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Part 1 Evaluation of the performance of the user cases: Public Places

Work Package 3

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Executive Summary

Background: The Empowerment Initiative in Vitoria-Gasteiz

This Empowerment Initiative applies the general aim of the CITI-SENSE project in the field of the management of Public Spaces. It has developed "Citizens' Observatories" (COs) to empower citizens to contribute to and participate in environmental governance of public spaces. The purpose is to enable them to support and influence priorities and associated decision making to address the creation, renovation, preservation and management of public places in the city.

The challenge faced in this Empowerment Initiative (EI) was to test in practice at the city of Vitoria-Gasteiz (Spain) if COs can support and enrich citizens' empowerment in this field, engaging on this assessment with citizens, city authorities and other stakeholders.

Overall strategy

Citizens' engagement is crucial in COs. We used the most effective and adequate methods available to try to ensure success of citizens' engagement and empowerment, particularly through two different complementary approaches:

1.   Build a community of users and followers of the project interested in the outcomes of the project. This was addressed by launching a General Questionnaire for a wide audience with regard to environmental comfort in public spaces. It was a valuable instrument since results from the questionnaire confirmed the influence of the environmental quality and comfort perceived in relation to citizens' satisfaction and quality of life. Moreover, citizens want to receive from the authorities more public information about the management, comfort and environmental quality of public spaces. Related to COs, they understood that new technologies, sensors and smartphones can definitely play an important role, particularly in public participation processes and empowerment initiatives.

2.   The second approach was to invite volunteers to make observations in diverse urban public spaces, to assess the environmental conditions of those spaces and to enrich the objective data collected with their perceptions (subjective data). We succeeded by engaging 55 participants for the Empowerment Initiative and recruited among different associations and citizens that usually make a regular use of the public spaces included in the study. As a result, they collected 139 observations, assessing comfort levels in the four public spaces selected by the municipality: Los Herran Boulevard, La Constitucion Square, Salinillas Park and Olarizu Park. Since the interest of the municipality was to check how COs can be integrated into the management process of public spaces, the selected areas were potentially appealing for the city and for CITI-SENSE's objectives. They are examples of different typologies of city environments and provide different situations and characteristics.

Detailed methodology for data gathering and analysis

Diverse methodological approaches were employed during the whole process to achieve citizens' engagement, to support the empowerment process and to evaluate the experience: introductory and feedback workshop,s focus group methodology, evaluation questionnaires and in-depth interviews.

Since the participants' expectations were collected, it is possible based on the actual answers (perceptions) to acknowledge that they were sufficiently motivated to participate improving the selected areas and enhancing their interest in the scientific experiments and sensor use.

During the data gathering phase in the EI, a toolkit of sensors was provided to the participants. This toolkit was developed in the EI and combines hardware and software tools that measure the objective and subjective parameters of the environmental conditions in urban spaces (noise levels, temperature, humidity and wind speed); and it includes a protocol that guides the participants into a conscious observation of the urban places. The data provided by sensors was accurate enough for the project´s aims and goals. They were off the shelf sensors, and their technical performance was adjusted and tested in the project.

In addition, it was important for CITI-SENSE to get good quality feedback information. With the aim of providing clear information, a workshop was devoted to the co-design of how to visualize on the webpage the results of complex analysis. On that basis, visualization widgets used are considered outputs of the project.

Main results

Data collected at each of the four public places are valuable for defining strategies for their management. Their analysis gives a diagnosis of each place; assessment of its environmental quality (understood as how it is perceived), and also the EI allowed collection of ideas or proposals to be taken into account into the urban management strategy.

Moreover, the comparative analysis of the whole set of observations improved the general understanding of which variables are most valuable for citizenship in public places and how they are perceived.

The main conclusions from the comparative analysis data of the 4 places are: (i) Spending time at the urban places has positive effects on perceived health. (ii) Interdependencies among different aspects of perception, i.e. the perception of different characteristics of the place (natural, safe, accessible …) influences citizens' global pleasantness on that place. (iii) Visual perception at an urban place influences strongly the global perception of comfort. (iv) Elements commonly liked and disliked pointed out by participants were identified. (v) The positive effect of natural elements on places' perception was quantified.

The Vitoria-Gasteiz experience must be evaluated as a successful project that increased the awareness among the participants. On average, participants assessed the experience as positive. They described it as a useful and a beneficial experience and the use of new technologies was described as an opportunity.

