

Faculdade de Engenharia da Universidade do Porto



Mobile Environmental Noise Protection System

Group 3A

VERSION 1.3

Quality and Risk Report

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January 16th 2013

Version Control

Version	Date	Author(s)	Approved by the Documentation Manager	Modified Sections	Changes
0.1	29/12/12	Rui Pinto	X	All of them	Creation of document
1.0	31/12/12	Rui Pinto	X	Chapter 2	Identification of the main phases and creation of the Gantt diagram
1.1	02/12/12	Rui Pinto	X	Chapter 3	Identification of relevant used documents and procedures
1.2	03/12/2012	Rui Pinto	X	Chapter 6	Identification and definition of some validation and verification tests
1.3	16/01/2013	Rui Pinto	X	All of them	Conclusion of the document

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List of Acronyms

API - Application Programming Interface

CPU - Central Processing Unit

FUSAMI - Fraunhofer Usage Mining

GPS - Global Positioning System

ISP - Internet Service Provider

M.E.N.P.S. - Mobile Environmental Noise Protection System

SQL - Structured Query Language

UI - User Interface

Chapter 1

Introduction

1.1. Presentation

Environmental noise can be defined as “all unwanted or harmful outdoor sound created by human activities”. Nowadays, this is a serious issue in all nations throughout the world. As such, there are some issues regarding lack of information and non-transparent situations that need solving.

The *Mobile Environmental Noise Protection System* is a distributed smartphone based system to protect citizens from illegal noise emissions.

It includes a set of inexpensive and easy to use monitoring boxes that fulfill the legal requirements imposed to noise measuring equipment. These boxes send data to a server that stores and analyses it and the results are displayed to the users through a web page and an *Android* compatible application.

Our team is responsible for the development of the web page and the *Android* application.

1.2. Document structure

This document is structured as follows:

- Introduction: brief explanation about the document, the project and the team;
- Project Work Plan: identification of the main project phases;
- Documents, Procedures and Standards: identification of the documentation that was required to develop the project and some used procedures;
- Risk Analysis: identification and evaluation of the project risks and their main causes;
- System Requirements: definition of the user-oriented system requirements, both functional and non-functional and classification of the nonconformities;
- Verification and Validation Procedures: description of the verification and validation tests to the system requirements;

- Project Documentation: description of the team's document repository.

1.3. Team Members Roles and Responsibilities

The team member's identification, their roles and responsibilities on this project are identified in chapter 2 of the quality manual, v1.3.

Chapter 2

Project Work Plan

Phase	Task	Start Date	Duration (days)	Due Date
Preparation	Quality Manual	3-Out	7	9-Out
Preparation	Market Survey	9-Out	13	21-Out
Preparation	Project Requirements Manual	14-Out	22	4-Nov
Preparation	Primary System Use Cases - non detail version	21-Out	10	30-Out
Preparation	Primary System Use Cases - detailed version	24-Out	10	2-Nov
Preparation	System Concept Report	31-Out	5	4-Nov
Preparation	Requirements and Specification Report	6-Nov	6	11-Nov
Preparation	Quality Report and Risk Plan	9-Nov	59	6-Jan
Implementation	Project Building	16-Nov	56	10-Jan
Implementation	Implementation and Testing	10-Jan	11	20-Jan
Implementation	Integration	13-Jan	6	18-Jan
Conclusion	Presentation Preparation	14-Jan	8	21-Jan
Conclusion	Final Presentation, Demonstration and Report	21-Jan	1	21-Jan

Table 1. Project Work Phases

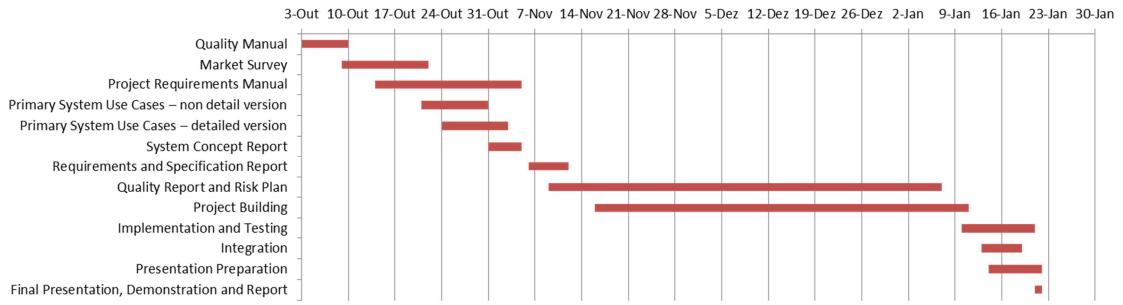


Figure 1. Gantt Diagram

Chapter 3

Documents, Procedures and Standards

Many documents are important in the development of this project. In these documents are analyzed some issues about Android programming, user interface and web services. It was also used documents about noise environment regulation.

