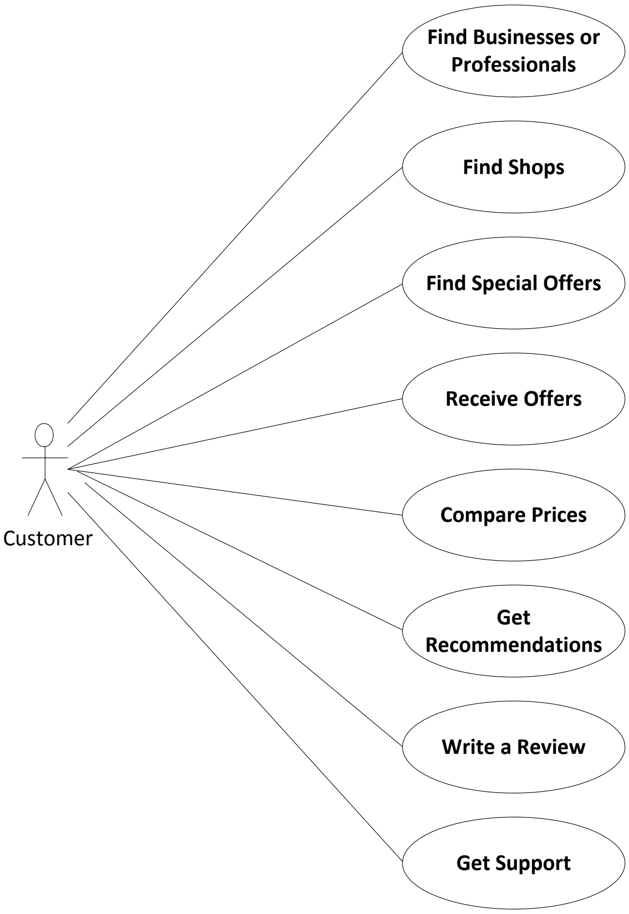


Figure 11 – Use cases involving the “Customer” Actor

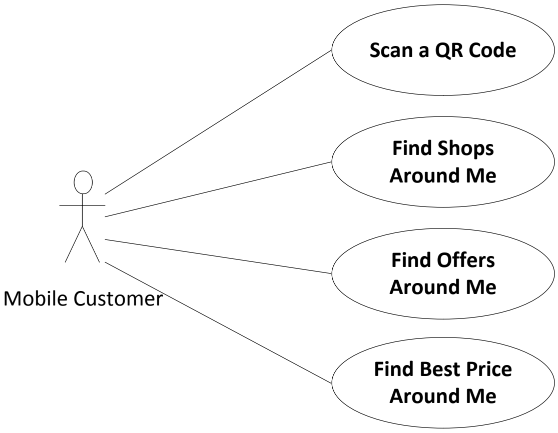


Figure 12 – Use cases involving the “Mobile Customer” Actor

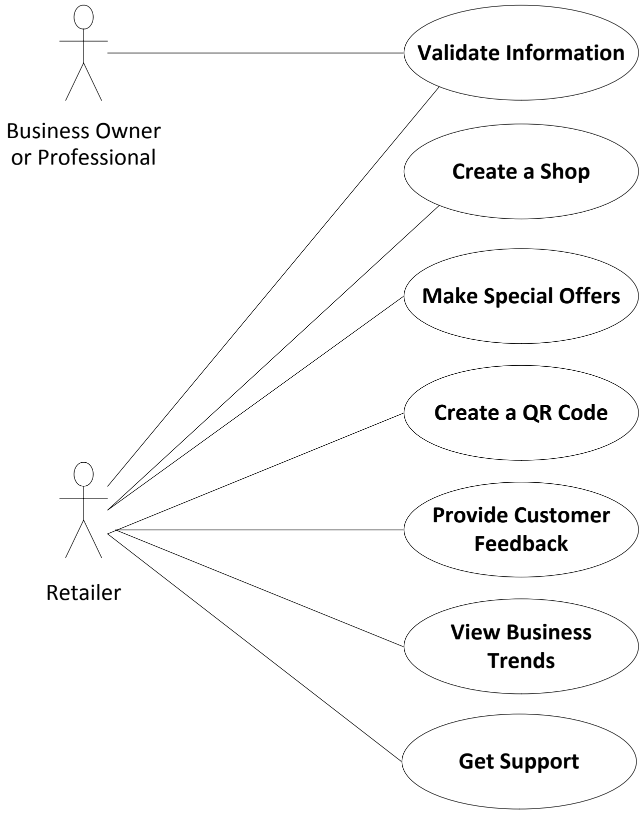


Figure 13 – Use cases involving the "Business Owner or Professional" and the "Retailer" Actors

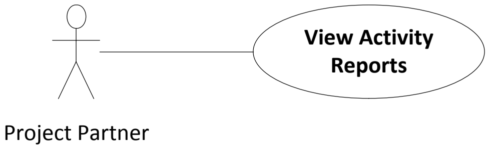


Figure 14 – Use cases involving the "Project Partner" Actor

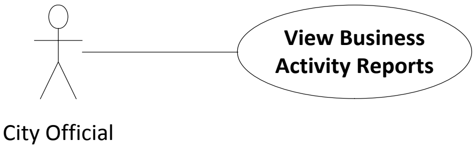


Figure 15 – Use cases involving the "City Official" Actor

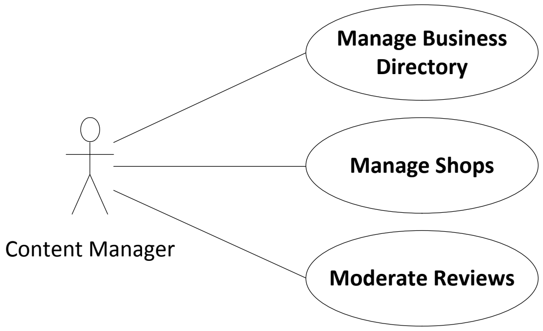


Figure 16 – Use cases involving the “Content Manager” Actor

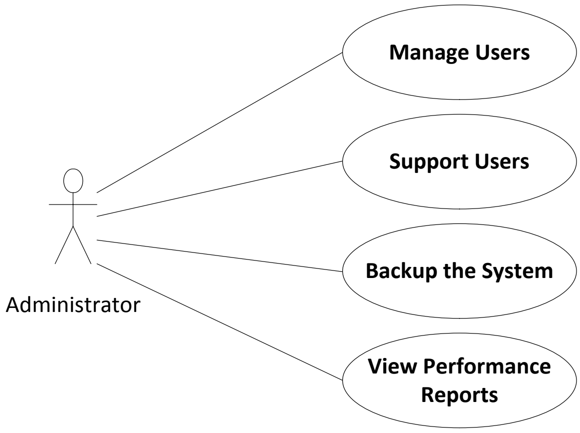


Figure 17 – Use cases involving the “Administrator” Actor

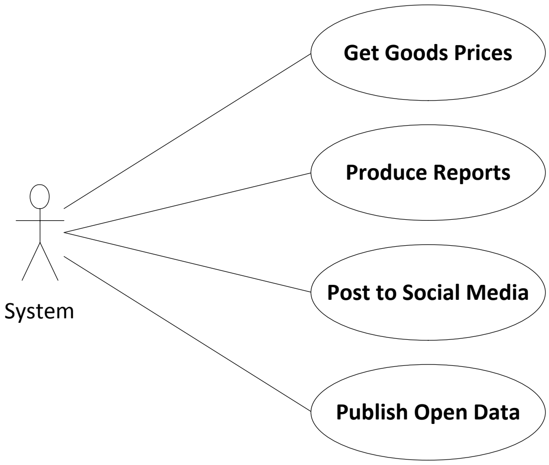
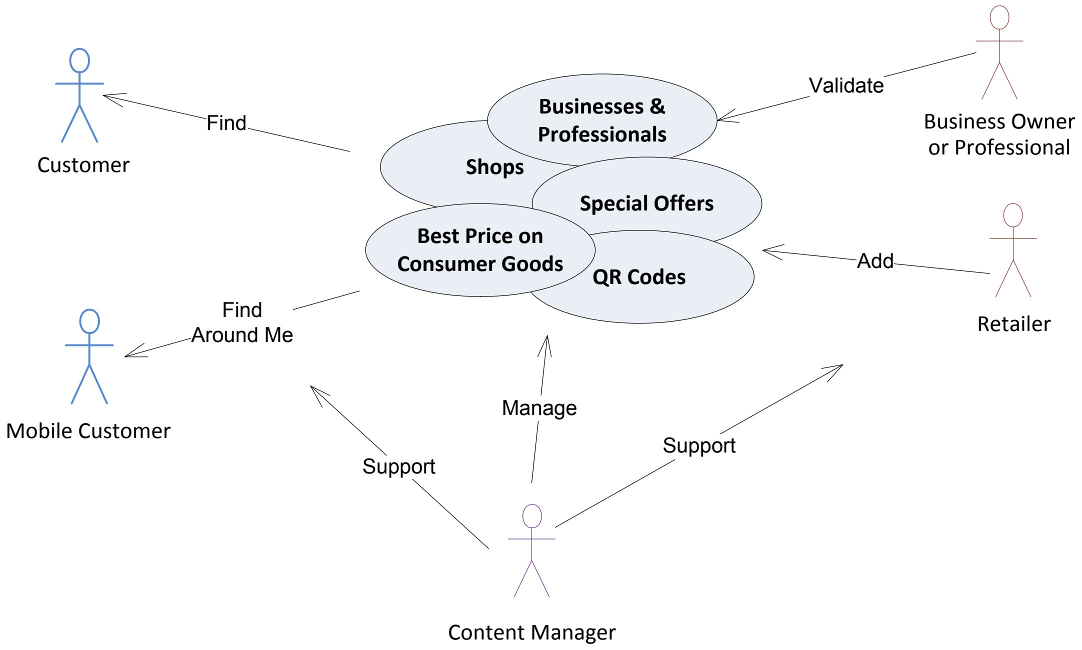
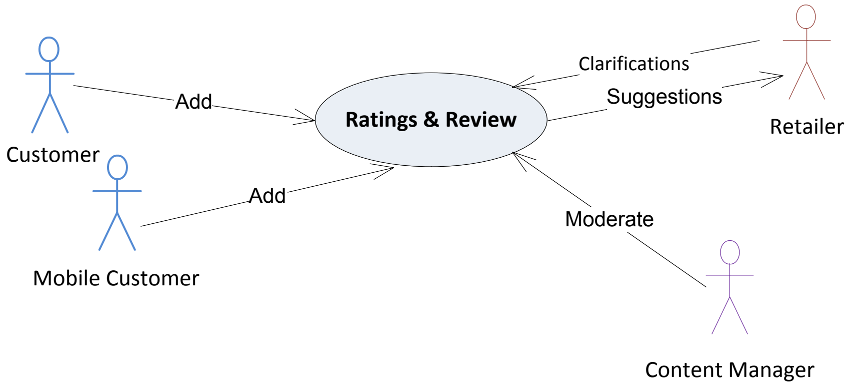


Figure 18 - – Use cases involving the “System” Actor

User interaction diagrams

The following diagrams show the fundamental interactions between the different actors and the core elements of the application.





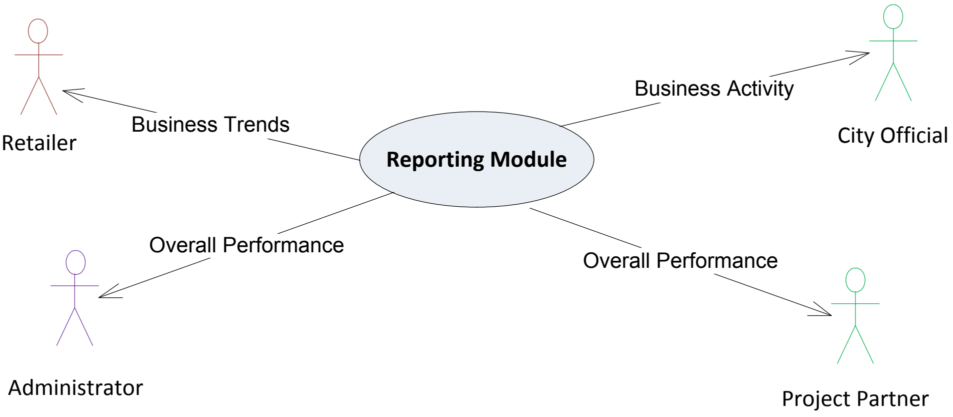


Figure 19, 20 21 – Interactions between actors and components

Use-case cards

Use case name
Find Business or Professional
Summary
The customer browses the Business Directory or navigates to the city centre via the map in order to find information about a Business or Professional
Actors
Customer
Preconditions
The customer visits the homepage of the application
Description of main sequence

1. Customer clicks on the “Business Directory” menu item. 2. The system presents a number of categories (hotels, restaurants, clothing shops, real estate, doctors, lawyers, etc.). 3. The user selects a category. 4. The system presents a list of businesses or professionals for the selected category. The list is ordered alphabetically. For each entry name and address will be shown. At the same time the entries are displayed on a map. 5. The user hovers over an entry on the map. 6. The system displays a pop-up window containing the name and the address. 7. The user clicks on the name of the entry (either on the list or on the map). 8. The system displays the page of the selected Business or Professional.
Alternative 1
Step 1: The customer uses the search box located on the homepage by typing a name of a Business or Professional. The system displays the results or “not found”.
Postconditions
The customer has found what he/she was looking for. He/she can read the information or make actions such as contact by email, print the page, send it by email, and share it in social networks.

Use case name
Find Shops
Summary
The customer is looking to find the shop that he/she is interested in.
Actors
Customer
Preconditions
The customer visits the homepage of the application
Description of main sequence

1. The customer clicks the “Local Marketplace and Shops” menu item. 2. The system presents the shops on the city map using different icons for different store types. The shops are also listed alphabetically by name. The shops’ types (categories) are also available in the same page. 3. The user hovers over an entry on the map. 4. The system displays a pop-up window containing the name and the address. 5. The user clicks on the name of the entry (either on the map or on the list). 6. The system displays the page of the selected shop.
Alternative 1
Step 1: The customer uses the search box located on the homepage by typing a name of a shop. The system displays the results or “not found”.
Alternative 2
Step 2: The customer can order shops by “Highest Rated”, “Most Reviewed” and “Special Offers”
Postconditions
The customer has found a specific shop. He/she can read the information or make actions such as contact by email, print the page, send it by email, and share it in social networks.

Use case name
Find Special Offers
Summary
The customer is looking for special offers in the city’s shops.
Actors
Customer
Preconditions
The customer visits the homepage of the application
Description of main sequence

1. The customer clicks the “Special Offers” menu item. 2. The system presents the list of special offers that have been submitted by registered retailers. The offers are classified by shop category. Each offer is presented by name and description. The offers are also presented on the map. 3. The user hovers over an entry on the map. 4. The system displays a pop-up window containing the name and the description of the offer. 5. The user clicks on the name of the offer (either on the map or on the list). 6. The system displays the page of the selected offer. 7. The user prints the given promotional code.
Alternative 1
Step 1: The customer can find special offers in each shop’s page.
Postconditions
The customer has found a specific offer. He/she can read the details and print the required coupon.

Use case name
Receive Offers
Summary
The customer can receive special offers by email.
Actors
Customer
Preconditions
The customer visits the homepage of the application
Description of main sequence
1. The customer first types his/her email address in a text box and then clicks the “Subscribe to Special Offers” button. 2. The system sends an email to the user with the verification code and clear instructions for the verification procedure as well as for the un-subscription process. 3. The user clicks the verification code link and visits a page which informs him/her about their successful subscription to special offers. 4. The system sends an email with the active special offers, to the registered users, daily. 5. The visitor visits the special offer’s page. 6. The user can be unsubscribed from the service.

Postconditions
The customer has been subscribed to the service.

Use case name
Compare Prices
Summary
The customer can compare consumer goods prices from local shops in one central place.
Actors
Customer
Preconditions
The customer visits the homepage of the application.
Description of main sequence
1. The customer clicks on the “Virtual Supermarket” menu item. 2. The system presents a number of categories (bakery, dairy, frozen, fruit & vegetables, drinks, beauty, etc.). The local supermarkets are also presented as a list and also on the city map. 3. The user selects a category. 4. The system presents a list of products for the selected category. For every product its price is given in each local supermarket. 5. The user selects his/her preferred supermarkets. If the user is logged in the system remember his/her preferences.
Alternative 1
Step 1: The customer uses the search box located on the homepage by typing a name of a product. The system displays the results or “not found”.
Alternative 2
Step 4: The customer can log in (If customer does not have account, the system creates an account). The system will use his/her saved preferences in order to show only the prices for favourite supermarkets.
Postconditions
The customer has compare consumer goods prices in different local supermarkets.

Use case name

Find Best Price
Summary
The customer gets recommendations on where he/she can find the best price for a selection of consumer goods.
Actors
Customer
Preconditions
The customer has added one or more products in the basket.
Description of main sequence
1. The customer selects a number of preferred local supermarkets (optionally) and provides a comparison request. 2. The system presents a comparison of the different local supermarkets based on user's basket. This comparison is also presented on the city map. 3. The user prints his/her basket contents and goes to the cheaper supermarket.
Alternative 1
Step 1: The customer can log in (If customer does not have account, the system creates an account). He/she can save the basket in order to use it again in the future. The system will use his/her saved preferences in order to show only the prices for favourite supermarkets. Moreover, if the user has provided his/her location the system will take it into account when make suggestions.
Postconditions
The customer has find the nearest supermarket that offers the best price for his/her needs.