Although stakeholders of Vitoria-Gasteiz evaluated CO for Public Places as useful, they were also slightly judgmental, since they considered that the experience did not create considerable empowerment among participants, and they thought that the outcome and results obtained were predictable. Nevertheless, they found that the products developed in CITI-SENSE were interesting and potentially attractive for environmental monitoring, since they recognized that implementation using new technologies is a fundamental and innovative step. The CITI-SENSE approach was defined as a "great idea", but still as an experimental trial. However, for

stakeholders of Vitoria-Gasteiz the CITI-SENSE project would still have needed more development in order to have a considerable impact among Vitoria-Gasteiz citizens.

As well as collecting the evaluation of persons directly involved in the EI, we presented the results from the EI implementation to other cities to collect their feedback about the experience. For that purpose, several interviews were made with diverse stakeholders, and according to them, the Environmental Citizens' Observatory for Public Places has the potential to be extended, implemented and adapted also in other cities. Furthermore, the experience with COs for public spaces was perceived as positive and useful for environmental improvement. They said that municipalities can benefit from including citizens' observatories into the decision making processes.

The global achievement level of the Key Performance Indicators (KPIs) defined in the project to test the EI's performance is Good (86%), being excellent in the KPIs that referred to sensor platforms (communication, data management and storage infrastructure) and products (software and procedures implemented to analyse collected data). Another set of KPIs referred to the performance of the EI from the point of view of participants (users' indicators) and the EI of Public Places achieved a medium score in those KPIs. The KPIs' evaluation helped to discover the product improvement possibilities: i.e., making the products more user-friendly for older participants and improving the degree of accessibility by implementing the apps on peoples' own smartphone.

With regard to the project´s potential impact among the population, according to the social impact indicator made for the project, we can say that CITI-SENSE has reached 50% of citizens in Vitoria-Gasteiz who are involved in environmental campaigns or actions.

Finally, the practical experience developed in this EI of CITI-SENSE stems from some general inputs to future initiatives of Citizens' Observatories. Those inputs relate to: (i) what could be the ideal role of City Authorities on Citizens' Observatories, (ii) the "hot" topic of Privacy issues related to Citizen Observatories.

As a final conclusion of the project, we offer some recommendations for Municipalities. (i) Take account of the interest in undertaking COs experiences to empower citizens into the understanding, management and/or the improvement of urban spaces (since COs can complement traditional participation processes). (ii) Be very clear with the type of empowerment framework deployed, in order to manage citizens' expectations. (iii) Adapt the design of the product for implementing COs to the peculiarities of each empowerment exercise and to the particularities of places. In that sense, the definition of how products could be adapted to each situation could be a clear opportunity for co-design initiatives.

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Abbreviations

CO	Citizens' Observatory;
DoW	Description of Work (document);
EI	Empowerment Initiative;
GQ	General Questionnaire;
KPI	Key Performance Indicator;
WP	Work package

Terminology and Definitions

Please find attached in the following table the most relevant notions and terms:

Notion	Explanation
Anonymized data	Anonymized data is a type of information that assures the protection of the privacy of personal data of citizens. These data have been treated either by encrypting or removing personally identifiable information from data sets, so that the people whom the data describe remain anonymous.
Citizen participation	A bottom-up process for identifying problems and ways of finding solutions; includes public meetings and hearings, citizen advisory committees, negotiation initiatives. The emergence of social media has increased the opportunities to effectively involve citizens in social innovation and policy- and decision-making processes (Moreno et al., 2013).
Citizen Science	Citizen participation in science and technology projects. The involvement of volunteers in science, particularly for collecting data (Moreno et al., 2013).
Co-Design	Co-Design is a research and development process and philosophy where professional designers empower, encourage, and guide users to develop product, service, or organization solutions for themselves. In Co-Design, users and designers cooperate tightly. An assumption behind Co-Design is that when design professionals and users create solutions together, the final result will be more appropriate and acceptable to the user. Co-Design had its roots in user-centred design and participatory design practices.
Environmental comfort	Environmental comfort is the condition of mind that expresses satisfaction with the environmental conditions and is assessed by subjective evaluation. It comprises specific variables, such as thermal comfort, acoustic comfort and visual comfort. It is conditioned by several characteristics of the space: light conditions, maintenance, safety feelings.
Environmental Studies Centre	The Environmental Studies Centre (ESC) was founded at the end of the 1980s, with the aim of energizing Vitoria-Gasteiz close surroundings with environmental educational strategies. The ESC mission is to look out for the sustainability in Vitoria-Gasteiz, fostering municipality's sustainable development not only as an isolated unit, but linked to the bioregion and the Alava Plains near Vitoria-Gasteiz.

