Faculdade de Engenharia da Universidade do Porto

Mobile Environmental Noise Protection System

Group 3A

VERSION 1.0

System Concept

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Version Control

Version	Date	Author(s)	Approved by the Documentation Manager	Modified Sections	Changes
1.0	06/11/12	Team	X	All of them	Document creation

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List of Acronyms

AJAX - Asynchronous JavaScript and XML

API - Application Programming Interface

FAQ - Frequently Asked Questions

GPS - Global Positioning System

HTML - HyperText Markup Language

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

REST - Representational State Transfer

SBS - System Breakdown Structure

SOAP - Simple Object Access Protocol

U.I. - User Interface

Chapter 1

Introduction

The definition of the system concept usually occurs at the beginning of the system development life cycle and it is an important stage of any project.

It helps to achieve a general model or overall view of the system before the detailed specification of all the requirements and design elements. The main goal of developing a system concept is to more easily identify the project's overall scope and boundaries.

This report defines the minimum knowledge of the system that all the teams involved should share, identifying the main system blocks and its interfaces with the users and between its subsystems.

This document is divided into four major sections, all related to the system concept:

- the Concept Generation: a mind map created in the brainstorming stage;
- the System Overview: includes a brief explanation of the project, a schematic representation of the overall architecture and the user descriptions and needs;
- the Concept Evaluation: the concept table and the decision matrixes used for evaluating the different parameters of the system;
- the System Breakdown Structure: hierarchical representation of products and life cycle processes of the system.

Chapter 2

Concept Generation

2.1.   Brainstorming

In the beginning of the project, a brainstorming session was done. In this session all possible system actors, processes and components were thoroughly thought through, resulting in the following diagram.
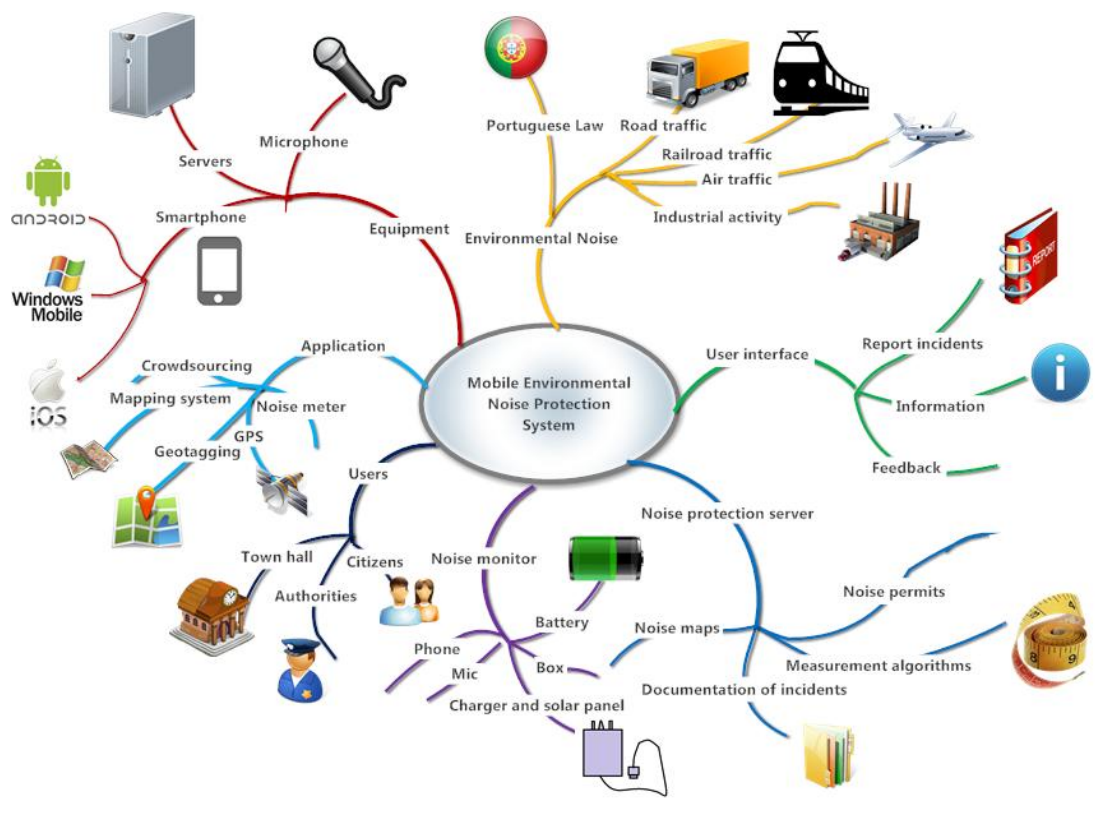

Figure 1 - Concept mind map

Chapter 3

System Overview

3.1.   System Description

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.