- Decreto Lei - Regulamento Geral Ruido
(<http://www.amde.pt/document/447750/454023.pdf>)
- Ushahidi
(https://sigarra.up.pt/feup/pt/conteudos_geral.ver?pct_pag_id=249640&pct_parametros=pv_ocorrenca_id=283632&pct_grupo=35061&pct_grupo=35995&pct_grupo=34704&pct_grupo=34948&pct_grupo=35337&pct_grupo=35420&pct_grupo=35987&pct_grupo=35421&pct_grupo=36208&pct_grupo=36360&pct_grupo=36362&pct_grupo=36520&pct_grupo=36558#35336)
- Mobile Devices UI
(https://sigarra.up.pt/feup/pt/conteudos_service.conteudos_cont?pct_id=141305&pv_cod=19UgzaQaxaNm)
- Web Services & FUSAMI
(https://sigarra.up.pt/feup/pt/conteudos_service.conteudos_cont?pct_id=142713&pv_cod=19p3DWo0Hamb)
- Google Maps JavaScript API V3
(<https://developers.google.com/maps/documentation/javascript/reference#HeatmapOptions>)

Chapter 4

Risk Analysis

Risk is the potential of activities that lead to a loss. It represents an undesirable situation that will probably cause harm or loss to the risk taker.

In risk management, we have to:

- Identify the risk, defining what can go wrong, the main causes for that and what will be the consequences;
- Evaluate the risk's occurrence probability;
- Estimate the risk's impact on the system;
- Define a risk reduction impact and a contingency plan.

$$\text{Relevance} = \text{occurrence probability} \times \text{impact on the system}$$

Risk Code	Type of Risk	Description	Occurrence Probability (0-100%)	Impact on system (min:1-max:10)	Relevance (min:0,max:10)
R01	SERVER	Server data loss	3%	10	0,3
R02	TEAM	No sub-system interoperability	45%	10	4,5
R03	INTERNET	Internet access failure	25%	9	2,25
R04	BOXES	Noise measurements errors	20%	9	1,8
R05	APPLICATION	<i>Android</i> location errors	30%	7	2,1
R06	APPLICATION	Usability issues	10%	6	0,6
R07	APPLICATION	Data input failure	35%	5	1,75
R08	SERVER	High Server latency	30%	5	1,5
R09	APPLICATION	Authentication failure	60%	1	0,6
R10	MARKET	No demand	50%	1	0,5

Table 2. Risk Identification and Analysis

Risk Code	Main Causes	Risk Reduction Strategy	Contingency Plan
R01	Critical failure on server; malicious attacks	Regular database backups	Backup restoration; input validation.
R02	Lack of inter-team dialogue	Regular team leader meetings	None
R03	ISP malfunction; unreachable network.	None	Save offline data for posterior publication
R04	Miscalibrated boxes; stolen/vandalized boxes; equipment failure	Have more than the minimal number of boxes	Ask the removal of a box from the server
R05	GPS errors	None	Use cellular location information
R06	Inadequate interface	User testing and following usability guidelines	Improve the usability on new system versions; produce new manuals and help systems
R07	Wrong user input	Input validation; explicit user interface	Inform user of input error; discard wrong data
R08	Excessive Server demand	File compression, transmit the minimum information required	Increase data compression
R09	Wrong credentials; unregistered user.	Input validation, inform users of their credentials via email	Show information message and ask for new input; password recovery
R10	Inadequate marketing target	Targeted marketing campaigns	Aggressive marketing; change of target

Table 3. Risk Identification and Analysis

Chapter 5

Project Requirements

5.1. Marketing Requirements

This section presents a list of user-oriented requirements or, in other words, a list of users' needs satisfied by the M.E.N.P.S.

5.1.1. Functional Marketing Requirements

FM01 - The system must allow the registration of different types of users.

FM02 - The system must allow user authentication.

FM03 - The system should allow the consult of a generic noise heat map.

FM04 - The system must allow the consult of reported incidents.

FM05 - The system must allow incident reports.

FM06 - The system must provide feedback to the incident reports published whenever a measurement is done.

FM07 - The system must allow the input and consultation of licenses for planned noisy activities.

FM08 - The system must allow noise measurement requests.

FM09 - The system should give feedback whenever a requested measurement is done.

FM10 - The interface should include a help menu.

5.1.2. Non-functional Marketing Requirements

5.1.2.1. Performance Requirements

NF01 - The system should not consume excessive resources (CPU, battery, memory, etc.).

5.1.2.2. Reliability Requirements

NF02 - The system should always present accurate information and when in doubt no information is better than producing inaccurate one.

NF03 - Recovery time in case of failure should be the shortest possible.

NF04 - The system should have the minimum down-time possible.

5.1.2.3. Security Requirements

NF05 - The system should be the most safe possible.

NF06 - Data should be maintained confidential and respect the predetermined boundaries.

NF07 - Users can only make a limited number of reports in a determined period of time.

NF08 - Users can delete their report within a certain amount of time.

5.1.2.4. Usability Requirements

NF09 - The system should be easy to use.