Empowerment Initiative	That is, enhancing an individual's or group's capacity to make choices and transform those choices into desired actions and outcomes (Alsop & Heinsohn, 2005: 5). Empowerment is being considered as a complex process that enables people, organisations and communities to exercise control over important socio-political processes and decisions for their own well-being (Rappaport 1987, Roy 2010). Two premises must be met to avoid that empowerment becomes a mere token of participation without any consequences: (1) stakeholders should be involved throughout the process (e.g. involvement is not limited to one specific point in time) and (2) involvement can only be entitled empowerment if participation and contributions have real impacts on decision-making and actions (Moreno et al., 2013).
ESEI index	The Environmental Sound Experience Indicator (ESEI) was developed by Tecnalia and it quantifies the acoustic comfort perceived in an acoustic environment. It is calculated by measuring noise levels, detecting acoustic events evaluated as positively or negatively perceived, identification of main sound source evaluated as positively or negatively perceived.
Focus groups	Focus groups are a form of group interview that capitalises on communication between research participants in order to generate data. Although group interviews are often used simply as a quick and convenient way to collect data from several people simultaneously, focus groups explicitly use group interaction as part of the method. This means that instead of the researcher asking each person to respond to a question in turn, people are encouraged to talk to one another: asking questions, exchanging anecdotes and commenting on each other's experiences and points of view. The method is particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think, but how they think and why they think that way (Kitzinger, 1995: 299).
Governance	The social process of acting, interacting and decision-making. Social co-ordination beyond formal governmental institutions and policy-makers (Moreno et al., 2013).
In-depth Interviews	In-depth and semi-structured interviews explore the experiences of participants and the meaning they attribute to them. Researchers encourage participants to talk about issues pertinent to the research question by asking open-ended questions, usually in one-to-one interviews. The interviewer might re-word, re-order or clarify the questions to further investigate topics introduced by the respondent. In qualitative health research, in-depth interviews are often used to study the experiences and meaning of disease, and to explore personal

	and sensitive themes. They can also help to identify potentially modifiable factors for improving health care (Tong et al. 2007: 351).
Participants	Includes all citizens who take part in workshops and data gathering experience.
PET index	The physiological equivalent temperature (PET) - a universal index for the bio-meteorological assessment of the thermal environment. PET is defined as the air temperature at which, in a typical indoor setting (without wind and solar radiation), the heat budget of the human body is balanced with the same core and skin temperature as under the complex outdoor conditions to be assessed. This way PET enables a layperson to compare the integral effects of complex thermal conditions outside with his or her own experience indoors.
Public Space	A public space is a space that is generally open and accessible to people. It has a social character, as social space, thus a physical space where people gather and interact.
Semantic differential (SD)	Semantic differential is a type of a rating scale designed to measure the connotative meaning of objects, events, and concepts. The connotations are used to derive the attitude towards the given object, event or concept. Osgood's semantic differential was an application of his more general attempt to measure the semantics or meaning of words, particularly adjectives, and their referent concepts. The respondent is asked to choose where his or her position lies, on a scale between two bipolar adjectives (for example: "Adequate-Inadequate", "Good-Evil" or "Valuable-Worthless"). Semantic differentials can be used to measure opinions, attitudes and values on a psychometrically controlled scale. The soundscape is evaluated using items such as: pleasant, calm, relaxing, natural, vibrant, informative and clear.
Soundscape	The soundscape is the component of the acoustic environment that can be perceived by humans. The acoustic environment is the combination of all the acoustic resources within a given area - natural sounds and human-caused sounds – as modified by the environment. The International Organization for Standardization (ISO) standardized these definitions in 2014. (ISO 12913-1:2014).
Stakeholder	Any person, group, organization or member of a system who affects or can be affected by an organization's actions, objectives or policies (Moreno et al., 2013).