Use case name
Write a Review
Summary
The customer rates a shop or writes a review about a shop or a product.
Actors
Customer
Preconditions
The customer visits the page where a specific shop is presented.
Description of main sequence

1. The customer clicks on “Post a Review” button. 2. The system retrieves customer account information. 3. The system presents a web form where the customer could write the review. 4. The customer writes the review, attaches related photos (optionally) and submits it. 5. The system confirms the submission and informs customer that the review is awaiting approval from the content manager.
Alternative 1
Step 1: The customer can rate a shop on a scale from 1 to 5 stars.
Alternative 2
Step 2: If customer does not have account, the system creates an account.
Postconditions
The rating or review has been submitted. The system updates the rating of the shop. The system places the review under moderation from content manager.

Use case name
Get Support
Summary
The customer finds answers to common issues. Furthermore, he/she contacts support team regarding problems encountered using the application as well as the offered services.
Actors
Customer
Preconditions
The customer visits the homepage of the application.
Description of main sequence
1. The customer clicks on “Get Support” button. 2. The system displays a page with online guides for the common tasks that he/she can accomplish using the system. In the same page it is also displayed a web form where the customer can write a message for the support team. 3. The customer describes the problem or makes a suggestion. He/she provides some personal details such as name and email. Optionally he/she can provide additional information regarding the problem (related subsystem or retailer). 4. The system confirms the submission of information. A support ticket is sent to support team (content manager & administrator) or to the related retailer.

Alternative 1
Step 2: If a customer clicked on “contact by email” link in a shop’s page, a web form where he/she can write a message to the retailer is displayed in a pop-up window. The system records the message and it also sends it to the retailer’s email.
Alternative 2
Step 3: The customer selects an online guide and is transferred to a new page where the guide is presented as a series of steps using text, images and video.
Postconditions
The customer either has found answer to the problem by using an online guide; either has submitted a request for support. The system has created a support ticket. The involved retailer has been notified if this was necessary.

Use case name
Scan a QR-Code
Summary
A customer who stands in front of a shop window scans a QR code with his/her smartphone. This code is a shortcut for shop’s webpage on the virtual marketplace.
Actors
Mobile Customer
Preconditions
The customer has a smartphone with a code reader application installed (The majority of smartphones have these applications preinstalled).
Description of main sequence
1. The customer discovers a sign with a QR code in a shop window. 2. The customer launches a QR-Code reader application on his/her smartphone and scans the sign with phone’s camera. 3. The QR –Code is converted to a web shortcut. 4. The customer connects to the Internet through city’s free Wi-Fi network. 5. The browser of the smartphone loads the shop’s webpage where the customer can find special offers.
Alternative 1
Step 1: The customer scans a QR-Code located on a stand in the city centre. This code is a shortcut for a webpage where the user can download smartphone applications for the services of Thermi's pilot.

Postconditions
The mobile customer was informed about the special offers of a specific shop.

Use case name
Find Shops Around Me
Summary
The mobile customer is looking for nearby shops.
Actors
Mobile Customer
Preconditions
The mobile customer launches the Thermi's Virtual Marketplace application or approaches one of the large touchscreens that are located in selected public buildings.
Description of main sequence
1. The mobile customer touches the "Local Marketplace and Shops" option. 2. The system checks the user's position. 2. The system presents on the city map the shops that are located near the user. 3. The user filters information by "Category", "Highest Rated", "Most Reviewed" and "Special Offers". 4. The user touches a shop on the map. 5. The system displays name and address of the shop as well as a link for more information. 6. The user touches the link. 7. The system displays the page of the selected shop.
Postconditions
The customer has found a nearby shop. The provided information are similar with the ones of the web application.

Use case name
Find Offers Around Me
Summary
The customer is looking for special offers in nearby shops.
Actors
Mobile Customer

Preconditions

The mobile customer launches the Thermi’s Virtual Marketplace application or approaches one of the large touchscreens that are located in selected public buildings.

Description of main sequence

1. The mobile customer touches the “Special Offers” option.
2. The system checks the user’s position.
3. The system presents on the city map special offers from shops that are located near the user.
4. The user filters information by “Category”
5. The user touches a special offer on the map.
6. The system displays the name and a short description as well as a link for more information.
7. The user touches the link.
8. The system displays the page of the selected offer.
9. The user saves the image of the given promotional code in the smartphone.

Postconditions

The customer has found a special offer in a nearby shop. The provided information about that offer are similar with the ones of the web application.

Use case name

Find Best Price Around Me

Summary

The customer is looking for the nearest supermarket which offers the best price for a selection of consumer goods.

Actors

Mobile Customer

Preconditions

The mobile customer launches the Thermi’s Virtual Marketplace application or approaches one of the large touchscreens that are located in selected public buildings.

Description of main sequence

1. The mobile customer touches the “Virtual Supermarket” option.
2. The system presents a number of categories (bakery, dairy, frozen, fruit & vegetables, drinks, beauty, etc.).
3. The user selects a category.
4. The system presents a list of products for the selected category.
5. The customer adds one or more products in the basket (shopping list) and touches the “Find Best Price” button.
6. The system checks the user’s position.
7. The system presents a table with three columns: “supermarket’s name”, “total price” and “distance from the user”.
8. The user chooses to display the information on the city’s map.
9. The system presents on the city map the value of the selected products in the nearby supermarkets.
10. The user touches a supermarket on the map.
11. The system displays, in a new page, the price of each product in the specific supermarket.

Alternative 1

Step 2: The customer logs in, loads an existing basket and touches the “Find Best Price” button.

Alternative 2

Step 11 (continued): If the user is logged in he/she could save the basket.

Postconditions

The customer has found the nearest supermarket that offers the best price for his/her selection.

Use case name

Validate Information

Summary

A business owner, professional or retailer validates his/her information found in the Business Directory.

Actors

Business Owner or Professional, Retailer

Preconditions

The user visits the homepage of the application.

Description of main sequence

1. The user finds his/her business page in the Business Directory and checks the provided information. If there is anything to change he could clicks the "Edit Business Info" button found in that page. 2. The system presents web form where the information about the specific business is editable by the user. 3. The user edits the information, adds his/her contact details and submit the form. 4. The system confirms the submission and informs the user that the updating of data will be made after the content manager contact him.
Postconditions
The new description of the business has been submitted. The system shops the information so the content manager can publish it after his communication with the business owner professional or retailer.

Use case name
Create a Shop
Summary
A Retailer creates a shop in the Virtual Marketplace and adds all the required information.
Actors
Retailer
Preconditions
The retailer visits the homepage of the application.
Description of main sequence

1. The retailer clicks on the “Create a New Shop” button that is located in the homepage.
2. The system asks the retailer to login.
3. The retailer uses his username/password combination.
4. The system displays a web form where the retailer can insert basic information about his/her shop such as name, category & subcategory, and description.
5. The retailer inserts the requested information and click on the “Create Shop” button.
6. The system creates the shop in database and sets its status to “private”, which means that only the retailer and the administrative team can access it.
7. The retailer is transferred to the “Retailers’ Dashboard” from where he/she can manage their shop.
8. Through a number of web forms the retailer can:
    a. Add or change all the information that is presented on shop’s page in the “Virtual Marketplace” (name, category & subcategory, contact details, description, opening hours, etc.).
    b. Add featured products
    c. Upload photos and videos
9. The retailer changes the status of the shop from “Private” to “Public”.
10. The system displays the shop in the Virtual Marketplace so everyone can visit it.

Alternative 1

Step 3: If retailer does not have account, the system creates an account. The retailer can use the system but his/her contribution will not be published until the administrative staff validates the account.

Alternative 2

Step 10: If the retailer’s account isn’t validated the shop will not be displayed on the Virtual Marketplace.

Postconditions

The new shop has been created and it is displayed in the Virtual Marketplace.

Use case name

Make Special Offers

Summary

A Retailer makes special offers through Virtual Marketplace.

Actors

Retailer

Preconditions
The retailer has logged in to Retailers’ Dashboard.
Description of main sequence
1. The retailer clicks on the “Make a Special Offer” button that is located in the Retailer’s Dashboard. 2. The system displays a web form where the retailer can insert information about his/her offer such as name, description, terms of service and photo(s). He/she also defines the number of available coupons. 3. The system creates the offer and associates it with a unique coupon that customers can print and bring to the shop. 4. The system displays a new page where the retailer can manage his/her offers.
Postconditions
The new special offer is displayed in the Virtual Marketplace.

Use case name
Create a QR-Code
Summary
A Retailer creates and prints QR-codes in order to use them as promotion materials.
Actors
Retailer
Preconditions
The retailer has logged in to Retailers’ Dashboard.
Description of main sequence
1. The retailer clicks on the “Create QR-Code” button that is located in the Retailer’s Dashboard. 2. The system presents the predefined available sizes for the QR-code (small, medium, large and extra-large). 3. The retailer selects the size according to QR-code usage (i.e. extra-large for the shop window, medium for an advertisement.) 4. The system creates the code and displays it as an image in png format. 5. The retailer prints the image or saves it for future use.
Postconditions
The retailer has created and printed a QR-code.

Use case name
Provide Customer Feedback
Summary
A retailer responds to comments and questions related with his/her shop.
Actors
Retailer
Preconditions
The retailer has logged in in Retailers' Dashboard.
Description of main sequence
1. The retailer clicks on the "View Comments" button that is located in the Retailer's Dashboard. 2. The system presents a list of comments that have been submitted from users in the shop's page on the Virtual Marketplace. 3. The customer clicks on each comment. 4. The system displays comment's details and a web form where the retailer can type an answer. 5. The retailer types the answer and clicks the "Reply" button. 6. The system publishes the answer under the comment in shop's page. 7. The system moves the answered comment into the archived comments list.
Alternative 1
Step 1: The retailer click the "Reply" button located under the user's comment in the shop's page.
Postconditions
The retailer has answered a comment made by a user in his/her shop's page.

Use case name
Get Support
Summary
A retailer finds answers to common issues. Furthermore, he/she contacts support team regarding problems encountered using the application.
Actors
Retailer

Preconditions
The retailer has logged in to Retailers’ Dashboard.
Description of main sequence
1. The retailer clicks on “Get Support” button that is located in the Retailer’s Dashboard. 2. The system displays a page with online guides for the common tasks that he/she can accomplish using the system. In the same page it is also displayed a web form where the retailer can write a message for the support team. 3. The retailer describes the problem or makes a suggestion. 4. The system confirms the submission of information. A support ticket is sent to support team (content manager & administrator).
Alternative 1
Step 3: The retailer selects an online guide and is transferred to a new page where the guide is presented as a series of steps using text, images and video.
Postconditions
The retailer either has found answer to the problem by using an online guide; either has submitted a request for support. The system has created a support ticket.

Use case name
View Business Trends
Summary
A retailer has access to statistics regarding the performance of his/her shop on the Virtual Marketplace.
Actors
Retailer
Preconditions
The retailer has logged in to Retailers’ Dashboard.
Description of main sequence
1. The retailer clicks on “Statistics” button that is located in the Retailer’s Dashboard. 2. The system displays a page with statistics related not only to retailer’ shop and special offers but also to other shops and special offers. 3. The retailer chooses a time period. 4. The system shows statistics only for this period.
Postconditions

The retailer has a clear view about the acceptance of his/her efforts, as well as of the other retailers’ efforts, from visitors of the Virtual Marketplace.

Use case name
View Activity Reports
Summary
A project’s partner has access to statistics regarding overall activity in the Virtual Marketplace.
Actors
Project Partner
Preconditions
The project partner has logged in to his/her account.
Description of main sequence
1. The system displays a special page to the logged in project partner with statistics related to overall activity in the Virtual Marketplace. 2. The project partner chooses a time period. 3. The system shows statistics only for this period.
Postconditions
The project partner has a clear view about overall activity in the Virtual Marketplace.

Use case name
View Business Activity Reports
Summary
A city official has access to statistics regarding business activity in the Virtual Marketplace.
Actors
City Official
Preconditions
The city official has logged in to his/her account.
Description of main sequence

1. The system displays a special page to the logged in city officials with statistics related to overall business activities in the Virtual Marketplace.
2. The city official chooses a time period.
3. The system shows statistics only for this period.

Postconditions

The city official has a clear view about business activity in the Virtual Marketplace.

Use case name

Manage Business Directory

Summary

The content manager uses a special section of the system in order to manage the entries (Businesses and Professionals) of Business Directory.

Actors

Content Manager

Preconditions

The content manager has logged in to administration area of the system.

Description of main sequence

1. The content manager accesses the administration panel and clicks the “Manage Directory” button.
2. The system displays a table with the registered businesses and professionals. The table’s columns include basic information (name, category, address, status (published/un-published), etc.) and a number of actions such as edit, change status and delete. An option for the creation of new entry is also available.
3. The content manager clicks on the name of an entry.
4. The system displays a web form where the content manager can change/insert information about the selected business or professional. There are also available a number of actions such as save, change status, preview, and delete.
5. The content manager inserts the information about the selected entry and clicks save.
6. The system stores the entry in the database and if its status is published it appears on the web.

Alternative 1

Step 3, Step 4: The content manager clicks the “Delete” button. A warning window is displayed. If he confirmed the action the selected entry will be deleted.

Alternative 2

Step 3: The content manager clicks the “Add New” button. The system displays a web form where he can add the required information about a new business or professional.
Postconditions
The content manager has added new, changed or deleted business and professionals in the Business Directory.

Use case name
Manage Shops
Summary
The content manager uses a special section of the system in order to manage the registered shops.
Actors
Content Manager
Preconditions
The content manager has logged in to administration area of the system.
Description of main sequence
1. The content manager accesses the administration panel and clicks the “Manage Directory” button. 2. The system displays a table with the registered shops. The table’s columns include basic information (name, category, retailer, creation date, status (published/un-published), etc.) and a number of actions such as edit, change status and delete. An option for the creation of new shop is also available. 3. The content manager clicks on the name of a shop. 4. The system displays a web form where the content manager can change/insert information about the selected shop. There are also available a number of actions such as save, change status, preview, and delete. 5. The content manager inserts the information about the selected shop and clicks save. 6. The system stores the entry in the database and if its status is published it appears on the web.
Alternative 1
Step 3, Step 4: The content manager clicks the “Delete” button. A warning window is displayed. If he confirmed the action the selected shop will be deleted.
Alternative 2

Step 3: The content manager clicks the “Add New” button. The system displays a web form where he can add the required information about a new shop. The content manager assigns the shop to a specific retailer.
Postconditions
The content manager has added new, changed or deleted shops.

Use case name
Manage Reviews
Summary
The content manager uses a special section of the system in order to manage the submitted reviews.
Actors
Content Manager
Preconditions
The content manager has logged in to administration area of the system.
Description of main sequence
1. The content manager accesses the administration panel and clicks the “Manage Reviews” button. 2. The system displays a list of reviews along with the related shops. Next to each review there is a number of buttons which represents the following actions: Approve/Unapprove Reply, Edit, Spam, and Delete. 3. The content manager clicks on a review. 4. The system displays the review text and the above mentioned actions. 5. The content manager reads the review takes one of the available actions. 6. If the review was approved the system displays it in the shop’s page.
Postconditions
The content manager has published or discarded the submitted reviews.

Use case name
Manage Users
Summary
The administrator uses a special section of the system in order to manage the registered users.

Actors

Administrator

Preconditions

The administrator has logged in to administration area of the system.

Description of main sequence

1. The administrator accesses the administration panel and clicks the “Manage Users” button.
2. The system displays a table with the registered users. The table’s columns include basic information such as: name, type (user types are similar to actors) and email. Next to each user there are three buttons which represents Activate, Edit and Delete actions. An option for the creation of new user is also available.
3. The administrator clicks on the name of a user or the “Edit” button.
4. The system displays a web form where the administrator can edit user’s profile. The information that is available for each user is related to user’s type.
5. The administrator makes the necessary changes and clicks “Save”.
6. The system stores the information in the database.

Alternative 1

Step 3: The administrator clicks the “Activate” button. The user is now active and is able to use the system (i.e. in case of a retailer he can create a new shop).

Alternative 2

Step 3: The administrator clicks the “Delete” button. A warning window is displayed. If he confirmed the action the selected user will be deleted.

Alternative 3

Step 3: The administrator clicks the “Add New” button. The system displays a web form where he can add basic information (username, email and password) about the user. The system notifies the user by email about his new account.

Postconditions

The administrator has successfully managed existing users or created new.

Use case name

Support Users

Summary

The administrator uses a special section of the system in order to provide support to the users of application.

Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.
Description of main sequence
1. The administrator accesses the administration panel and clicks the “Open issues” button. 2. The system displays a list of the open issues created by users. 3. The administrator clicks on a issue title. 4. The system displays the user’s comment or request. 5. The administrator makes the necessary actions in order to solve the reported problem. 6. The administrator sends an email to the user with a solution to his/her problem. 7. The administration changes the status of the issue to “solved”. 8. The system removes closed issues into archive.
Postconditions
The administrator has successfully addressed a problem submitted by a user.

Use case name
Backup the System
Summary
The administrator uses a special section of the system in order to take a backup.
Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.
Description of main sequence
1. The administrator clicks the “Backup” button. 2. The system creates a copy of its current state. This copy includes all files as well as the database tables. 3. The system prompts the administrator to download the backup file in zip format. 4. The administrator saves the file in his computer.
Alternative 1

Step 1: The administrator clicks the "Restore" button. The system requires from the administrator to upload the backup file. The administrator uploads the file and the system executes the restore procedure.
Postconditions
The administrator has successfully backup or restore the system.