NF10 - Context help should be provided in every operation.

NF11 - Error messages should have a clear and constructive language.

NF12 - Every operation done by the user should have system feedback.

NF13 - The user interface should be intuitive, simple, straightforward and alike throughout.

NF14 - The system should be accessible to users with different disabilities, with special regard to those with color-blindness and visual field limitation.

5.1.2.5. Maintenance Requirements

NF14 - The system should be easy to install.

NF15 - All necessary documentation should accompany the software.

NF16 - The system should be easily updatable.

5.2. Engineering Requirements

Marketing Requirements	Engineering Requirements	Justification
FM01, NF03	System will sanitize the user input	To protect the server from text input attacks and SQL injections
FM02, FM03, NF05, NF06	The system must automatically manage user permissions according to their type and login	To guarantee data confidentiality and access control
FM02, FM03, NF05, NF06	The system should use encryption for the most sensitive data	To be secure
NF14	The system should use appropriate colors and contrast	To promote user inclusion
NF17	The programming should be organized in well-defined classes	To allow the system to be easily updatable

Table 4. System Requirements

Chapter 6

Verification and Validation Procedures

Verifications tests are used to know if a result complies with the specifications. Validation tests aims to evaluate whether the developed product corresponds to the user's needs and is suitable for use. Validation tests may consist in operational tests and marketing studies.

- **Requirement:** FM01 - The system must allow the registration of different types of users.

Verification test1: In the registration page, fill correctly the required fields to validate the registration. The email was to be valid and the password was to be more than 6 characters.

Result: The user is automatically logged and is redirect to the main page.

Verification test2: In the registration page, fill incorrectly the required fields to validate the registration

Result: An error message appears on the field.

Verification test3: In the registration page, submit registration without filling all the required fills.

Result: An error message appears to the user.

- **Requirement:** FM02 - The system must allow user authentication.

Verification test1: Click on the "Sign In" bottom and fill the user name and password.

Result: The user is logged and is redirect to the main page.

Verification test2: Click on the "Sign In" bottom and fill incorrectly or submit the required fields without filling the user name and password.

Result: An error message appears to the user.

- **Requirement:** FM03 - The system should allow the consult of a generic noise heat map.

Verification test1: In the index page, user can view a generic noise heat map.

Result: The user can view the noise heat map the moment he access the page.

- **Requirement:** FM04 - The system must allow the consult of reported incidents.

Verification test1: After being logged, the main page of the user has a noise reported incidents map.

Result: The user can view the reported incidents map the moment he access the main page.

- **Requirement:** FM05 - The system must allow incident reports.

Verification test1: The user logged as *Citizen* must be on the “Submit Report” page and fill the required fields.

Result: The citizen is redirected to a page where he can view and edit his report.

Verification test2: The user logged as *Citizen* must be on the “Submit Report” page and doesn’t fill any fields or the required fields.

Result: An error message appears to the user.

- **Requirement:** FM06 - The system must provide feedback to the incident reports published whenever a measurement is done.

Verification test1: The user logged as *Citizen* must be on the “Consult Reports” page and choose to view more details of a “Feedback is available” status report.

Result: The user can view a detailed feedback about the report associated permit.

- **Requirement:** FM07 - The system must allow the input and consultation of licenses for planned noisy activities.

Verification test1: The user logged as *Authority* or *City Hall* must be on the “Submit a Noise Report” page and fill the required fields.

Result: A success message appears to the user.

Verification test2: The user logged as *Authority* or *City Hall* must be on the “Submit a Noise Report” page and doesn’t fill the required fields.

Result: An error message appears to the user.

Verification test3: The user logged as *Authority* or *City Hall* must be on the “Consult Noise Report” page.

Result: The user can view a list of submitted permits and he has the option of delete or view them with more detail.

- **Requirement:** FM08 - The system must allow noise measurement requests.

Verification test1: The user logged as *City Hall* must be on the “Noise Measurements” page and fill the required fields.

Result: A success message appears to the user.

Verification test2: The user logged as *City Hall* must be on the “Noise Measurements” page and doesn’t fill the required fields.

Result: An error message appears to the user.

- **Requirement:** FM10 - The interface should include a help menu.

Verification test1: The user logged as *Citizen*, *Authority* or *City Hall* must be on the “The Project” page.

Result: The user can view a help text the moment he access the main page.

Chapter 7

Project Documentation

All working and final documents, about the project and the team, are located on the team's Dropbox Folder. You can find more information about this directory on chapter 3 of the Quality Manual, v1.3.

On this directory there are several documents:

- Documents in progress;
- Internal documents about the team, such as group and self-evaluation, a to do list, quality manual and meeting summoning and minutes templates;
- External documents about the project, such as meeting summoning and minutes and reports, such as market survey, requirement document, system concept and requirements and specification report.

References

- [1] AZEVEDO, Américo - Qualidade no Projecto e Análise de Risco, v1.5, Novembro 20th 2012