A. Introduction

The Citizens' Observatory concept fits perfectly for management of urban public space. Urban public spaces play key roles in the general quality of the city and in the quality of life of its inhabitants. In that sense, citizens are the real experts about the quality of public spaces, since they know them and which their weak and strong points are. How citizens choose where to go determines the success or failure of any public space in their city. Therefore, city authorities can see the application of COs as an opportunity to improve the success of their urban places and therefore improve the main functions of urban spaces: social cohesion in the city, the identification of citizen with their city, its attractiveness and citizens' wellbeing.

We fully agree with the advice of an urban planner, who told us: "to define what people need, the most important is to involve people to be active in city". The implementation of CITI-SENSE for Public Places addresses this need.

This Empowerment Initiative faces the challenge of testing and demonstrating that COs can contribute to empower citizens in the process of managing public places in a city (understanding, renovating and preserving them). CITI-SENSE has developed tools to support COs in this field and made a real implementation in the city of Vitoria-Gasteiz of an Empowerment Initiative (EI) and citizens, city authorities and other stakeholders participated to reach a positive final conclusion.

Vitoria is located in the Basque Country (Spain), in the northern part of the Iberian Peninsula beside the Atlantic Ocean inside the western part of a flat circular valley surrounded by mountains. The city is 110 km from the coast and 525 metres above sea level. Its population in 2010 was 240,580 inhabitants. The city presents a good urban development that includes important sustainable criteria. It has a long tradition of green and sustainable policies. There are many green areas inside the city, but also there are a significant number of natural areas around the city that occupy 4.210.000 m^2 and that are expected to increase to 7.500.000 m^2 by 2020. Vitoria-Gasteiz has won many national and international awards that guarantee its environmental quality. In this context, the city was the European Green Capital during 2012.

The Empowerment Initiative invited people to participate collecting simultaneous objective (environmental data) and subjective (their related well-being) information. Citizens participating in the initiative shared information, experiences and feelings with others, thus they built a community. And the Public Places CO helped them to understand the need of a balance between objective parameters and perception.

We consider that City Authorities should lead COs and in doing so, they apply innovation to the participatory process and collect novel information. Moreover, the data gathered in the Empowerment Initiatives can contribute to the general understanding of the success of urban spaces and they can help in the definition of aspects for improvement (challenges and opportunities) in the places that citizens have observed. The products and tools created in CITI-SENSE for COs in public places have the aim of supporting a dialogue between city Authorities and citizens.

B. Aims and Objectives

Already in the CITI-SENSE DoW (Bartonova et al., 2012) and in D3.1 (Høiskar et al., 2013) and D3.2 (Robinson et al., 2015), specific project aims and general objectives for the empowerment initiatives were described. The main aim of the Empowerment Initiative Public Spaces in Vitoria-Gasteiz is to empower citizens in the process of designing public places from an environmental point of view including comfort criteria.

The project has been developed in two stages: a) a Pilot Implementation of the products to check its functionalities and b) the Full Implementation in the city of Vitoria-Gasteiz. This document describes the second stage, the Full Implementation phase, conceived as one of the Empowerment Initiatives (EIs) of the project. It is an experimental action to analyse the interest of municipality and citizens in adopting the CO as an approach to enrich it and to increase the citizens' participation in the decision-making processes of the Local Administration.

C. Methods

This section describes the methods that were used to engage with/empower the citizens as well as the products and tools that have been developed/used for engagement activities. And the methods used to evaluate the performance of the use case.

The Table below summarizes the full Empowerment Initiative.

Table 1 Empowerment Initiative process

	Nov 14-Feb 15	March 15	April 15	May - October 15	Nov - Dec 15	May 16
Participants recruitment	▨					
Training Workshops		▨				
Citizens' observations			▨			
General Questionnaire			▨			
Research and Data Analysis	▨	▨	▨	▨	▨	▨
Feedback Workshops					▨	
In-Depth Interviews						▨
Feedback other stakeholders						▨

C.1. Recruitment of users

The Empowerment Initiative in Vitoria-Gasteiz was an experimental action to analyse the municipality and citizens' interest to be engaged within an empowerment initiative, understood as an approach to increase the citizens' participation in the decision-making processes (citizens' observatories creation). In this section we are going to explain briefly how we scheduled and planned the citizen's engagement process. However, an extended version is available in the D3.2 (Robinson et al., 2015) CITI-SENSE deliverable.