Use case name
View Performance Reports
Summary
The administrator has access to statistics regarding overall performance of the Virtual Marketplace.
Actors
Administrator
Preconditions
The administrator has logged in to administration area of the system.
Description of main sequence
1. The administrator clicks the "Statistics" button 2. The system displays a special page with statistics related to overall performance of the Virtual Marketplace. 3. The administrator chooses a time period. 4. The system shows statistics only for this period.
Postconditions
The administrator has a clear view about overall performance of the Virtual Marketplace.

Use case name
Get Goods Prices
Summary
The system retrieves the prices of supermarkets' goods from the price watch system of the Greek Ministry of Regional Development and Competitiveness.
Actors
System
Preconditions

The administrator has setup the process.
Description of main sequence
1. Each day, at a scheduled time, the system connects with the http://www.e-prices.gr web service that is available at: http://services.e-prices.gr and retrieves the data for the local supermarkets. 2. The system stores the data into the Virtual Supermarket database. 3. The system reports the result (successful or not) to the administrator.
Postconditions
The system has store in the database of the Virtual Supermarket the latest goods' prices in local supermarkets.

Use case name
Produce Reports
Summary
The system produces activity and performance reports for retailers, project partners, city officials and administrators.
Actors
System
Preconditions
The interested users click the "Statistics" button.
Description of main sequence
1. A retailer, project partner, city official and administrator requests a report based on statistics collected during the system's operation. 2. The system presents to retailers, project partners, city officials and administrators reports tailored to their needs.
Postconditions
The system has produced the reports.

Use case name
Post to Social Media
Summary
The system shares its content to most popular social media sites.

Actors
System
Preconditions
The interested users click the “Statistics” button.
Description of main sequence
1. A retailer or contact manager adds new content to the virtual marketplace (new shop, special offer, etc.) 2. The system automatically posts new content to pilot’s accounts on Facebook and Twitter.
Alternative 1
Step 1: The visitor clicks “Share” button which can be found in every page of the Virtual Marketplace. The system displays to him a list of social networks to choose. The user selects and the system posts the link of the specific page to that social network.
Postconditions
The system has shared the content to social networks.

Use case name
Publish Open Data
Summary
The system publishes part of its content in form of open data.
Actors
System
Preconditions
A number of open datasets has been created.
Description of main sequence
1. A user downloads an open dataset.
Alternative 1
Step 1: An external system connects to web service and retrieves an open dataset.
Postconditions
Part of the system’s data can be reused by other people or systems.

Pilot use-cases summary

In the table below are listed all the uses cases that are detailed in the document regarding the services of Thermi pilot.

Use-case / service	Environmental Pollution Monitoring System	Parking Spaces Availability	City Fix	Tourism and Recreation Facilities Guide	Virtual Marketplace
Use case 1					
Use case 2					
Find information about parking spaces		X			
Find parking near a location		X			
A driver enters a parking		X			
A driver exits the parking		X			
Calculate empty spaces		X			
Receive statistical data		X	X		
Check operation of components		X	X		
Produce reports		X	X		
Registration			X		
Log in			X		
New password creation			X		
View problems			X		
Filing an issue			X		
Voting an issue			X		
View comments			X		
Commenting an issue			X		
Posting on facebook			X		
Checking for inappropriate content			X		
Problem status updating			X		
Forward a problem			X		

Post to social media			X	X	X
View a Point of Interest (POI)				X	
Get Support				X	X
Scan a QR Code				X	X
Find Places Around Me				X	
Tour the Museum				X	
Suggest a POI				X	
Add Content				X	
View Activity Reports				X	X
View Popularity Reports				X	
Manage POIs				X	
Manage Categories				X	
Create QR-Codes				X	X
Manage Users				X	X
Support Users				X	X
Backup the System				X	X
View Performance Reports				X	X
Produce Reports				X	X
Publish Open Data				X	X
Find Business or Professional					X
Find Shops					X
Find Special Offers					X
Receive Offers					X

Compare Prices					X
Find Best Price					X
Write a Review					X
Scan a QR-Code					X
Find Shops Around Me					X
Find Offers Around Me					X
Find Best Price Around Me					X
Validate Information					X
Create a Shop					X
Make Special Offers					X
Create a QR Code					X
Provide Customer Feedback					X
View Business Trends					X
View Business Activity Reports					X
Manage Business Directory					X
Manage Shops					X
Moderate Reviews					X
Get Goods Prices					X

Specifications

Functional requirements

Environmental Pollution Monitoring System

There is no user input required for the service to run apart from feedback that can be provided by electronic means. The main service inputs are the raw data related to air quality that will be collected from the air pollution measurement stations. This data will represent a local status and condition of the air quality.

The outputs of the service are the air monitoring data that are going to be presented to the public.

The service will require minor administrative activities such as collecting feedback or replying to user comments, making sure that all air quality measuring stations are on-line, and making sure that the method of saving the data (database) is operating without faults. The administration is a task for the City Officials or their technical department.

The service will generate automated alerts if atmospheric pollution exceeds certain limits that are defined by National and EU laws and directives. The limits of the air pollutants that are going to be monitored are provided bellow and these are according to the Greek National laws. These limits are the same as the EU ones as they come from an EU directive which was incorporated in Greek National law. So these can be applied to all EU member states.

Air Pollutant	Permitted Limit	Alarm Limit	Notes
NO_2	38 μg/m^3 / Hour	140 μg/m^3	Valid from 1/1/2010
CO	6 mg/m^3 / 8-hours	10 mg/m^3 / 8-Hours	Valid from 1/1/2005
NO	38 μg/m^3 / Hour	140 μg/m^3	Valid from 1/1/2010
Air contaminants	28 μg/m^3 / day	35 μg/m^3 / day	Valid from 1/1/2005

Feedback from the use of service will be provided via an electronic contact form that will be created and incorporated into the platform that will support the data generation and their presentation through the web. This will be centralized for all pilot services.

The available presented data will be available to be used in other services such as the one involving the availability of parking spaces to promote the use of the City's parking and to reduce the use of cars in the city centre.

Parking Spaces Availability

Parking areas will be presented on a map. The user will be able to select a point on the map by drag and drop feature. The application includes predetermined points of interest in the city of Thermi (e.g. City Hall, Church etc), in case that the user does not know an address or the location of his/her destination on the map. Proximity of a parking place to a destination will be calculated with a radiance of 400m (walking distance) from an address or a point of interest on google map.

Location of parking areas and of the number of available parking seats will be presented on display panels. The administrator has set the level of parking availability, i.e. the number of empty spots that exist in the underground parking. Given that there is a limited number of parking seats that are rented by month, (these should not be included in the total spaces available), the administrator has to update the system whenever there is a change on this number. It should be noted that the underground parking already disposes an electric generator in case of power loss.

The system stores data for a predetermined period of time in order to produce reports. The data on entering/exiting cars is aggregated for every two hours. The information provided to the city officials can be used for the creation of indicators such as filled percentage per hour, percentage of peak hours per day/ week/ month etc.

City Fix

Users are filed in the system with their e-mail addresses. A potential misuse of such a practice is that if a person registers with more than one e-mail address the system distinguishes him/her a two different users.

The filing form consists of a) a drop down list of problem categories, b) a section for problem description, c) a section for uploading extra material, a picture or/and a video and c) a section for specifying the location of the problem either by selecting a point on a map or by entering an address. The problem categories will be adjusted and refined after a pilot test of the application operation. Problem categories have been corresponded to municipal departments. In case where the municipal department does not have the specific jurisdiction, the request returns to the administrator. The status of the problems solving process is visible next to a problem and can be described as open, acknowledged, closed. Different colors can be used to demonstrate the process of solving with yellow in the first stages and green in the final stage. For issues that are open or acknowledged, users can vote or make comments.

Voting will be made on a 1- 5 scale with 1 less significant and 5 most significant. Numbers from 1 to 5 –with a checking point- will be visible under each problem. Voting can be made by clicking on the checking point next to the desirable number. Non registered/no logged in users will be able to see the numbers but the checking points will be inactive.

Only registered users will be able to post a comment. Commenting form will be inactive to all other users. Comments will be linked to users by their username, which means that underneath the comment the system will include username and time and date of comment submission. There is no limit on the number of comments made by a specific user; however, in cases of misuse by one user, the administrator has the responsibility to intervene by blocking the account of the user. In addition, in case where the material entered by the user is not appropriate for public display, it should be removed by the administrator

Regarding posting on Facebook option, security policy applied to the users' Facebook account will make the post visible to the people that he/she has selected (public, friends, groups of friends, selected persons).

Tourism and Recreation Facilities Guide

Functional requirements capture the intended behaviour of the system. In the following pages the features and characteristics of both web and mobile applications are listed.

User requirements

The public users of the application are able to:

- View information about Point of Interest (POIs) located in the Municipality of Thermi. The POIs which include monuments, attractions, museums, public buildings, churches, parks, gardens, etc. will be presented in the city's map. For each POI it will be available:
  - Short text description
  - Photo(s)
  - Panorama(s)
  - Video(s)
- Suggest a POI to be included into the application

- Add his/her content (photos, panoramas and videos to an existing POI)
- Find POIs located near them
- Scan QR-Codes with their smartphone and visit the corresponding webpages for specific POIs
- View an interactive tour of the Science Center and Technology Museum "NOESIS" using his/her smartphone. The smartphone application will provide:
    - News & current events
    - Movies details (info, photos, trailers) and time schedule
    - Exhibitions details (description, photos, videos) and visiting hours
    - Audio tour
    - Educational guides about scientific discoveries
    - Map of the museum
    - A place to display messages from sponsors.
- Set support

The project partners and the administration team are able to:

- Manage POIs and users
- Support Users
- View reports regarding the overall activity and performance of the system
- Backup and restore the system

Web applications requirements

- POIs are classified in categories and subcategories
- The entries are presented as a list (with paging) as well as on a map. Hovering on an entry results the display of information.
- Information filtering is supported by “Category/Subcategory” and “Most Popular”.
- The POIs database should be searchable.
- Each POI will be presented in a separate pop-up window. The following info will be available: name, category & subcategory, description, photo(s), video(s) and panorama(s).
- A number of actions will be offered to the visitor: print the page, send it by email, and share it in social networks.
- The system takes into account user’s location

- The system should provide to the users a way to suggest new POIs by using a web form.
- The system should provide to the users a way to add more information and upload images, videos and panoramas about existing POIs by using a web form.

Mobile Website

- The mobile website has quite similar functionality with the web application.

Smartphone Application

- The smartphone application offers an interactive tour of the Science Center and Technology Museum "NOESIS". The smartphone application should present a selection of the information located in Noesis website (http://www.noesis.edu.gr). This information should be adapted in a format suitable for smartphone’s screen requirements.

Administration backend features

- The application has a built-in user registration system that can allow people to register and perform specific tasks. Users’ registration should be validated by the administrator.
- The application’s user system allows up to 4 levels of users, with different levels having different (and configurable) privileges with regard to publishing, editing, options, and other users. These levels correspond to 1) active users, 2) project partners & city officials, 3) content managers, and 4) administrators. The roles and capabilities of these users are presented in the use cases.
- The application provides to project’s partners and city’s officials a special section where they have access to performance and activity reports.
- The system should provide an administrative area where content managers are able to manage the available POIs. This area should have the following features:
    - The content managers can add or edit information using web forms and a WYSIWYG editor.
    - The content managers can upload images, video and panoramas.

  - The location of the entry in the city’s map can be retrieved from its address. Moreover, the content managers can make corrections to the proposed location by moving the location marker on the map.
- The system should provide an administrative area where content managers are able to manage the POIs’ categories. This area should have the following features:
  - The content managers can add or edit information using web forms and a WYSIWYG editor.
  - The content managers can attach an image to each category.
  - Each category has one or more subcategories.
- The system should provide, in the administrative area, an option for content managers to print a QR-code for each POI. The QR-code corresponds to a URL where the related POI is presented. Four predefined sizes will be supported: small, medium, large and extra-large.
- The system should provide an administrative area where content managers are able view the suggested POIs.
- The system should provide an administrative area where content managers are able view the data submitted by the users.
- The system should provide an administrative area where administrators are able to create new or manage existing registered users. The administrator can activate users, edit their profile or delete them from the system.
- New users should be notified by email for the creation of their accounts.
- The system should provide an administrative area where administrators are able to view and answer users’ support requests.
- The system should provide a procedure for export and import its data.
- The system should support the creation of static pages with text, images and video.
- The system should support the creation of contact forms. The most common form elements (textfields, checkboxes, radio buttons, select menus and textareas) as well as image upload and CAPTCHA validation control should be supported. Each contact form will have multiple recipients.
- The application has a module that provides web analytics. This module is responsible for measurement, collection, analysis and reporting of internet data for purposes of understanding and optimizing the operation of Virtual Marketplace. A number of

different reports are available for the different types of users. The following statistics are available:

- The application has a module that provides web analytics. This module is responsible for measurement, collection, analysis and reporting of internet data for purposes of understanding and optimizing the operation of the application. A number of different reports are available for the different types of users. The following statistics are available:
  - Total number of visitors
  - Total number of POIs
  - Total number of active users (users that have made suggestions or submit their content.)
  - Total number of suggested new POIs
  - Most popular POIs
  - Total number of mobile users
  - Total number of downloads of the mobile applications
- The application has a module for simultaneous sharing of content to Facebook, Twitter, Email, and other well-known social networks. The module automatically posts new content to pilot's accounts on Facebook and Twitter. It also enables visitors to post content on their accounts in Facebook, Twitter and other social networks.
- The application implements a web service which provides a data set available as API, in a variety of machine-readable formats. The open data catalogue contains descriptions of the data, the collection method, and other contextual material (metadata), make the data sets easier to understand and use. The following data sets will be available:
  - List of Points of Interest located to Municipality of Thermi

Virtual Marketplace and Crowd-Media

As the system consists of five subsystems/applications (business directory, virtual representation of the local marketplace and shops, coupon site containing promotional codes, virtual supermarket, and review engine), each of them has some special requirements while there also many common requirements. In the following pages attempted a summary of both common features and specific characteristics of each application. Also the features of the application for smartphones are listed.

User requirements

The public users of the applications are able to:

- Find local businesses, professionals, shops and special offers
- Receive special offers by email
- Compare prices of goods in local supermarkets and find the best price
- Write a review about a local shop
- Set support and provide feedback
- Publish content to their accounts in popular social media sites
- Scan QR-Codes with their smartphone and visit the corresponding webpages.
- Find shops and special offers located near them
- Validate their information found in Business Directory
- Create shops and make special offers
- Create QR-Codes related to their shops
- View reports regarding the performance of their shops and offers.
- View reports regarding the overall business performance of the Virtual Marketplace

The project partners and the administration team are able to:

- Manage business directory, shops and users
- Moderate Reviews
- Support Users
- View reports regarding the overall activity and performance of the system
- Backup and restore the system

Web applications requirements

- Businesses, professionals, shops, special offers, and supermarket's products are classified in categories and subcategories
- The classification varies depending on the type of information.
- The entries are presented as a list (with paging) as well as on a map. Hovering on an entry results the display of information such as Name and Address.
- Business directory, shops special offers, and supermarket's products are searchable.
- Each entry is presented in a separate page.
- For each Business or Professional the following info is available: name, category & subcategory, contact details, description, visiting hours, photo(s), and position on the map.

- For each shop the following info is available: name, category & subcategory, contact details, description, opening hours, photo(s), products, users rating, users' reviews, special offers, and location on the city's map.
- For each special offer the following info is available: name, category & subcategory, contact details, description, terms of service, photo(s), related shop, users rating, users' reviews, location on the city's map and the special coupon.
- Information filtering is supported by "Name", "Highest Rated", "Most Reviewed" and "Special Offers".
- The system supports ratings and reviews on selected content.
- Whether or not the users must to login to post a review will be an option.
- The reviews are displayed after their validation from the administrating staff.
- The system takes into account user's location.

Special features of Virtual Supermarket application

- The application support users' registration. Saved user preferences will be used for information filtering.
- The system compares the total price of the basket in different supermarkets. The suggestion about the supermarket with the best price should take into account user's preferences and location.
- The user should be able to browse products in various categories and create, save and load baskets (shopping lists).

Smartphone Application

- The mobile application has quite similar functionality with the web application.
- A key parameter for various suggestions (shops, offers, supermarkets) of the application is the user's location.

Administration backend features

- The application has a built-in user registration system that can allow people to register and perform specific tasks. Users' registration should be validated by the administrator.