The M.E.N.P.S. aims to provide a fast interface between city halls that publish licenses for noisy activities, citizens that consult this information and occasionally may want to report noise related incidents, and public authorities that must ensure that legal noise limits are being met. This integrated solution optimizes the response time of authorities to the requests and reports of the population.

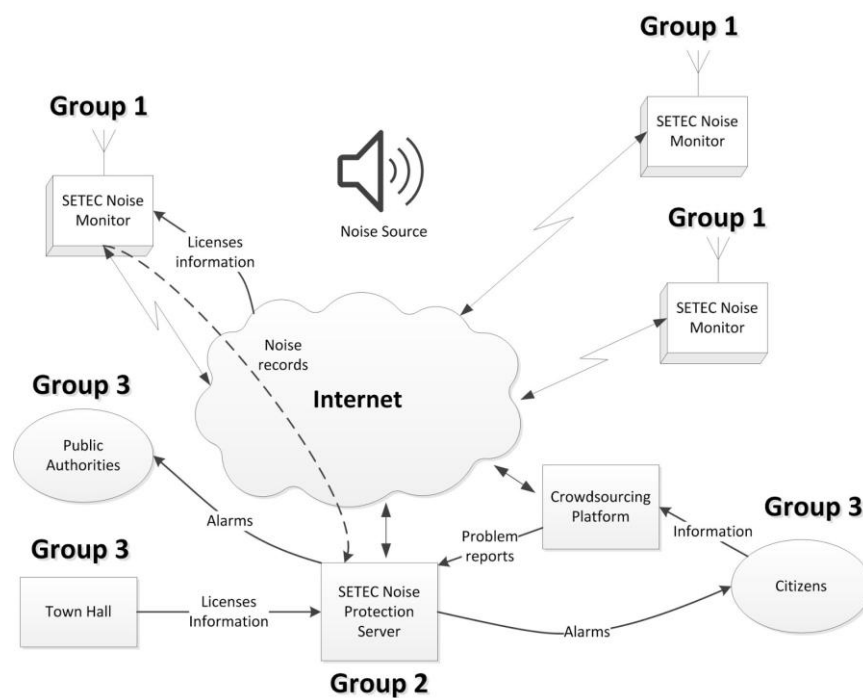The system is divided in three subsystems, corresponding to the three groups presented in figure 2.

Figure 2 - Overall System Architecture

In this figure a schematic view of the entire system can be shown, enabling a quick understanding of all the system's players - from the measuring boxes to the user interfaces.

From this point forward the focus will be given to Group 3's work.

3.2.   User Descriptions and Needs

3.2.1. Citizens

This is the most common type of user. Citizens can have a general perception of the city's noise levels via a noise heat map. Once registered, the general population can report incidents of disturbance in the noise levels via either the system's webpage or the Android application. Citizens can also view the status of their own incident reports.

3.2.2. Law Enforcement

Once authenticated, law enforcement is able to access a detailed city noise heat map with every incident reported. Law enforcement is also notified whenever a box registers a noise level that is considered illegal according to the law.

3.2.2. City Hall

The Environmental Department or equivalent department within the City Hall, once authenticated on the M.E.N.P.S.'s website, can not only view noise heat maps and every incident reported but also submit licenses and request noise measurements.

Chapter 4

Concept Evaluation

4.1.   Concept table

Application programming	Website programming	Communication protocol
Java	HTML	REST
C	Flash	SOAP
C++	AJAX	

Table 1 – Design choices

4.2.   Decision matrixes

4.2.1. Application programming

Criteria	Weight	Design Option/Score (1-5)		
		Java	C	C++
Code familiarity	1	4	4	3
Code simplicity	3	5	3	3
Support and documentation	2	5	4	3
Performance	3	5	5	5
Standard API compatibility	2	5	3	3
Score		54	42	39

Table 2 – Application programming decision

4.2.2. Website programming

Criteria	Weight	Design Option/Score (1-5)		
		HTML	Flash	AJAX
Code familiarity	2	5	3	2
Code simplicity	3	5	3	2
Support and documentation	2	5	4	3
Performance	3	4	2	4
User experience	3	5	3	5
Score		62	38	43