Having the objective to recruit at least 50 participants (with the aim of collecting 15 observations per public space assessed), the following methodological criteria were established in order to achieve this goal:

1. **Plurality of volunteers**: the variation of volunteer profiles was considered necessary, achieving a heterogeneous and diverse sample.

2. **Participants' interest with the aim of the study**: the potential interest or disinterest of the associations and organizations with environmental issues and urban comfort assessment were considered.

3. **Geographical plurality**: different locations were detected in order to look for potential perception differences related to the neighbourhoods.

C.1.1 Recruitment process

All contact information was obtained from the website´s database of Vitoria-Gasteiz council. The engagement process started at the end of February/beginning of March 2015. The contact method for the sample configuration included email messages, invitation letters and phone calls. Appropriate and enough information were given to them so they could make an informed decision about whether to participate.

Below are described the organizations and target population that were contacted in order to achieve the potential participants for the CITI-SENSE experience.

1. **LOCAL ENTITIES**

    - 49 local organizations potentially interested in environmental issues: a letter of invitation was sent by post to all pre-selected associations and a week before the date of the workshops the associations were called by phone (when the phone number was available).

    - 8 members from the Environmental Studies Centre: This group was invited by email to participate in the EI. Some people expressed interest in participating to observe more than one location. Like the volunteers, they were invited to the workshops as well.

2. **INDIVIDUALS**

    - 17 people not linked with environmental organizations: they were contacted by e-mail and telephone, and they were invited to the initial workshops in March 2015.

3. **HIGH SCHOOL**

    - 1 environmental sciences professor from Jesus Obrero Studies Centre: We held telephone/mail conversations with the tutor and a session was conducted in the classroom with a group of 34 students where detailed information of the project was presented.

Figure 1 summarizes the process applied and the different channels used to recruit participants.
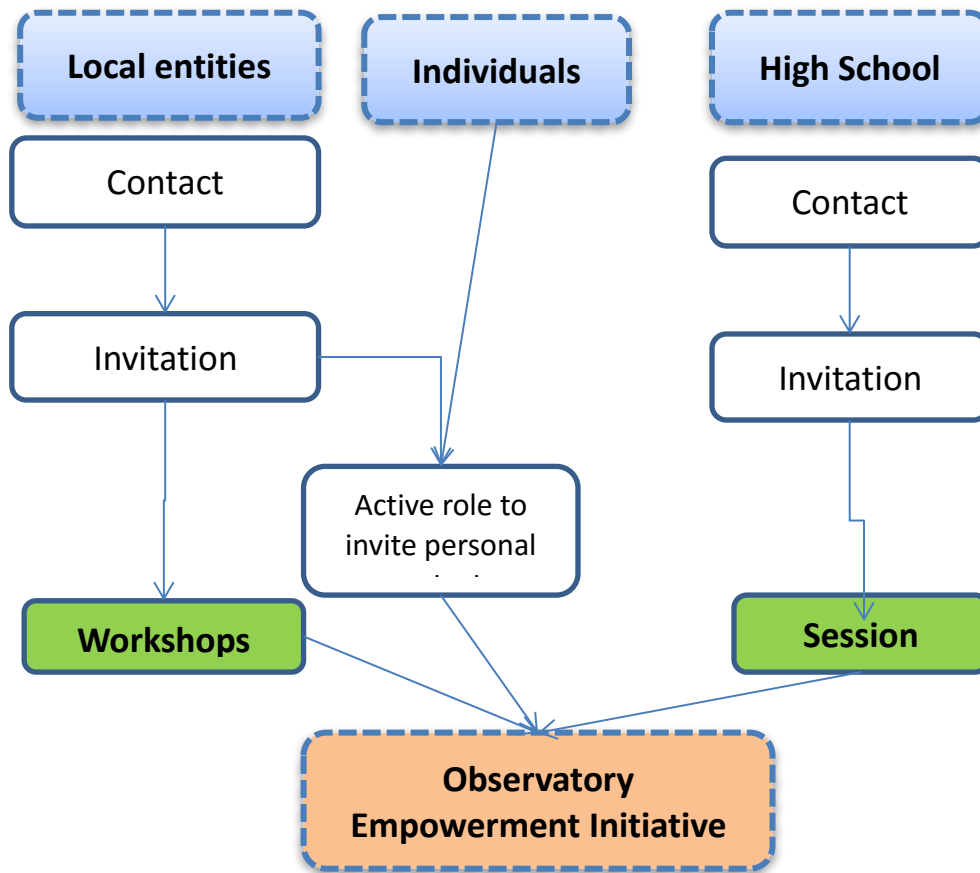
Figure 1. Scheme of the means of recruiting the participants.