- The application's user system allows up to 5 levels of users, with different levels having different (and configurable) privileges with regard to publishing, editing, options, and other users. These levels correspond to 1) public users, 2) retailers, 3) project partners & city officials, 4) content managers, and 5) administrators. The roles and capabilities of these users are presented in the use cases.
- Public users create account in order to post reviews and comments. Registered users save their shopping lists and preferences about products and supermarkets.
- Retailers have access to "Retailers' Dashboard", from where they create and maintain their shops and special offers. Retailers' Dashboard has the following features:
    - Retailers can add or edit information related to shops and special orders using web forms and a WYSIWYG editor.
    - Retailers can upload images and videos.
    - Retailers can add featured products.
    - Retailers can print QR-codes in predefined sizes (small, medium, large and extra-large) that correspond to the URL of their shops.
    - The location of the shop and offer in the city's map can be retrieved from its address. Moreover, the retailer can make corrections to the proposed location by moving the location marker on the map. The offers will expire at the end of their duration or withdrawn if all the coupons used.
    - Retailers can view and respond to users' reviews and comments.
    - Retailers can view reports regarding the performance of their shops and offers.
- The application provides to project's partners and city's officials a special section where they have access to performance and activity reports.
- The application provides to content managers a special section where they manage businesses, professionals, shops and reviews. This section has all features of "Retailers' Dashboard" plus:
    - Content managers can assign a store to a retailer so he/she to be responsible for shop's management.
    - Content managers can approve/unapproved, reply, edit, mark as spam and delete user reviews.
- The application provides to administrators a special section where administrators:

  - Create new or manage existing registered users (new users are notified by email for the creation of their accounts).
  - Activate users, edit their profile or delete them from the system.
  - Create backups and restore from a previous backup.
- The application has a module which sends template based email campaigns, manage subscribers and track results. The users subscribed and unsubscribed through web forms from the site. Confirmed opt-in is supported.
- The application supports the creation of static pages with text, images and video.
- The application supports the creation of contact forms. The most common form elements (textfields, checkboxes, radio buttons, select menus and textareas) as well as image upload and CAPTCHA validation control should be supported. Each contact form will have multiple recipients.
- The application has a module that provides web analytics. This module is responsible for measurement, collection, analysis and reporting of internet data for purposes of understanding and optimizing the operation of Virtual Marketplace. A number of different reports are available for the different types of users. The following statistics are available:
  - Number of visitors in each shop
  - Number of reviews in each shop
  - Number of visitors in each special offer
  - Number of reviews in each special offer
  - Most popular shops
  - Shops with the higher ratings
  - Shops with the larger number of special offers
  - Most popular special offers
  - Special offers with the higher ratings
  - Total number of visitors (total number per subsystem)
  - Total number of Businesses and Professionals in the Business Directory
  - Total number of registered shops
  - Total number of active special offers
  - Total number of special offers
  - Total number of customers that made use of a special offer
  - Total number of ratings

- Total number of reviews
- Total number of registered users in the Virtual Supermarket
- Total number of mobile users
- Total number of downloads of the mobile applications

- The application retrieves, automatically, open data from the web service of price watch system of the Greek Ministry of Regional Development and Competitiveness (http://services.e-prices.gr). The following queries has implemented:
    - Web services availability (checkWSAvailabilityWS)
    - List of areas (GetAreasWebService)
    - List of shops (GetShopsWebService)
    - List of products' categories (GetCategoriesWS)
    - List of a products of a category (GetProductsOfACategory)
    - Price of a product in a shop (GetPriceOfAProductatShopWS)
    - Minimum price of a product in an area (GetMinimumPriceOfAProductatPlaceWS)
    - Minimum price of a products' category in an area (GetMinimumPriceOfACategoryatPlaceWS)
    - List of shops in an area (getShopsOfAnAreaWS)
    - List of products (getProductsWS)
- The application has a module for simultaneous sharing of content to Facebook, Twitter, Email, and other well-known social networks. The module automatically posts new content to pilot's accounts on Facebook and Twitter. It also enables visitors to post content on their accounts in Facebook, Twitter and other social networks.
- The application implements a web service which provides a number of data sets available as APIs, in a variety of machine-readable formats. The open data catalogue contains descriptions of the data, the collection method, and other contextual material (metadata), make the data sets easier to understand and use. Some indicative data sets are:
    - List of Thermi's shops
    - List of Thermi's supermarkets
    - Lists of Thermi's business and professionals
    - Special offers descriptions using GoodRelations ontology

Non functional requirements

Environmental Pollution Monitoring System

The service will be available through a web application via any mobile device that can be connected to the internet (smart phones, laptops, PDA's, ipad's etc). The web application can be loaded or presented by any of the current available web browsers.

The service will require installation and operation of the air quality measuring stations that will be part of a wireless sensor network. All measured data will be directed via the network to either a database implemented on a physical server or to a database implemented into cloud web services.

The service is available in cities worldwide and some features such as WiFi part of the wireless network are specifically designed for use in the pilot related to the City of Thermi. But as these features can be easily removed or other similar or serving the same purpose added so that the service can be applied to other pilots or other cities as well.

All software applications or tools that are going to be developed for the specific service will be open source so one can use them or change them to meet its specific needs and requirements.

All hardware that is going to be installed and used is readily available from a large number of sources, vendors and manufacturers and so one can apply the service using any kind of hardware related material he or she chooses.

The service will have the ability to compare measured data that will be presented to the public via the web against pre-defined data limits according to national and EU air pollution directives. Also the service will provide statistical data as the service is run and data will be accumulated.

The language that the service will be provided through the web will be the Greek and English language.

Parking Spaces Availability

The sensors send the information through a wireless network to a hub-gateway unit located in the parking area. Data transmission from the 'hub' to the system, i.e. a central server, is made either by using existing Wi-Fi infrastructure or through a wired local area network (Ethernet). The system will be updated every 30 seconds and the website will be refreshed every 5 seconds. Display panels will be updated every 2 minutes.

City Fix

Registration can be made by using a username and password. They can be up to 10 letters comprised by numerical and/or arithmetical characters. The user will be able to upload pictures related to a problem. There is no limit on the size of the picture uploaded.

Cityfix component follows the latest Joomla framework version 1.7 guidelines which introduce heavily changes in comparison to the previous widespread version (1.5), like nested categories, ACL and of course new enhanced API. It uses Joomla core tables for storing data (categories, users) making it fully compatible, easily extendable and easily maintainable in future needs.

Cityfix is a two-fold component with a backend (administrator side) and a frontend (what user's see). City Fix follows the MVC (Model View Controller) software pattern which gives great extensibility to the component. The pattern isolates "domain logic" (the application logic for the user) from the user interface (input and presentation), permitting independent development, testing and maintenance of each (separation of concerns).

Tourism and Recreation Facilities Guide

The non-functional requirements of the application are identical with the non-functional requirements of the platform.

Virtual Marketplace and Crowd-Media

The non-functional requirements of the application are identical with the non-functional requirements of the platform.

Services Common Non-Functional Requirements

The following requirements are common to the five applications of Thermi's pilot.

Quality attributes

Quality attributes are the overall factors that affect run-time behaviour, system design, and user experience. They represent areas of concern that have the potential for application wide impact across layers and tiers. Some of these attributes are related to the overall system design, while others are specific to run time, design time, or user centric issues. The Platform will possess a desired combination of the following quality attributes:

Conceptual Integrity - Conceptual integrity defines the consistency and coherence of the overall design. This includes the way that components or modules are designed, as well as factors such as coding style and variable naming.

Maintainability - Maintainability is the ability of the system to undergo changes with a degree of ease. These changes could impact components, services, features, and interfaces when adding or changing the functionality, fixing errors, and meeting new business requirements.

Reusability - Reusability defines the capability for components and subsystems to be suitable for use in other applications and in other scenarios. Reusability minimizes the duplication of components and also the implementation time.

Availability - Availability defines the proportion of time that the system is functional and working. It can be measured as a percentage of the total system downtime over a predefined period. Availability is affected by system errors, infrastructure problems, malicious attacks, and system load.

Interoperability - Interoperability is the ability of a system or different systems to operate successfully by communicating and exchanging information with other external systems written and run by external parties. An interoperable system makes it easier to exchange and reuse information internally as well as externally.

Manageability - Manageability defines how easy it is for system administrators to manage the application, usually through sufficient and useful instrumentation exposed for use in monitoring systems and for debugging and performance tuning.

Performance - Performance is an indication of the responsiveness of a system to execute any action within a given time interval. It can be measured in terms of latency or throughput. Latency is the time taken to respond to any event. Throughput is the number of events that take place within a given amount of time.

Reliability - Reliability is the ability of a system to remain operational over time. Reliability is measured as the probability that a system will not fail to perform its intended functions over a specified time interval.

Scalability - Scalability is ability of a system to either handle increases in load without impact on the performance of the system, or the ability to be readily enlarged.

Security - Security is the capability of a system to prevent malicious or accidental actions outside of the designed usage, and to prevent disclosure or loss of information. A secure system aims to protect assets and prevent unauthorized modification of information.

Supportability - Supportability is the ability of the system to provide information helpful for identifying and resolving issues when it fails to work correctly.

Testability - Testability is a measure of how easy it is to create test criteria for the system and its components, and to execute these tests in order to determine if the criteria are met. Good testability makes it more likely that faults in a system can be isolated in a timely and effective manner.

Usability - Usability defines how well the application meets the requirements of the user and consumer by being intuitive, easy to localize and globalize, providing good access for disabled users, and resulting in a good overall user experience.

Visual Design Principles

The visual design of the Platform should provide a common look and feel through all platforms components. Design is about communication. We must create a web site that works and presents information well, but also is usable and accessible. The elements and functionality of the finished web site design should work as a single cohesive unit, so that[1]:

- **Users are pleased by the design but drawn to the content** - One of the biggest concerns among usability professionals is the time it takes users to scan the page for the information they want, be it a piece of content, a link to another page, or a form field. The design should not be a hindrance; it should act as a conduit between the user and the information.
- **Users can move about easily via intuitive navigation** - The main navigation block itself should be clearly visible on the page, and each link should have a descriptive title. A navigation structure that not only changes appearance on mouse hover, but also indicates the active page or section helps users recognize where they are, and how to get where they want to go.
- **Users recognize each page as belonging to the site** - Even if there's a dramatic difference between the layout of the homepage and the rest of the site, a cohesive theme or style should exist across all the pages of a site to help hold the design together.

The following elements are the seven key principles that make the platform's web design look good[2]:

- **Balance** - Balance is all about ensuring that your design does not tip to one side or the other. It is like the balance of **weight** in achieving symmetry or asymmetry.

[1] "The Principles of Beautiful Web Design" by Jason Beaird, SitePoint, 2007

[2] 7 Key Principles That Make A Web Design Look Good, http://bit.ly/15UBA2

- **Grid** - The concept of grids is closely related to that of balance. Grids are a **series of horizontal and vertical rulers** that help you “compartmentalize” a design. Think of columns. Columns improve readability, making a page’s content easier to absorb. Spacing and the use of the Rule of Thirds (http://en.wikipedia.org/wiki/Rule_of_thirds) (or similar Golden Ratio (http://en.wikipedia.org/wiki/Golden_ratio)) make everything easier on the eye.
- **Color** – For the selection of the color scheme aesthetic, identity, and usability considerations are taken into account.
- **Graphics** - Graphics add to the visual message. Although great design doesn’t need fancy graphics, poor graphics will definitely hurt a design.
- **Typography** - Although web typography is handicapped compared to print typography, we have the means now to make it look interesting and, more importantly, **pretty**.
- **White space** - White space, or negative space, has to do with what is *not* there. Like measure and leading, white space gives text some breathing room and spatial peace. You can make elements stand out by adding white space around them.
- **Connection** - Connection here refers to a Web design that has both **unity** and **consistency**. Unity refers to how the different elements in a design interact and fit together. For example, do the colours and graphics match? Does everything contribute to one unified message? Consistency, on the other hand, is found between the pages of a design. A design should be consistent in its use of colours, in its range of fonts, with its icons, etc. Unity is perhaps the more important of the two. Without unity, having a good design is hard. Inconsistency, however, may look a bit “sloppy” but may not make the design “bad.”

Mobile Design Principles

Mobile browsers render web pages differently from desktop browsers, so some steps are needed to make them work well on phones.

In general the following issues will be considered on the design of applications:

Multiple screen sizes & densities - The following table[3] illustrates a little of the range of mobile screen sizes and densities. Since screen sizes are variable for every device, we've decided to full support 480X800 and 640x900 resolutions

Phone model	Resolution	Display	Density
iPhone	320x480	3.5''	164ppi
Palm Pre	320x480	3.1''	186ppi
Palm Pixie	320x400	2.63''	194ppi
HTC Hero	320x480	3.2''	180ppi
Motorola Droid	480x854	3.7''	264ppi
Nexus One, HTC Desire	480x800	3.7''	252ppi
Nexus S	480x800	4''	235ppi
Nokia N97	360x640	3.2''	229ppi
Nokia N900	800x480	3.5''	266ppi
iPhone4	640x960	3.5''	329ppi

Table 1 – Smartphone Screen Sizes

Performance optimization – In order to make web content faster and more suitable for consumption on mobile devices the mobile applications should[4]:

- Reduce the number of requests and the amount of data transferred by eliminating redirects, using CSS sprites to serve multiple images, consolidating CSS & Javascript into a single file, minifying the code, and load contents lazily (transfer data when needed and preload where appropriate).
- Take Advantage of HTML5 by using application cache for local content storage, and using CSS3 and canvas tag instead of images where possible.

Touch targets, gestures, and actions – Mobile users interact with applications using gestures. Gestures are mostly inspired by real world metaphors, and similar usage of daily life objects. For instance you can delete your mails by swiping right to left on the title. The basic touch gestures are: Tap, Double Tap, Drag, Flick, Pinch, Spread, Press, Press & Tap, Press & Drag, and Rotate.

[3] Adapted from "Mobile First" presentation by Luke Wroblewski (http://goo.gl/YfMK5)

[4] Make the mobile web faster, Jeremy Weinstein (http://goo.gl/hKq5a)

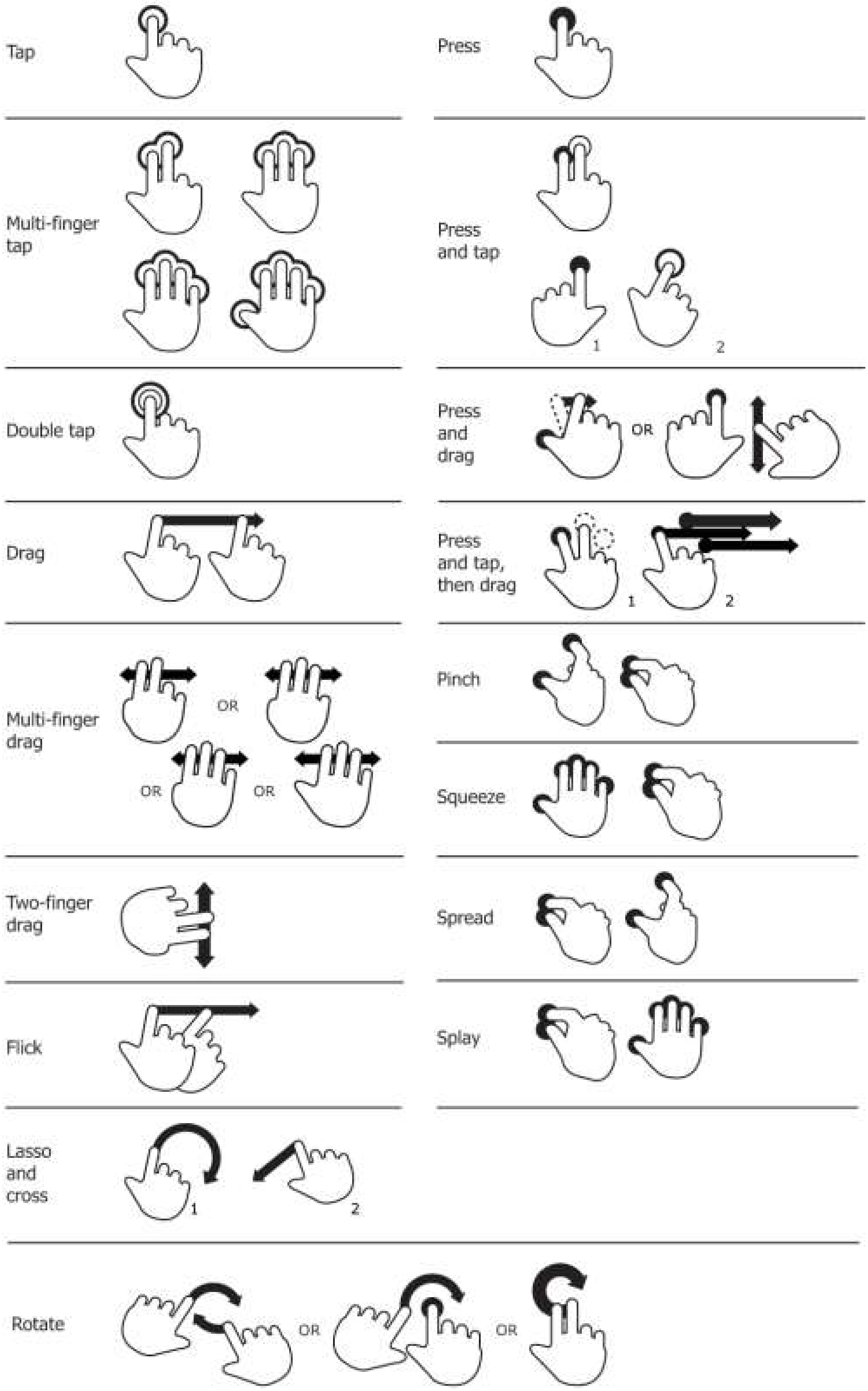

Tap
Press
Multi-finger tap
Press and tap
1
2
Double tap
Press and drag
OR
Drag
Press and tap, then drag
1
2
Multi-finger drag
OR
OR
OR
Pinch
Squeeze
Two-finger drag
Spread
Flick
Splay
Lasso and cross
1
2
Rotate
OR
OR

Figure 22 – Touch Gesture Diagrams[5]

Device capabilities – Mobile phones have capabilities not found in personal computers. In particular:

- Application cache for local storage
- CSS3 & Canvas for performance optimization
- Multi-touch sensors
- Location detection
- Device positioning & motion: from an accelerometer
- Orientation: direction from a digital compass
- Audio: input from a microphone; output to speaker
- Video & image: capture/input from a camera
- Push: real-time notifications “instant” to user
- Device connections: through Bluetooth between devices
- Proximity: device closeness to physical objects
- Ambient Light: light/dark environment awareness
- RFID reader: identify & track objects with broadcasted identifiers

Mobile operating systems vendors have create guidelines for their platforms:

- iPhone OS: Phone Human Interface Guidelines (http://goo.gl/BEP2R)
- Windows Phone 7: Windows Phone UI Design and Interaction Guide (http://goo.gl/k8Fw7)
- Android: User Interface Guidelines (http://goo.gl/erd8R)

The World Wide Web Consortium (W3C) in the framework of MobiWebApp European research project (http://mobiwebapp.eu) has created the Mobile Web Application Best Practices document[6]. This document contains guidelines aid the development of rich and dynamic mobile Web applications.