Table 3 – Website programming decision

4.2.3. Communication protocol

Criteria	Weight	Design Option/Score (1-5)	
		REST	SOAP
Code familiarity	2	4	4
Code simplicity	3	5	3
Support and documentation	2	5	4
Performance	3	5	4
Security	3	4	4
Score		60	49

Table 4 – Communication protocol decision

Chapter 5

System Breakdown Structure

The system breakdown structure gives an overall view on the system's hierarchy of products and processes that incorporates the system's architecture.
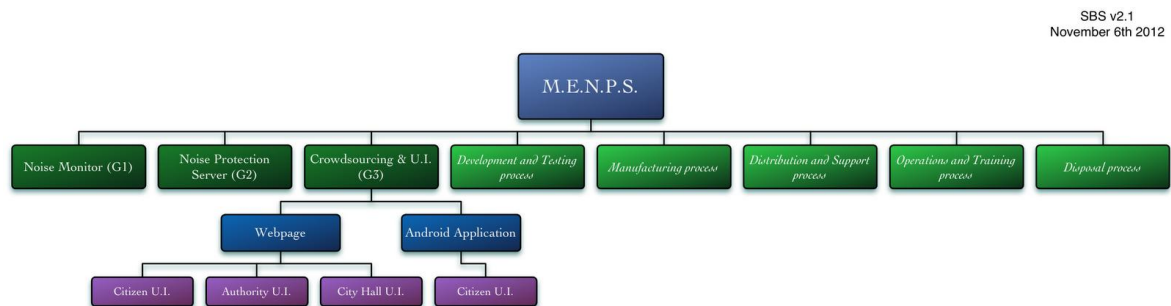

Figure 3 - System Breakdown Structure (see Annex 1 for an enlarged view)

- The Development and Testing process consists on building the webpage and the Android application using the tools chosen previously. After the development phase, a thorough testing phase begins, in which programming bugs are detected and corrected. Afterwards, an integration period will take place to incorporate all groups' subsystems into working prototypes.
- Manufacturing process belongs to group's one work.
- The Distribution and Support process pertains to making the software widely available to the public, being this through making the webpage public on the Internet or the Application on Google Play and providing support by updating the webpage or via new application versions.
- In the Operations and Training process the users should be actively using the system, which may require an initial training phase for the top level users. The common citizens may have a help manual and/or a FAQ page.
- In the case of software installed on smartphones, the Disposal process consists simply on uninstalling the application. For each user account there should be an option that allows its removal from the system. There is no Disposal process for the website.

References

[1] AZEVEDO, Américo – "Conceito do Sistema", v1.0, November 6th 2012

[2] http://developer.android.com/tools/index.html, retrieved on November 6th 2012
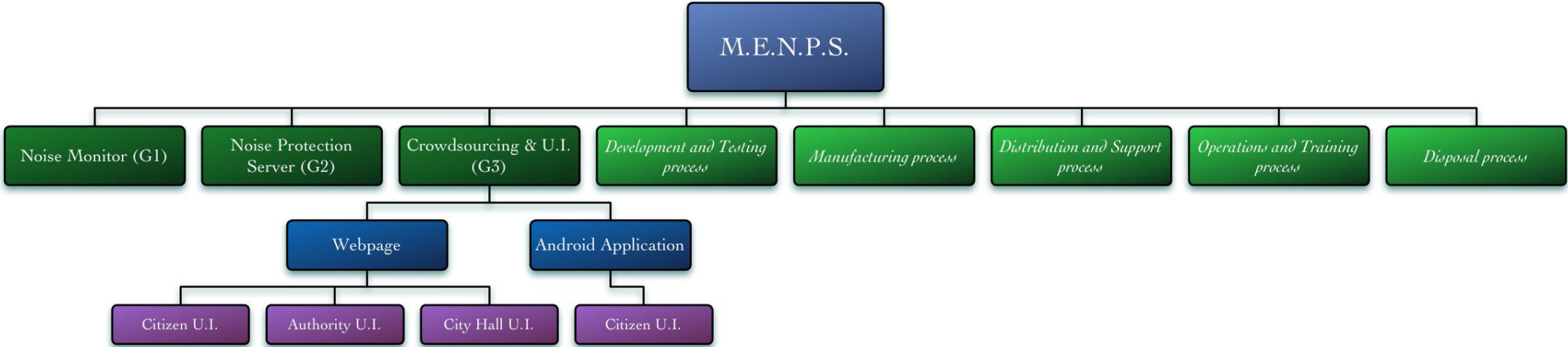
Annexes

Annex 1 – System Breakdown Structure

Figure 4 – System Breakdown Structure (enlarged)