Web Technologies and Tools

The applications will be built using the following web technologies:

HTML5: HTML5 is the core element in Thermi’s pilot multiplatform strategy. HTML5 is the fifth revision of the HTML standard. Its core aims have been to improve the language with

[5] Touch Gesture Reference Guide by Luke Wroblewski (http://goo.gl/jZdRN)

[6] http://www.w3.org/2010/09/MWABP/

support for the latest multimedia while keeping it easily readable by humans and consistently understood by computers and devices. By building the applications in HTML5 it is ensured that they are compatible with the maximum number of current and tomorrow’s web browsers on desktop and mobile devices. (http://whatwg.org/html)

CSS3: CSS 3 is a powerful tool for Web designers. The biggest change in CSS level 3 is the introduction of modules. The old specification was simply too large and complex to be updated as one, so it has been broken down into smaller pieces – with new ones also added. Some of these modules include: The Box Model, Lists Module, Hyperlink Presentation, Speech Module, Backgrounds and Borders, Text Effects, Multi-Column Layout. The multiplatform strategy will be supported by Media queries, a CSS3 extension that allows us far greater control over rendering across different devices than do media types alone. (http://www.w3.org/TR/CSS/#css3)

jQuery: jQuery is a cross-browser, fast and concise JavaScript Library that simplifies HTML document traversing, event handling, animating, and Ajax interactions for rapid web development (http://jquery.com/)

Modernizr: Modernizr is a starting point for making websites and applications that work exactly right no matter what browser or device the visitors use. Modernizr is a small JavaScript library that detects the availability of native implementations for next-generation web technologies, i.e. features that stem from the HTML5 and CSS3 specifications. Many of these features are already implemented in at least one major browser (most of them in two or more), and what Modernizr does is, very simply, tell you whether the current browser has this feature natively implemented or not. (http://www.modernizr.com)

Smartphone Applications Technologies and Tools

In addition with **HTML5** and **CSS3** mentioned above the following tools will be used for the development of the smartphones’ applications:

jQuery Mobile: Touch-Optimized Web Framework for Smartphones & Tablets. A unified user interface system across all popular mobile device platforms, built on the rock-solid jQuery and jQuery UI foundation. Its lightweight code is built with progressive enhancement, and has a flexible, easily themeable design (http://jquerymobile.com/)

Sencha Touch Mobile JavaScript Framework: Sencha Touch allows the development of mobile web apps that look and feel native on iPhone, Android, and BlackBerry touch devices. Sencha Touch is built specifically to leverage HTML5, CSS3, and Javascript for the highest level of power, flexibility, and optimization. Sencha Touch comes with an incredibly powerful data package. Developers can easily request data from a wide variety of sources whether by

AJAX, JSONP, or YQL, bind that data to specific visual components or templates, and then take that data offline with localStorage writers. (http://www.sencha.com/products/touch/)

PhoneGap: PhoneGap is a standards-based, open-source development framework for building cross-platform mobile apps with HTML, CSS and JavaScript for iPhone/iPad, Google Android, Palm, Symbian, BlackBerry, Windows Mobile and more. Developers are able to write a PhoneGap app once with HTML and Javascript and deploy it to any mobile device without losing features of a native app (http://www.phonegap.com/)

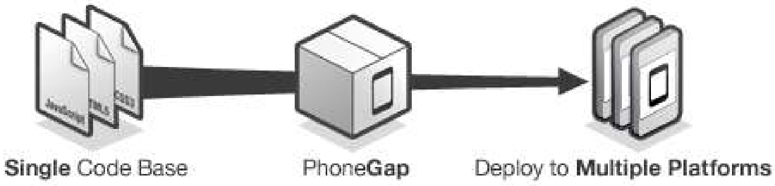


Figure 23 – How PhoneGap works

Technical Requirements

The Platform will be built using open source technologies:

Application language: PHP (version 5.2.4 or greater). PHP is a general-purpose server-side scripting language originally designed for web development to produce dynamic web pages. PHP can be deployed on most web servers and as a standalone interpreter, on almost every operating system and platform free of charge[7]. (http://www.php.net/).

Database server: MySQL (version 5.0 or greater). MySQL is a relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases. The MySQL database has become the world's most popular open source database because of its high performance, high reliability and ease of use. It is also the database of choice for a new generation of applications built on the LAMP stack (Linux, Apache, MySQL, PHP / Perl / Python.) Many of the world's largest and fastest-growing organizations including Facebook, Google, Adobe, Alcatel Lucent and Zappos rely on MySQL to save time and money powering their high-volume Web sites, business-critical systems and packaged software. (https://www.mysql.com)

Web server: Apache HTTP server (version 2.x or greater). The Apache HTTP Server is an open-source HTTP server. It supports a variety of features, many implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes. Since April 1996 Apache has

[7] http://en.wikipedia.org/wiki/PHP (Accessed at 14/10/2011)

been the most popular HTTP server software in use. As of May 2011 Apache was estimated to serve 63% of all websites and 66% of the million busiest[8]. (http://httpd.apache.org/)

Content management system (CMS): Joomla (version 1.7). Joomla is the one of the world's most popular open source CMS. Joomla is written in PHP, stores data in a MySQL database, and includes features such as page caching, RSS feeds, printable versions of pages, news flashes, blogs, polls, search, and support for language internationalization. The software is used by individuals, small & medium-sized businesses, and large organizations worldwide to easily create & build a variety of websites & web-enabled applications. Two of the platform's applications based on Joomla: City Fix and Tourism & Recreation Facilities Guide have been developed as Joomla 1.7 components.

User Requirements

User can access the platform using a modern browser or a smartphone application. The browser runs either on a PC or a smartphone. The following browsers are supported in laptops/desktops: Firefox 4+, Google Chrome 14+, Internet Explorer 7+, Safari 5+ and Opera 11+. In smartphones all modern browsers are supported: Mobile Safari, Mobile Firefox, Microsoft IE for Mobile, Google Android, Opera Mini, Opera Mobile, Skyfire, Dolphin, etc.

Other Requirements

The following requirements cover other important aspects of the applications.

Authentication – Users will be able to sign in with an existing account. Two protocols have been considered: OpenID (http://openid.net) and OAuth (http://oauth.net).

- OpenID is a safe, faster, and easier way to log in to web sites. OpenID is used by Google Yahoo!, Flickr, MySpace and Wordpress.
- OAuth is an open protocol to allow secure API authorization in a simple and standard method from desktop and web applications. OpenID is used by Facebook and Twitter.

Location-Based Services – There are many ways that a location is processed: Global Positioning System (GPS), WiFi and Bluetooth MAC Address, GSM/CDMA Cell IDs, IP Address. Each way leads to different accuracy, positioning time and battery life.

	Accuracy	**Positioning Time**	**Battery Life**
GPS	10m	2-10 minutes (only outdoors)	5-6 hours on

[8] "May 2011 Web Server Survey". Netcraft. May 17, 2011 (http://news.netcraft.com/archives/2011/05/02/may-2011-web-server-survey.html)

			most phones
WiFi	50m (improves with density)	Almost instant (server connect & lookup)	No additional effect
Cell tower triangulation	100-1400m (based on density)	Almost instant (server connect & lookup)	Negligible
IP	Country: 99% City: 46% US, 53% Intl ZIP: 0%	Almost instant (server connect & lookup)	Negligible

Table 2 – Methods for determination the user's location[9]

In smartphones hybrid of GPS, Wifi, and cell tower triangulation is used whereas in laptops/desktops: WiFi, IP, and rarely GPS. Google provides free location estimation through Google Latitude API

Maps – Wherever is required a map as background Google Maps will be used. Google Maps has a wide array of APIs that let developers embed Google Maps into their own websites and applications, and overlay their own data on top of them. (http://code.google.com/apis/maps/)

Microformats – Designed for humans first and machines second, microformats are a set of simple, open data formats built upon existing and widely adopted standards. The following microformats will be supported:

- hAtom – for marking up Atom feeds
- hCard – for contact information; includes:
  - adr – for postal addresses
  - geo – for geographical coordinates (latitude, longitude)
- hMedia - for audio/video content
- hProduct – for products
- hReview – for reviews

Open Linked Data – Open Linked Data refers to data published on the Web in such a way that it is machine-readable, its meaning is explicitly defined, it is linked to other external data sets, and can in turn be linked to from external data sets. Wherever possible, the platform's API strives to be as RESTful[10] as possible. Resources are represented in a hierarchical manner, and the service uses the standard HTTP GET, POST, PUT, and DELETE

[9] "Mobile First" presentation by Luke Wroblewski (http://goo.gl/YfMK5)
[10] Wikipedia - Representational state transfer (http://goo.gl/aMsmG)

methods to manipulate those resources. The applications will provide open data using RDF and/or JSON:

- RDF is a generic graph-based data model with which to structure and link data that describes things in the world.
- JSON, or JavaScript Object Notation, is a lightweight text-based open standard designed for human-readable data interchange.

GoodRelations ontology will be used in “Virtual Marketplace” application. GoodRelations is a vocabulary for publishing all of the details of products and services.

Internationalization – The applications will support localization and international deployment. Unicode standard will be used for encoding whereas it is avoided dependence in code of user-interface string values. Internationalization Quick Tips[11] from the Web from W3C are also taken into consideration.

Accessibility – It is essential that the applications of Thermi pilot to be accessible in order to provide equal access and equal opportunity to people with diverse abilities. While the main focus of Web accessibility is people with disabilities, accessibility also benefits people without disabilities, including: older people, people with low literacy or not fluent in the language, people with low bandwidth connections or using older technologies, and new and infrequent users. The following W3C guidelines will be followed:

- Web Content Accessibility Guidelines (WCAG) 2.0[12]
- Accessible Rich Internet Applications (WAI-ARIA) 1.0[13]

Web Analytics – Google Analytics (http://www.google.com/analytics/) provides a core set of tools that supports the primary tasks of a web analytics process. It tracks many standard website metrics, like visits, unique visitors, pageviews, bounce rate, and abandonment rate. It can also track business outcomes, called goals. Google analytics will be used in combination with applications internal analytics modules.

Technical architecture

The most important goal of platform’s architecture is to design services as autonomous reusable components. Services are intended to be self-contained and loosely coupled,

[11] http://www.w3.org/International/quicktips/
[12] http://www.w3.org/WAI/intro/wcag.php
[13] http://www.w3.org/WAI/intro/aria.php

meaning that dependencies between services are kept to a minimum. Instead of one service depending on another, coordination services are provided in situations in which multiple services need to be accessed and access to them needs to be sequenced.

The architecture that fits perfectly in the above goal is the service-oriented architecture (SOA). The service-oriented architecture is a distributed software architecture that consists of multiple autonomous services. The services are distributed such that they can execute on different nodes with different service providers. With a SOA, the goal is to develop software applications that are composed of distributed services, such that individual services can execute on different platforms and be implemented in different languages. Standard protocols are provided to allow services to communicate with each other and to exchange information. In order to allow applications to discover and communicate with services, each service has a service description. The service description defines the name of the service, the location of the service, and its data exchange requirements.

Services will to be designed according to the following key principles:[14]

- **Loose coupling.** Services should be relatively independent of each other. Thus, a service should hold a minimum amount of information about other services and ideally should not depend on other services.
- **Autonomy.** Each service is self-contained, such that it can operate independently without the need of other services.
- **Abstraction.** The details of a service are hidden. A service only reveals its interface in terms of the operations it provides, and for each operation, the inputs it needs, and the outputs it returns.
- **Reusability.** A key goal of SOA is to design services that are reusable. The preceding design goals of services are intended to facilitate reuse.
- **Composability**. Services are designed to be capable of being assembled into larger composite services. In some cases, a composite service also needs to provide coordination of the individual services.
- **Discoverability**. A service provides an external description to help allow it to be discovered by a discovery mechanism.

The following figure presents the architecture of the platform.

[14] Erl, T. 2006. Service-Oriented Architecture (SOA): Concepts, Technology, and Design. Upper Saddle River, NJ: Prentice Hall.

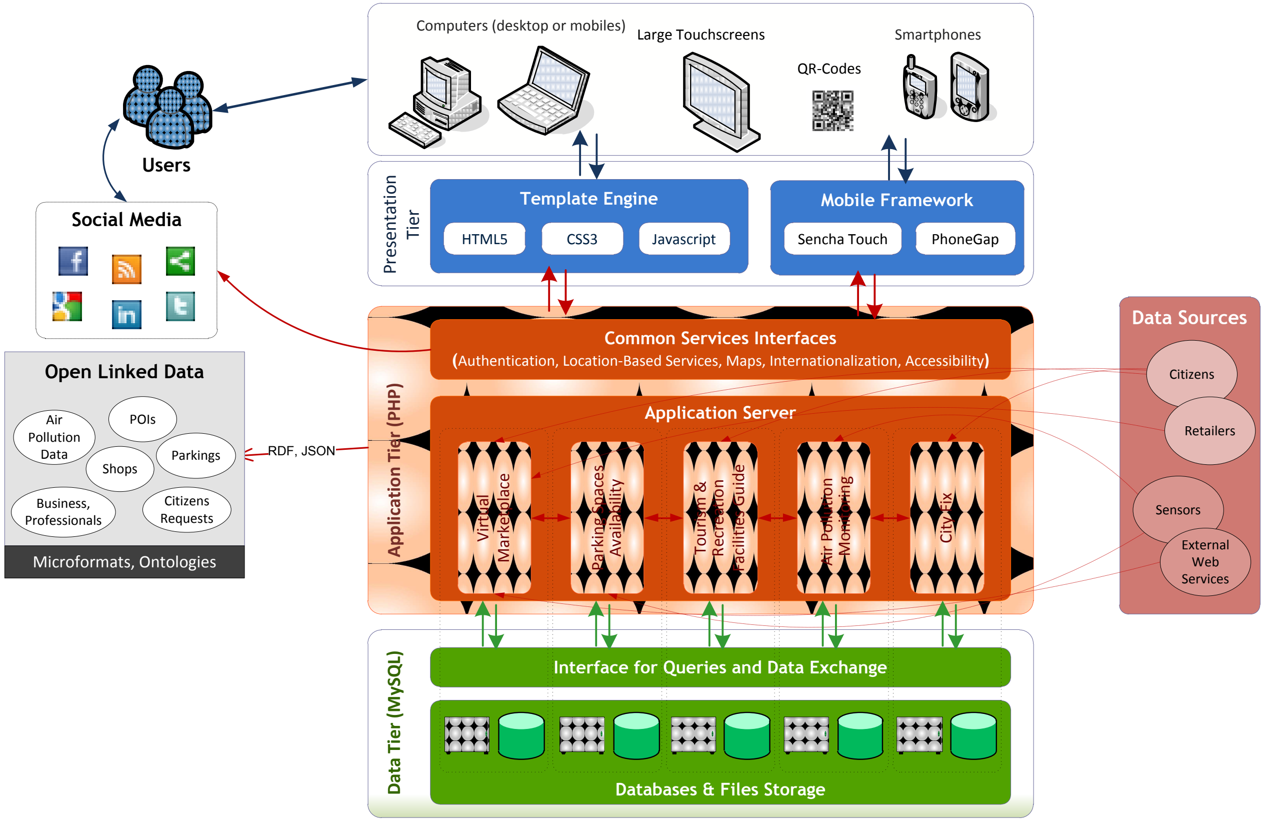

Computers (desktop or mobiles)
Large Touchscreens
QR-Codes
Smartphones
Users
Social Media
Open Linked Data
Air Pollution Data
POIs
Shops
Parkings
Business, Professionals
Citizens Requests
Microformats, Ontologies
RDF, JSON
Presentation Tier
Template Engine
HTML5
CSS3
Javascript
Mobile Framework
Sencha Touch
PhoneGap
Application Tier (PHP)
Common Services Interfaces
(Authentication, Location-Based Services, Maps, Internationalization, Accessibility)
Application Server
Virtual Marketplace
Parking Spaces Availability
Tourism & Recreation Facilities Guide
Air Pollution Monitoring
City Fix
Data Sources
Citizens
Retailers
Sensors
External Web Services
Data Tier (MySQL)
Interface for Queries and Data Exchange
Databases & Files Storage

Figure 24 – The architecture of the platform supporting Thermi's pilot

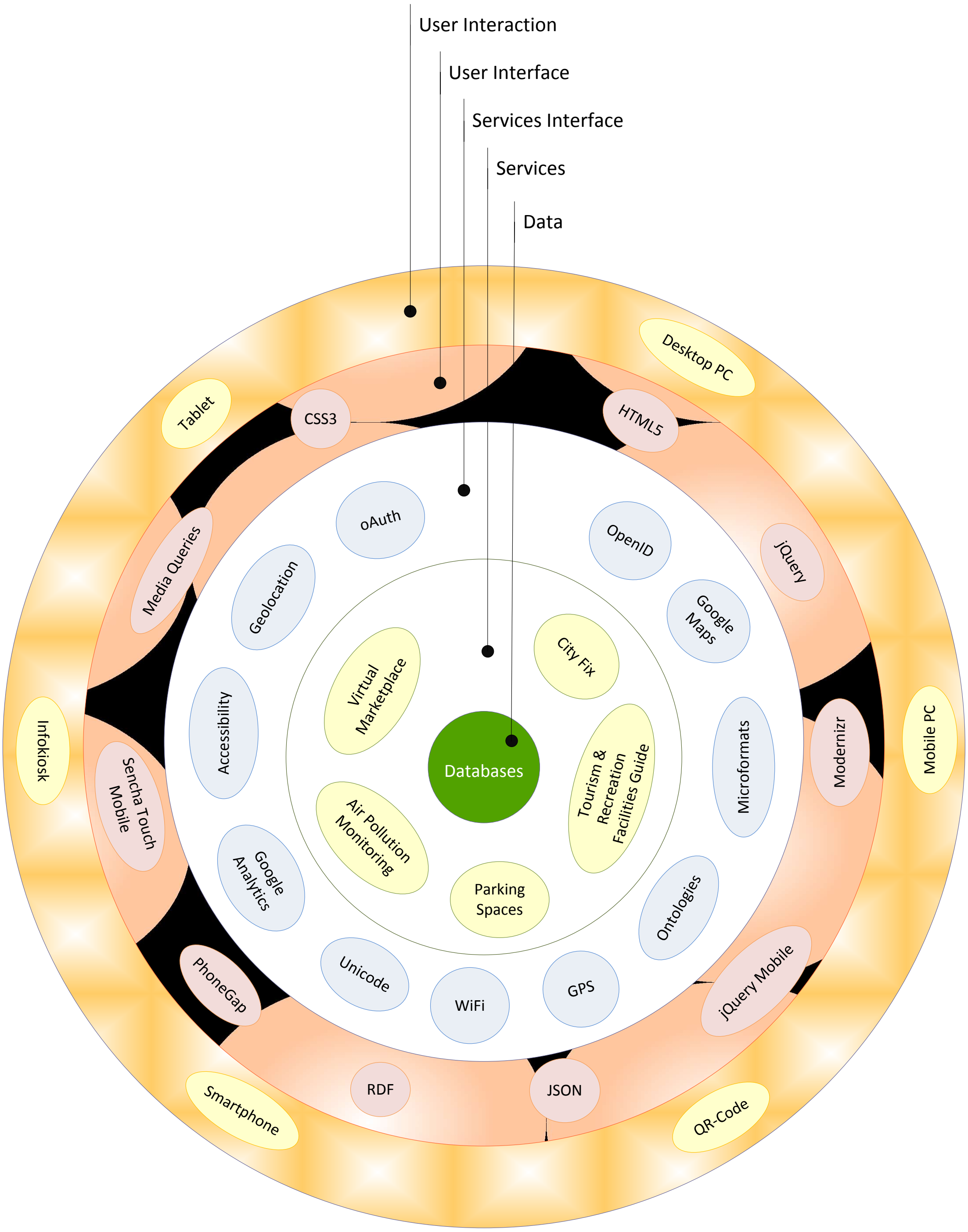


Figure 25 – Thermi's platform: A combination of open web technologies and tools

Requirements related to the use of open-source system (OSS)

As it is mentioned before a number of open source solutions will be used. In particular:

- **PHP** as application language
- **MySQL** as database server
- **Apache HTTP server** as web server
- **Joomla** as content management system in City Fix and Tourism & Recreation Facilities Guide applications

Operating Platform

The following table summarises the way in which a user can uses the services of Thermi's pilot.

	Web Application	Mobile Website	Mobile Application
Environmental pollution monitoring system	X	X	
Parking Spaces Availability	X	X	
City Fix Application	X	X	
Tourism and Recreation Facilities Guide	X	X	X*
Virtual Marketplace and Crowd-Media	X	X	X*
* Mobile application has a subset of web application's features			

Table 3 – The way that services will be available to the users

The platform's architecture has been presented in the previous section of the "Technical architecture". As services have been designed as autonomous components they have separate administration environments. The administration of each service has been presented in the section about the functional requirements of each service.

5. Vitry-sur-Seine

i. Local Information Service

Description

The application provides user-directed information related to the city where he is. When the user is connected, this service will provide only local information related to his location. The goal of the service is to provide information than are directly selected based on the location of the user: indeed Internet gives global information, which are not directly applicable to the local situation or the user needs to provide more information to access. For example in the case of weather information, the user must write/choose his city and then he will have the weather. With these services, as the users are physically connected in the city, he will access only weather data he needs.

This service must be accessible without any registration or authentication as the functionalities should be accessible quickly for any user. There is no need to store personal data or interact with user profiles. For the sustainability and the interoperability of this service, it will also include a management section in order to give to an administrator an easy way to hide or display some functionalities of the service. Indeed, some data might not be available in other cities or countries where the Local Information Service can be deployed.

Service release

The Local Information Service was released on the 26th of March, 2012. This date corresponds to the public release of the source code on a Github repository and to the first deployment of the service on a public server.

Open Approach method

The full service will be developed using an Open Approach method for the three Innovation Cycles. One to two co-design sessions will be conducted during each Innovation Cycle.

First Innovation Cycle: A prototype version was running on January 2012 on the server of the developers' team. The first public release of the service was done on the 26th of March, 2012.

Second Innovation Cycle: A second public release is expected to be available on June 2012.

Third Innovation Cycle: At the moment, one release of this service is expected during the month of October 2012.

During the first Innovation Cycle, a prototype was internally released and tested by employees from the partners of Vitry-sur-Seine pilot in coordination with the PEOPLE team and the developers' team. The feedbacks provided the requirements for improvements of the service. Developments were done and conducted to a public release on March, 26th. The co-design session was conducted with the students, teachers and administration staff for the validation of the service. The service was deployed on an online platform. During two days, they were asked to fulfil questionnaires on papers. Feedbacks were then proceed to extract valuable information for the upcoming developments

Co-design sessions during the second and the third Innovation Cycle are expected to follow the same steps, but in different locations. For the second Innovation Cycle, experimentations will be conducted near the City Hall as well as in the IUT. For the third Innovation Cycle, it will include the same process than the second Innovation Cycle but will be extended to two other locations: Mac Val (Museum) and Exploradôme (Science Center).

Open Source Software and tools for the sustainability of communities

The Local Information Service is an Open Source Software. It is released under the GNU General Public License, version 2.

The developers community from IUT and the Project developers community are following the developments of the service and are expected to provide the necessary support for its sustainability. As long as the source code is hosted on a Github repository, we also expect contributions from volunteers or any other Open Source Community that might find some interests in the service.

In order to foster Open Source communities around the project, following tools are used or are recommended to use:

- **Github**, web-based host system
- **GIT**, distributed versioning control system
- **Mantis**, Bug Tracking Management
- **Eclipse**, source development
- **Maven**, dependencies management for Java language
- **Jenkins**, continuous build for Java language

Actors

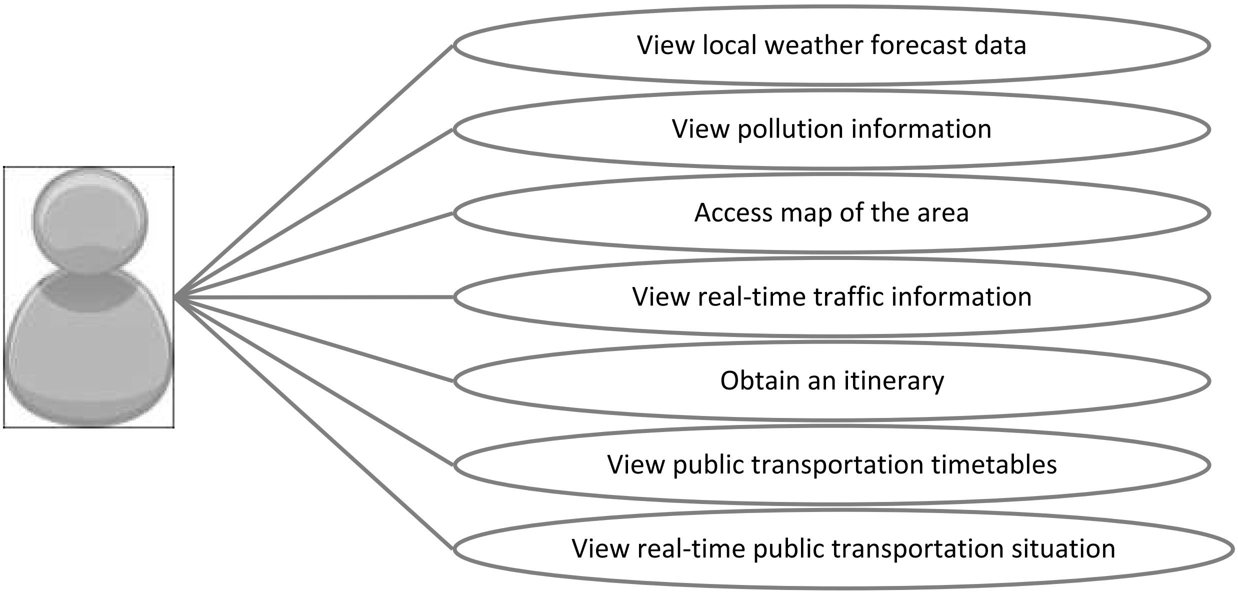

View local weather forecast data
View pollution information
Access map of the area
View real-time traffic information
Obtain an itinerary
View public transportation timetables
View real-time public transportation situation

Figure 26. Generic user and associated use cases

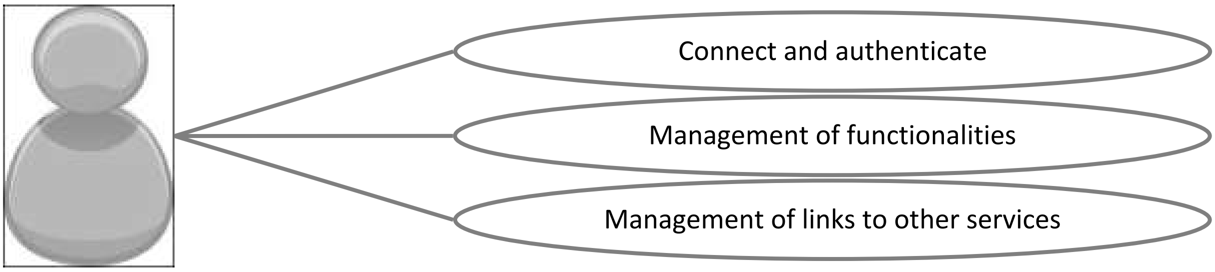

Connect and authenticate
Management of functionalities
Management of links to other services

Figure 27. Service Administrator and associated use cases

Use-case cards

Use case name 1
View local weather forecast data

Summary
The user wants to have access to weather and weather forecast data of the area
Actors
Generic user
Preconditions
Data from meteofrance.com must be available and open for a free use
Description of main sequence
• The user access the Public Information Service webpage • The system builds and sends requests to meteofrance.com in order to get the weather and weather forecast data from the area where the user is located • The website meteofrance.com returns the data • The raw data are processed and transformed into visual information by the system • The information is displayed on a widget on the Public Information Service webpage

Use case name 2
View pollution information
Summary
The user wants to have access to pollution information of the area
Actors
Generic user
Preconditions
Data from airparif.asso.fr must be available and open for a free use
Description of main sequence

- The user access the Public Information Service webpage
- The system builds and sends requests to airparif.asso.fr in order to get the pollution data from the area where the user is located
- The website airparif.asso.fr returns the data
- The raw data are processed and transformed into visual information by the system
- The information is displayed on a widget on the Public Information Service webpage

Use case name 3
Access to the map of the area
Summary
The user wants to have access to the map of the area
Actors
Generic user
Preconditions
Data from maps.google.fr must be available and open for a free use
Description of main sequence
• The user access the Public Information Service webpage • The system builds and sends requests to maps.google.fr in order to get the map and local information data from the area where the user is located • The website maps.google.fr returns the data • The raw data are processed and transformed into visual information by the system • The information is displayed on a widget on the Public Information Service webpage

Use case name 4
View real time traffic information

Summary
The user wants to know the traffic situation of the area in real-time
Actors
Generic user
Preconditions
Data from Sytadin.fr website must be available and open for a free use
Description of main sequence
• The user access the Public Information Service webpage • The system builds and sends requests to Sytadin.fr in order to get the weather and weather forecast data from the area where the user is located • The website Sytadin.fr returns the data • The raw data are processed and transformed into visual information by the system • The information is displayed on a widget on the Public Information Service webpage

Use case name 5
Obtain an itinerary
Summary
The user wants to reach a place located nearby the bus stop.
Actors
Generic user
Preconditions
Data from maps.google.fr website must be available and open for a free use
Description of main sequence

- The user select the "Itinerary" tab next to map widget on the Public Information Service
- The user types the place where he/she wants to go. The location can be written as:
    - A postal address ("47 rue de l'église")
    - A facility's name ("Mairie", "toilette", "Intermarché")
- The user clicks on the "search" button
- The system builds and sends requests to maps.google.fr in order to get the coordinates data corresponding to the location situated in the area where the user is located
- The website maps.google.fr returns the itinerary in a specific format
- The raw data are processed and transformed into visual information by the system
- The Public Information Service webpage is updated with the itinerary displayed on the map widget

Use case name 6
View public transportation timetables
Summary
The user wants to have access to the local public transportation timetables affected to the bus stop
Actors
Generic user
Preconditions
Data from transport-idf.fr website must be available and open for a free use
Description of main sequence

- The user access the Public Information Service webpage
- The system builds and sends requests to transport-idf.fr in order to get the timetables data from the area where the user is located
- The website transport-idf.fr returns the documents
- The documents are displayed on a specific widget on the Public Information Service webpage
- The user select which public transportation timetable he/she wants to consult by clicking on the right tab over the zone where the timetable is displayed

Use case name 7

View real-time public transportation situation

Summary

The user wants to know the local public transportation situation in real-time

Actors

Generic user

Preconditions

Data from transport-idf.fr website must be available and open for a free use

Description of main sequence

- The user access the Public Information Service webpage
- The system builds and sends requests to transport-idf.fr in order to get the weather and weather forecast data from the area where the user is located
- The website transport-idf.fr returns the data
- The raw data are processed and transformed into visual information by the system
- The information is displayed on a widget on the Public Information Service webpage

Use case name 8

Connect and authenticate
Summary
The administrator wants to have access to an administration functionality
Actors
Service administrator
Preconditions
The administrator needs to be already registered by another administrator.
Description of main sequence
• The administration webpage asks the user to provide his/her login and associated password in order to identify the administrator and verify that it is his/her identity. • If the system validates the log-in, it redirects the administrator to the service that he was accessing or, by default, to the management webpage of the service. • If not, the user is asked to fulfil again the information.

Use case name 9
Manage the functionalities
Summary
The data available for the bus stops might differ from a country to another, a city to another or an area to another. The functionalities needs to be disabled if the needed data are missing.
Actors
Service administrator
Preconditions
The administrator must be logged-in
Description of main sequence

- The administrator accesses to the Administration Public Information Service webpage
- The webpage displays the list of the functionalities with their state and a button to enable/disable the functionality.
- The administrator chooses then which functionality to disable by clicking on their state.

Use case name 10

Management of links to other services

Summary

As the pilot integrates several different services, the Public Information Service can centralise the accesses to other services and display a link or a widget returning information from these services.

Actors

Service administrator

Preconditions

The administrator must be logged-in

Description of main sequence

- The administrator accesses to the Administration Public Information Service webpage
- The webpage displays the list of the links with their state and a button to enable/disable each link.
- The administrator can types in a text field the name of a new service and fill-in the right URL in another text field.
- The administrator clicks on "submit a new service" to send the new service.
- The information are then checked and validated by the system.
- If the name and the link are validated, the service is added to the list.
- Else, the system goes back to the Administration Public Information Service webpage and display information on the problems encountered.

ii. Private Information Service

Description

The service enables to display and edit the user profile. It allows also the user to display and manage the list of friends' profiles, location and their connexion context (available, online, etc). The user profile is a collection of personal data regarding identity, activities, location and preferences. He/she can also access to a users list. If the user wants to know if their friends or contacts are connected, and eventually determinate their approximate location (if the targeted person allows that functionality, regarding privacy issues), he/she can use the Private Information Service to do so. Due to the confidentiality and privacy issues related previously, the user cannot access to the service without being identified and authenticated.

Service release

The Private Information Service was released on the 26th of March, 2012. This date corresponds to the public release of the source code on a Github repository and to the first deployment of the service on a public server.

Open Approach method

The full service will be developed using an Open Approach method for the three Innovation Cycles. One to two co-design sessions will be conducted during each Innovation Cycle.

First Innovation Cycle: A prototype version was running on January 2012 on the server of the developers' team. The first public release of the service was done on the 26th of March, 2012.

Second Innovation Cycle: A second public release is expected to be available on June 2012.

Third Innovation Cycle: At the moment, one release of this service is expected during the month of October 2012.

During the first Innovation Cycle, a prototype was internally released and tested by employees from the partners of Vitry-sur-Seine pilot in coordination with the PEOPLE team and the developers' team. The feedbacks provided the requirements for improvements of the service. Developments were done and conducted to a public release on March, 26th. The co-design session was conducted with the students, teachers and administration staff for the validation of the service. The service was deployed on an online platform. During two days, they were asked to fulfil questionnaires on papers. Feedbacks were then proceed to extract valuable information for the upcoming developments

Co-design sessions during the second and the third Innovation Cycle are expected to follow the same steps, but in different locations. For the second Innovation Cycle, experimentations will be conducted near the City Hall as well as in the IUT. For the third Innovation Cycle, it will include the same process than the second Innovation Cycle but will be extended to two other locations: Mac Val (Museum) and Exploradôme (Science Center).

Open Source Software and tools for the sustainability of communities

The Private Information Service is an Open Source Software. It was released under the GNU General Public License, version 2. Since this service is based on the core engine of the Open Source Social Network platform ELGG, the service inherits this license. Any related source code can be freely shared out or modified, as long as it remains under the license GPL-2.0.

As the application is an Elgg component, we expect the Elgg community to follow the development of this service. Also tThe developers community from IUT and the Project developers community are following the developments of the service and are expected to provide the necessary support for its sustainability. As long as the source code is hosted on a Github repository, we also expect contributions from volunteers or any other Open Source Community that might find some interests in the service.

In order to foster Open Source communities around the project, following tools are used or are recommended to use:

- **Github**, web-based host system
- **GIT**, distributed versioning control system
- **Mantis**, Bug Tracking Management
- **Eclipse**, source development
- **Maven**, dependencies management for Java language
- **Jenkins**, continuous build for Java language

Actors

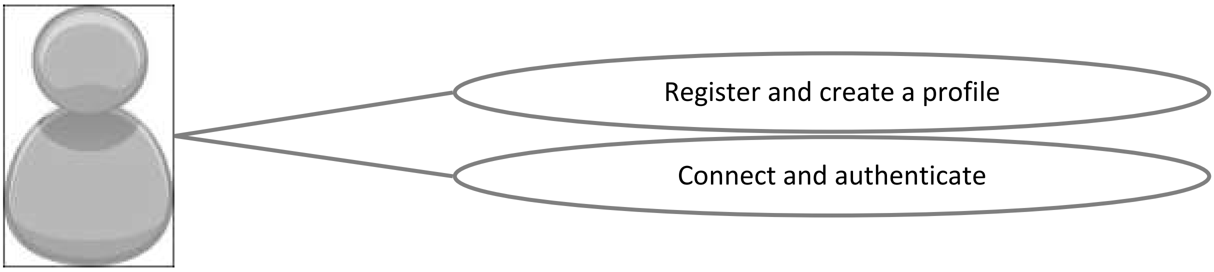


Figure 28. Generic user and associated use cases

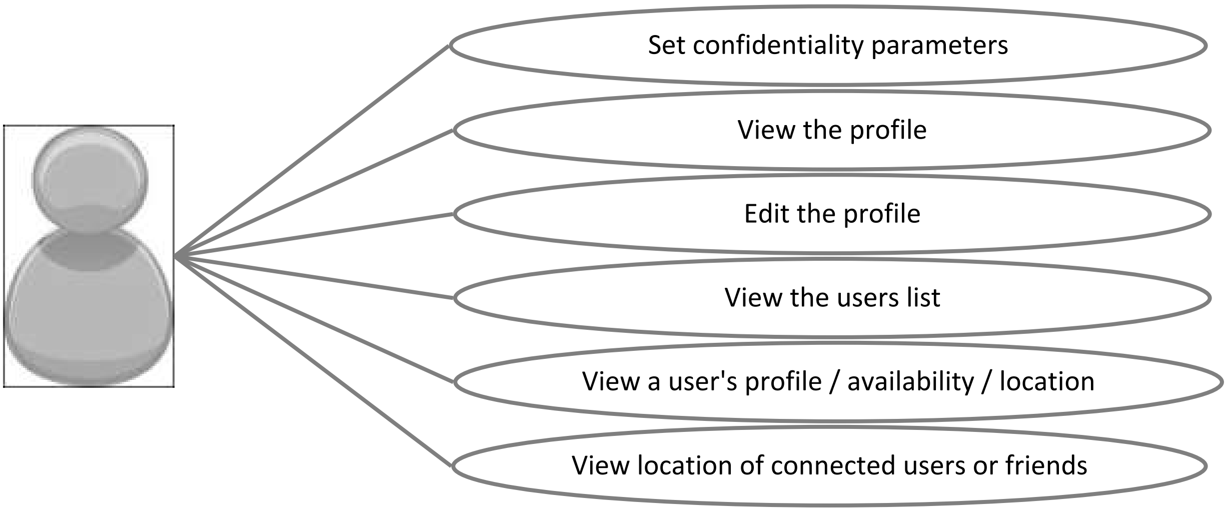

Set confidentiality parameters
View the profile
Edit the profile
View the users list
View a user's profile / availability / location
View location of connected users or friends

Figure 29. Authenticated user and associated use cases

Use-case cards

Use case name 11
Register
Summary
The user can register to use the service or specific functionalities
Actors
Generic user

Preconditions

There is no precondition to accomplish this action

Preconditions

- The user access to a page where the required information are asked in appropriate and comprehensive fields. Necessary fields to complete the registration are mentioned on the webpage and additional information can be fulfilled if the user accepts to do so. To finalize the registration, the user presses the validation button.
- The information is then checked and validated by the system.
- If the registration is validated, then the user is registered and informed through an e-mail.
- Else, the system goes back to the registration webpage and displays information on the problems encountered.

Use case name 12

Connect and authenticate

Summary

The user wants to have access to a service or specific functionalities that require an authentication

Actors

Generic user

Preconditions

The user needs to be already registered.

Description of main sequence

- The connection and authentication webpage asks the user to provide his/her login and associated password in order to identify the user and verify that it is his/her identity.
- If the system validates the log-in, it redirects the user to the service that he was accessing or, by default, the portal of the pilot.
- If not, the user is asked to fulfil again the information.

Use case name 13
Set confidentiality parameters
Summary
The data that the user provides to the system belongs to him/her and he/she might want to manage and modify which information can be viewed by other users or used by the services, regarding privacy and confidentiality settings. In order to facilitate the settings, the system will propose four different levels of confidentiality.
Actors
Authenticated user
Preconditions
The user must be authenticated and logged in.
Description of main sequence
• The page displays a list of four different levels of confidentiality and the user chooses, by checking the right radio box, which one he/she wants to on displayed information from the his/her profile, availability, location or activities: ○ Public: all the information are available to every people registered on the system ○ Friends: only friends or group of friends can access to personal information ○ Totally restricted: no information is available to other persons even if they are registered on the system ○ Custom: the user can set for each information (first name, last name, location, e-mail address, etc…) a different privacy setting • For each level of confidentiality, the system warns the user on the effects of his/her choice. Indeed, some services require specific information from the user to run, but if the user doesn't share the necessary information, the user cannot use it.

Use case name 14

View the profile
Summary
The user can access to his/her profile and check the information displayed.
Actors
Authenticated user
Preconditions
The user must be authenticated and logged in.
Description of main sequence
• On the webpage, the user can display information on his/her profile (name, e-mail, hobbies, activities, etc.) and check if they are right or up to date.

Use case name 15
Edit the profile
Summary
The user can edit the information on his/her profile.
Actors
Authenticated user
Preconditions
The user must be authenticated and logged in.
Description of main sequence

- On the edit section of the service, the user can display information of his/her profile (name, e-mail, hobbies, activities, etc.) and modify them.
- The information is then checked and validated by the system.
- If the information is validated, the user is informed that the modifications have been made.
- Else, the system goes back to the edit webpage and display information on the problems encountered.

Use case name 16

View the users list

Summary

The user can access to a webpage where a list of users, connected users, friends or connected friends.

Actors

Authenticated user

Preconditions

The user must be authenticated and logged in.

Description of main sequence

- The webpage display a list of persons that can be either users or friends by selecting the option (users/friends).
- The user can check a box to select only connected users or friends from the list.
- The list offers a link to access to any user's profile displayed in the list.
- The list offers the possibility to the user to add a person to his/her friends list

Use case name 17

View a user's profile / availability / location

Summary

The user can access to a user's profile which displays information such as the profile, the availability and the location. The user can also interact with the user by adding him/her to his friends list, or initiate a conversation through the immersive instant messaging service.

Actors

Authenticated user

Preconditions

The user must be authenticated and logged in.

Description of main sequence

- After clicking on a person name, the user will access to his/her profile displaying several information, according to the privacy settings:
    - Identity with name, e-mail, address, birth date, etc.
    - Activities done lately on services
    - Availability (online/offline)
    - location
- The user can also add/delete the person to/from the friends list after a confirmation
- The user can initiate a conversation which will redirect him/her to the Immersive Instant Messaging service.

Use case name 18

View location of connected users or friends

Summary

A map displays the location of users and friends on a defined area.

Actors

Authenticated user

Preconditions

The user must be authenticated and logged in. The user must have selected a person's profile.
Description of main sequence
• The user access to a map based on Google Maps where the locations of users and friends are displayed • The user can display a different area by moving the map • The user can choose to display any users or friends only by selecting the right radio box

iii. Interactive Search for persons and facilities

Description

The application provides a search function among the information published by the portal. This search is semantic, which means the request is analyzed to understand what the goal of the request is and to adapt it (no direct matching). Furthermore the user will be helped interactively. This is performed using the interactive search function of objects in the urban space based on context aware semantic search queries. A registry is used to store the references and description of friends, virtual and physical objects of interest that are present in the city space such as gardens, public offices, etc. The result of search is a set of useful information such as profile description, contacts and contexts (presence, location and how they can be reached). The profile can be extracted from standards registries like LDAP, XML Standard profiles or FOAF. A physical object can be the bus station or other objects in the proximity (e.g. water fountain, garden, office building, shops, accommodations, etc.).

Furthermore this search function addresses a wide public (from student to elderly people) and thus should provide helpful characteristics. Indeed the search should be semantic, so that the results are more accurate and it allows the user to have a better flexibility. Also, it should help the user during his search with interactive functions.

Service release

The Interactive Search for persons and facilities is under development at the moment, but doesn't have any released version. It is expected to be released during the Second Innovation Cycle, in the middle of June 2012.

Open Approach method

The service will be developed using an Open Approach method for the three Innovation Cycles. One to two co-design sessions will be conducted during each Innovation Cycle.

Second Innovation Cycle: The first version of the service is expected to be available on June 2012. A second co-design session is expected to be run during this Innovation Cycle, probably around July 2012.

Third Innovation Cycle: A third release is expected during the month of October 2012.

This service has not been submitted to any co-design session yet. But it will be done during the second and third Innovation Cycle.

Co-design sessions during the second and the third Innovation Cycle are expected to follow the same steps than the co-design session driven during the First Innovation Cycle, but in different locations. For the second Innovation Cycle, experimentations will be conducted near the City Hall as well as in the IUT. For the third Innovation Cycle, it will include the same process than the second Innovation Cycle but will be extended to two other locations: Mac Val (Museum) and Exploradôme (Science Center).

Open Source Software and tools for the sustainability of communities

The Interactive Search for Persons and Facilities is an Open Source Software. It will be released under the GNU General Public License, version 2.

The developers community from IUT and the Project developers community are following the developments of the service and are expected to provide the necessary support for its sustainability. As long as the source code is hosted on a Github repository, we also expect contributions from volunteers or any other Open Source Community that might find some interests in the service.

In order to foster Open Source communities around the project, following tools are used or are recommended to use:

- **Github**, web-based host system
- **GIT**, distributed versioning control system
- **Mantis**, Bug Tracking Management
- **Eclipse**, source development
- **Maven**, dependencies management for Java language
- **Jenkins**, continuous build for Java language

Actors

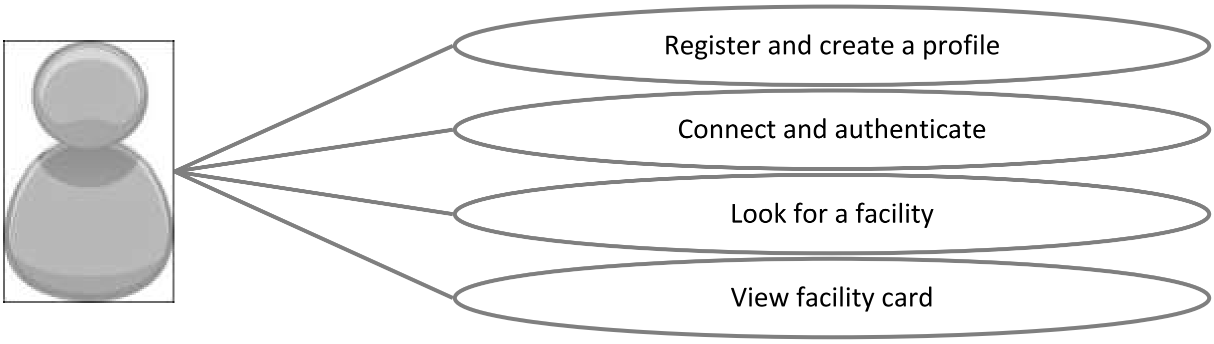


Figure 30. Generic user and associated use cases

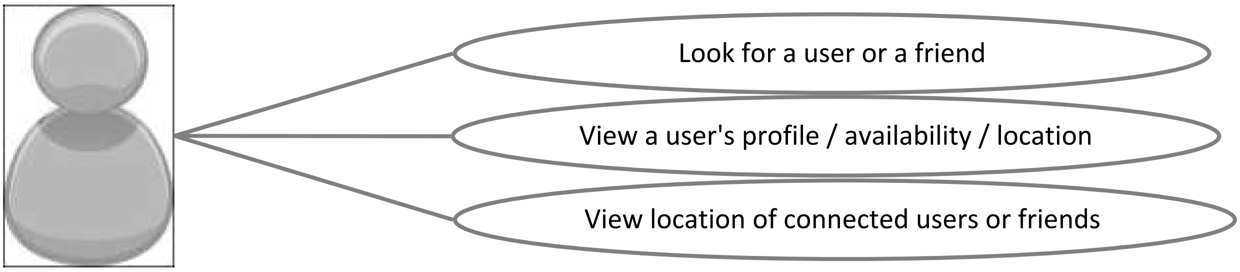

Look for a user or a friend
View a user's profile / availability / location
View location of connected users or friends

Figure 31. Authenticated user and associated use cases

Use-case cards

Use case name 19
Register
Summary
The user can register to use the service or specific functionalities
Actors
Generic user
Preconditions
There is no precondition to accomplish this action

Preconditions
• The user access to a page where the required information are asked in appropriate and comprehensive fields. Necessary fields to complete the registration are mentioned on the webpage and additional information can be fulfilled if the user accepts to do so. To finalize the registration, the user presses the validation button. • The information is then checked and validated by the system. • If the registration is validated, then the user is registered and informed through an e-mail. • Else, the system goes back to the registration webpage and displays information on the problems encountered.

Use case name 20
Connect and authenticate
Summary
The user wants to have access to a service or specific functionalities that require an authentication
Actors
Generic user
Preconditions
The user needs to be already registered.
Description of main sequence
• The connection and authentication webpage asks the user to provide his/her login and associated password in order to identify the user and verify that it is his/her identity. • If yes, the system redirects the user to the service that he was accessing or, by default, the portal of the pilot. • If not, the user is asked to fulfil again the information.

Use case name 21
Look for a facility

Summary
This functionality helps the user to find a place, a building, shop, service, town facility or any facility that might be located close-at-hand. The service then displays a short description of the facility and show the location on a map based on Google Maps to help the user for the directions.
Actors
Generic user
Preconditions
The user must allow the location based on the bus-stop used to connect to the service.
Description of main sequence
• The user starts make a query in the search field • The system helps the user to build the query based on a context aware semantic engine • The user select the facility

Use case name 22
View facility card
Summary
The user can access to a user's profile which displays information such as the profile, the availability and the location. The user can also interact with the user by adding him/her to his friends list, or initiate a conversation through the immersive instant messaging service.
Actors
Generic user
Preconditions
The user has selected a facility
Description of main sequence

- After selecting a facility, the user accesses to the facility card displaying several useful information (depending on their availability):
  - Short description
  - Opening hours
  - Contact details
  - location
- A map, based on Google Maps application, is displayed to show the location and helps the user to find his/her way

Use case name 23

Look for a user or a friend

Summary

This functionality helps the user to find a person, then contact or locate him/her on a map, based on Google Maps.

Actors

Authenticated user

Preconditions

The user must be authenticated and logged in.

Description of main sequence

- The user makes a simple query
- The system returns a list of persons corresponding to the query
- After selecting a person's profile, the user can access to:
  - The Immersive Instant messaging to contact him/her
  - The location of this person in order to join him/her physically (depending on the privacy setting of the selected person, this function can be disabled)
  - His/her profile

Use case name 24
View a user's profile / availability / location
Summary
The user can access to a user's profile which displays information such as the profile, the availability and the location. The user can also interact with the user by adding him/her to his friends list, or initiate a conversation through the immersive instant messaging service.
Actors
Authenticated user
Preconditions
The user must be authenticated and logged in.
Description of main sequence
• After clicking on a person name, the user will access to his/her profile displaying several information, according to the privacy settings: ○ Identity with name, e-mail, address, birth date, etc. ○ Activities done lately on services ○ Availability (online/offline) ○ location • The user can also add/delete the person to/from the friends list after a confirmation • The user can initiate a conversation which will redirect him/her to the Immersive Instant Messaging service.

Use case name 25
View a user's profile / availability / location
Summary

The user can access to a user's profile which displays information such as the profile, the availability and the location. The user can also interact with the user by adding him/her to his friends list, or initiate a conversation through the immersive instant messaging service.

Actors

Authenticated user

Preconditions

The user must be authenticated and logged in.

The user must have selected a person's profile

Description of main sequence

- After clicking on a person name, the user will access to his/her profile displaying several information, according to the privacy settings:
    - Identity with name, e-mail, address, birth date, etc.
    - Activities done lately on services
    - Availability (online/offline)
    - location
- The user can also add/delete the person to/from the friends list after a confirmation
- The user can initiate a conversation which will redirect him/her to the Immersive Instant Messaging service.

iv. Immersive instant messaging

Description

Whenever a network allows people to exchange data using their smart phones, communication between users is needed, in real time or not. The instant immersive messaging service allows one to communicate with another person over a network in real time, with relative privacy. This service is limited at the beginning to users connected to the portal using a web browser or smart phone application. It will be extended in a second phase to users that will use clients such as XMPP-Jabber, Google Talk, MSN, SIP or Yahoo! Messenger or connect through Facebook, Google+ and Diaspora. The service provides people with private and public bidirectional communication facility. This will include one to one communication or group discussion involving different participants according to a star topology. In the case of private communication the service will allow the inviter to add or remove a participant.

Adding or removing a friend will be performed by entering the person's key word contact or by selecting it in a list. If the person accepts any communication, his/her name will typically be listed as available. Clicking on their name will provide summary of her context (location, surrounding environment description, noise, etc) according to privacy rules.

Service release

The Immersive Instant Messaging was released as part of the Private Information Service on March 26th.

Open Approach method

This service is not developed using Open Approach.

Open Source Software and tools for the sustainability of communities

The Immersive Instant Messaging is an Open Source Software. It is released under the GNU General Public License, version 2. This service is an extension of the Chat service from the Open Source Social Network platform ELGG, the service inherits this license. Any related source code can be freely shared out or modified, as long as it remains under the license GPL-2.0.

As the application is an Elgg component, we expect the Elgg community to follow the development of this service. Also the developers community from IUT and the Project developers community are following the developments of the service and are expected to provide the necessary support for its sustainability. As long as the source code is hosted on a Github repository, we also expect contributions from volunteers or any other Open Source Community that might find some interests in the service.

In order to foster Open Source communities around the project, following tools are used or are recommended to use:

- **Github**, web-based host system
- **GIT**, distributed versioning control system
- **Mantis**, Bug Tracking Management
- **Eclipse**, source development
- **Maven**, dependencies management for Java language
- **Jenkins**, continuous build for Java language

Actors

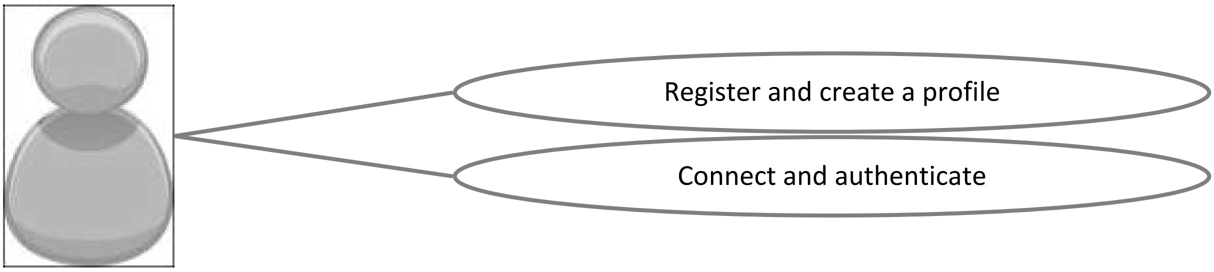


Figure 32. Generic user and associated use cases

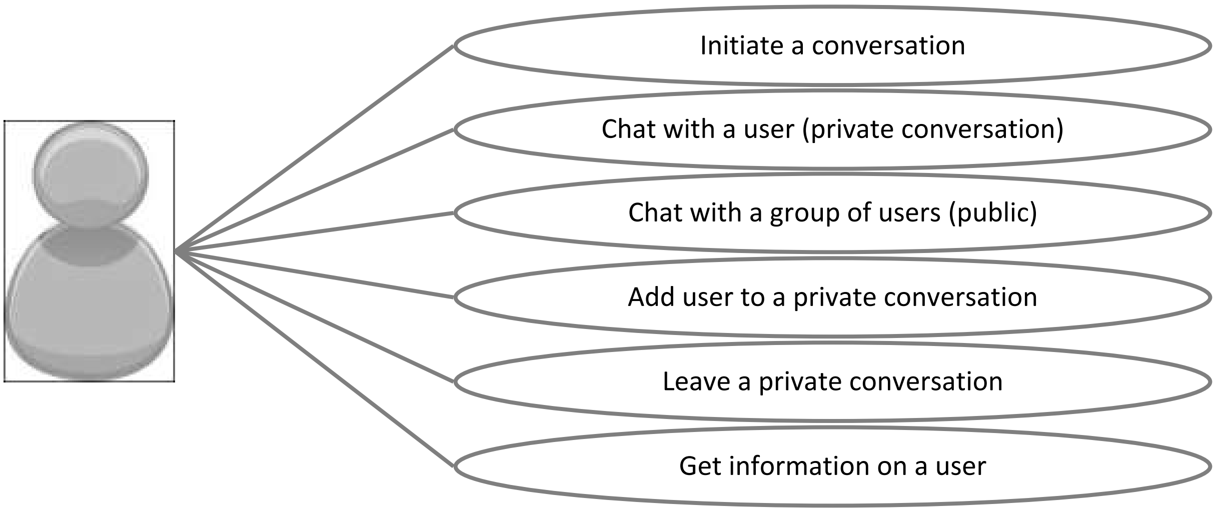

Initiate a conversation
Chat with a user (private conversation)
Chat with a group of users (public)
Add user to a private conversation
Leave a private conversation
Get information on a user

Figure 33. Authenticated user and associated use cases

Use-case cards

Use case name 26
Register
Summary
The user can register to use the service or specific functionalities
Actors
Generic user
Preconditions
There is no precondition to accomplish this action
Preconditions

- The user access to a page where the required information are asked in appropriate and comprehensive fields. Necessary fields to complete the registration are mentioned on the webpage and additional information can be fulfilled if the user accepts to do so. To finalize the registration, the user presses the validation button. - The information is then checked and validated by the system. - If the registration is validated, then the user is registered and informed through an e-mail. - Else, the system goes back to the registration webpage and displays information on the problems encountered.

Use case name 27
Connect and authenticate
Summary
The user wants to have access to a service or specific functionalities that require an authentication
Actors
Generic user
Preconditions
The user needs to be already registered.
Description of main sequence
- The connection and authentication webpage asks the user to provide his/her login and associated password in order to identify the user and verify that it is his/her identity. - If yes, the system redirects the user to the service that he was accessing or, by default, the portal of the pilot. - If not, the user is asked to fulfil again the information.

Use case name 28
Initiate a conversation (private conversation)
Summary

There are two kind of conversation: private or public. In case of a private conversation, the user can initiate a conversation with one other person by clicking on the "conversation" button from the profile of this user. He/she can then add more persons to the conversation. At any time, the conversation is control by an automatic robot in order to avoid misuses of language or uses of explicit content.

Actors

Authenticated user

Preconditions

The user must be logged in.

The user must be on a user's profile

Description of main sequence

- On the profile of a person, the user clicks on the "conversation" button of a user
- A chat window is displayed on both users' windows

Use case name 29

Join a chat room (public conversation)

Summary

There are two kind of conversation: private or public. In case of a public conversation, the user join a "chat room" that is permanently running. He/she can then participate to the conversation with people present in the room. The room are basically dedicated to a bus stop area and can be accessible only if you are connected there. At any time, the conversation is control by an automatic robot in order to avoid misuses of language or uses of explicit content.

Actors

Authenticated user

Preconditions

The user must be logged in.

The user must be on the Public Information Service associated to a bus stop area

Description of main sequence
• On the Public Information Service associated with the bus stop, the user clicks on the dedicated chat room • A chat window is then displayed on his/her screen

Use case name 30
Chat with users
Summary
The user can read and write on the chat room to converse with other participants. At any time, the conversation is control by an automatic robot in order to avoid misuses of language or uses of explicit content.
Actors
Authenticated user
Preconditions
The user must be logged in. The user must be participating in a conversation.
Description of main sequence
• The user types a sentence in the dedicated text field • The user click on "send" button to submit the sentence • The sentence is checked by the system • If the text is validated by the system, it is displayed on the conversation window of other participants or on the chat room

Use case name 31
Add user to a private conversation
Summary

In a private conversation, in the part of the window where users can see people participating in the conversation, a search field is displayed to allow the user to add someone to the conversation.

Actors

Authenticated user

Preconditions

The user must be logged in.

The user must be participating in a private conversation.

Description of main sequence

- The user types a query with a name of a friend in a search field
- The user select the name of the person that he/she wants to add to the conversation
- The selected person is notified and add to the chat window

Use case name 32

Leave a private conversation

Summary

At any time, a user can freely leave a conversation.

Actors

Authenticated user

Preconditions

The user must be logged in.

The user must be participating in a conversation.

Description of main sequence

- The user clicks on "leave the conversation" button.

Use case name 33
Get information on a user (private conversation)
Summary
In order to access quickly to information on a person, the user can click on the name of someone that is present in private conversation and view information on his/her location and other relievant indicators of the environment (temperature, time, etc.) (accordingly to the privacy settings of the person)
Actors
Authenticated user
Preconditions
The user must be logged in. The user must be participating to a private conversation.
Description of main sequence
• The user clicks on the name of a participant • A window pops up and displays contextual information

Pilot use-cases summary

In the table below are listed all the uses cases that are detailed in the document regarding the services of Vitry-sur-Seine pilot.

Use-case / service	Local Information Service	Private Information Service	Interactive Search for Persons and facilities	Immersive Instant Messaging	Classified Ads	Instant Alarm Notification	Camera Service	Public Authorities Communications Service
Register		X	X	X	X			
Connect and authenticate		X	X	X	X	X		
Connect and authenticate (administrator)	X				X			
Connect and authenticate (public authority user)							X	X
View local weather information	X							
View pollution information	X							
Access map of the area	X							
View real-time traffic information	X							
Obtain an itinerary	X							
View public transportation timetables	X							
View real-time public transportation situation	X							
Management of functionalities	X							
Management of links to other services	X							
Set confidentiality parameters		X						
View the profile		X						
Edit the profile		X						
View the users list		X						
View a user's profile/availability/location		X	X	X				
View location of connected users of friends		X	X	X				
Look for a facility			X					
View facility card			X					
Look for a user or a friend			X					

Initiate a conversation				X				
Chat with a user (private conversation)				X				
Chat with a group of users (public)				X				
Add a user to a private conversation				X				
Leave a private conversation				X				
Get information on a user				X				
Explore ads					X			
Display an ad					X			
Contact a seller					X			
Add an ad					X			
Delete an ad					X			
Send an Instant Alarm Notification						X		
Manage an Instant Alarm Notification							X	
View details and contact a public authority							X	X
Select a camera							X	
Cue a camera							X	
Add an alert information								X
Delete an alert information								X

Specifications

Functional requirements

1) There will be four user profiles:
    a. General User
        - to register / login to the services
        - to use the services (see usecases)
    b. Authenticated User
        - to use the services (see usecases)
    c. Public Authority
        - to login to the dedicated services
        - to use the dedicated services and management features
    d. Administrator:
        - to manage services' configurations
2) The pilot must have access to an Internet connection
3) The internet connection speed needs to be at least of 780 kbps
4) Some services requires a registration and a login process from users
5) Name, e-mail address and password are required from the user to registering, additional information are asked but they are not necessary
6) IP Camera will need to have PTZ (Pan, Tilt, Zoom) functions
7) Video Stream access will need video protocols and drivers

Non functional requirements

1) Password will be required to be longer than 6 characters including special types (numbers, capital letters, non-letters)
2) Text are analysed by the system in order to detect misuses of language or uses of explicit/sexual content or any words that would not be acceptable in a social environment.
3) Ads won't be stored longer than two weeks
4) Important actions from the user (registration, addition or deletion of a classified ad, etc.) are confirmed with an e-mail
5) Videos cannot be stored or recorded

Technical architecture

1) The development language will be PHP 5.0 or higher (open source)
2) Ajax technology will be used to update automatically some parts of webpages without requiring refreshing the entire page.
3) Database system used in the pilot is MySQL version 5 or higher (open source)

Requirements related to the use of open-source system (OSS)

1) All the services use at least 50% of open-source code.
2) The development language PHP and the web technology AJAX are both open-source technologies.
3) Apache is be used as the web server and MySQL is used as the relational database management system and are also an open-source technologies.
4) The registration and authentication system is proprietary.

Operating Platform

The system will be centralized around a portal to be as functional and easy to use as possible for the user. Any service which is part of the pilot will be accessible from the portal. The Public Information Service will serve as portal.

The Instant Alarm Notification will not be released as an Open Source Software.

The Security and Safety camera service will not be released as an Open Source Software.

6. Common perspectives and synergies across the pilots

Early discussions driven with the participation of all the pilots have highlighted some similarities between pilots:

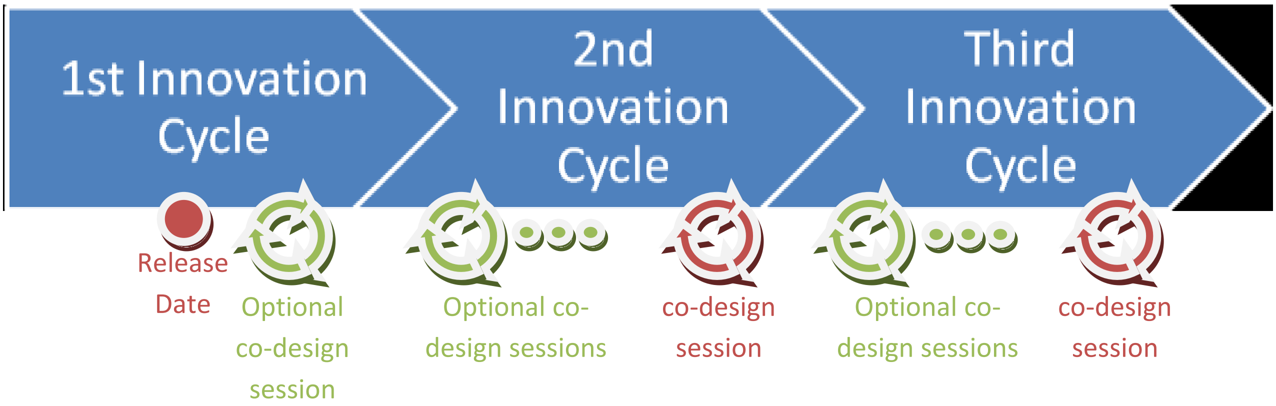
- Most of them are running with web applications. It is the case for Bilbao, Thermi and Vitry-sur-Seine. Bremen is the only partner which is developing the entire pilot as mobile apps for Android, while Bilbao and Thermi will also offer a few functionalities as mobile applications. This requirement couldn't be changed as it would change the overall interest of the German partners for the project and change the entire approach. However, the partners will try to provide an access to the mobile applications through a webpage and offer some functionalities as web applications if possible. But this requirement is optional in case the feedback from the users shows some interest for it and if the partners have enough time to process this request during the project timeframe.

- For the web applications, specifications have been suggested by the Chief Technological Officer (CTO – Panagiotis Tsarchopoulos) in order to use the same technologies as much as possible:
  - **Web server: Apache**
    - The Apache HTTP Server is an open-source HTTP server. It supports a variety of features, many implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes. Since April 1996 Apache has been the most popular HTTP server software in use. As of May 2011 Apache was estimated to serve 63% of all websites.
    - Version 2.x or greater
  - **Database server: MySQL**
    - The MySQL database has become the world's most popular open source database because of its high performance, high reliability and ease of use. MySQL runs on more than 20 platforms including Linux, Windows, Mac OS, Solaris, HP-UX, IBM AIX. Many of the world's largest and fastest-growing organizations including Facebook, Google, Adobe, etc. rely on MySQL
    - Version 5.0 or greater
  - **Programing language: PHP**
    - PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. PHP can be used on all major operating systems, including Linux, many Unix variants, Microsoft Windows, Mac OS X, etc.
    - Version 5.2.x or greater

- Concerning the storage of web applications, pilots which are concerns by such needs (Bilbao, Thermi and Vitry-sur-Seine) expressed the requirement to use internal server for hosting the pilot instead of using Cloud Computing services. This choice has been done for financial reasons but it doesn't affect any technologies or technical architecture of the services and a few changes might be necessary to adapt them to a Cloud Computing storage. Therefore this choice can be reversed.

- Finally, every pilot will try, if possible, to integrate an English version for the services in order to reach the more persons possible and make the services even more interoperable. Nevertheless, this work will be necessarily done in case of transferred services from a pilot to another. In such case, both pilots are required to conduct the needed work together to translate the service.

Regarding the Open Approach, most of the services are released using this methodology. According to the Innovation Cycle chosen for the first release, each service will go through one, two or three co-design sessions, at least, during the project lifespan. Indeed, the cycle when the first release is done (if possible) and each of the following cycle needs to imply a co-design session. Pilots are free to drive more co-design sessions in an Innovation Cycle if they can.



A co-design session is composed of three steps. The first step is the creation or modification of the service. It is the moment where the technologies are developed, the source code is produced until a stable and completed version of the service, regarding the initial requirements, is producted. Following this step, the service is released and a validation session is started with the users in order to try and test the service, evaluate it and collect the feedback or comments of the users. The third step consists then of an analysis of the material resulting from the validation session. Modifications and improvements are finally extracted from the analysis and gathered into new requirements for the next co-design session. The same process is done several time consecutively until a satisfying version of the service is released. For more information about the methodology, I kindly invite you to consult the deliverable D1.6.1 and D1.6.2: *PEOPLE guidelines and processes for Open Innovation management within Smart Urban ecosystems*.

Annex I

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