C.1.2 Initial workshops

Figure 2. Environmental Citizens' Observatory for Public Places project Training workshop

To carry out the empowerment initiative, several **initial workshops** were conducted. Concretely, in a first stage, three working sessions were prepared prior to the observations. These sessions were developed in three *civic centres* of Vitoria-Gasteiz, and they took place close in time to the observations (during the third and fourth week of March 2015) and, in this way, the information provided about places and methods of evaluation were the most updated ones for them.

The objectives of the initial workshops were to provide detailed **information** about the project, to **train** the participants in the use of the sensors and to get a first feedback from them through the "evaluation questionnaire completion". Hence, in order to monitor the participants'

thinking evolution, a questionnaire about the first **expectations** was carried out in the initial meetings. This questionnaire was designed to evaluate the interest and commitment with CITI-SENSE among the participants. Annex I presents the abovementioned expectations´ questionnaire.

After the data gathering in the four public spaces (April 2015), participants were called to participate in the **feedback workshops**. This stage is crucial to measure the citizens' empowerment as it is stated in D5.3 (Arpaci *et al,* 2015).

Workshops Advantages

✓ It allows gathering different citizens participating on equal terms, with a method that facilitates the sharing of diverse points of view.

✓ The participants have the same opportunities to express their ideas freely and in a pleasant working environment.

✓ It allows communicating the objectives, limits and project phases, as well as the use of sensors and smartphones.

Who was involved?

✓ People who were on the participation´s boards. Political representatives, technical, economic and business fields, professionals, groups of citizens...

Please note that the recruitment and empowerment evaluation results are presented in Section D, the Results chapter.

C 1.3 Privacy Policy

The CITI-SENSE project has defined a common framework for data management issues, according to the legal aspects referred to protection of data and to inform participants about their rights and duties. This framework was adapted in the EI on Public Places according to the national legal conditions. We have distinguished clearly the personal data that is the assignment of users id, meanwhile all data collected by the users was considered anonymized data, since it was associated exclusively to the email address given by the CITI-SENSE team to him/her. All these details were presented in two documents signed by users/ participants (i.e., the Privacy Policy and the User Agreement).

To full fill the requirements of the legal framework for privacy policy (European Directive 95/46/EC, 24th October 1995, on the protection of individuals with regard to the processing of personal data and on the free movement of such data, and Spanish Ley Orgánica 15/1999, de 13 de diciembre, de Protección de Datos de Carácter Personal), a privacy policy document was developed.

This document described the type of data to be collected, how it was going to be used (e.g., for research and scientific publications), where it was going to be stored and how the data was going to be protected. It provided the users an email address and password when they signed the document to give to them access to their individual results of their observations at the

website. Personal data is property of Tecnalia that saved it in a digital file that will be deleted at the end of the project, according to the Spanish legislation.

C.2. Engagement activities

The aim of the project was not only to recruit people to make observations in each public space, but also to build a community of users and followers of the project interested on the outcomes of the project.

Therefore, other means of participation were proposed. Those means are described in the following chapters.

C 2.1 General Questionnaire

With the aim of engaging the citizens that did not take part in the data gathering process described in C.1, a "lighter" General Questionnaire (GQ) was developed for data collection.

The GQ consisted of a short questionnaire that focused on fundamental aspects of the study (environmental quality of public spaces) for a wider audience, without the need for prior training or specific knowledge related to environmental issues. Thus, diverse citizens made contributions focused on end-user perception vision.

The GQ provided information with regard to environmental comfort in public spaces. First of all, the GQ got a broader view on the perception of these public spaces that allowed us to complement and contrast the results. Secondly, the GQ helped to socialize the project and to approach a project with a very technical profile to a larger audience.

Thus, questions in this questionnaire aimed at better understanding the following:

✓ What aspects determine the comfort of urban spaces?

✓ Which aspects determine the use of public spaces?

✓ The relationship between quality of life and environmental quality in the urban spaces.

✓ The type of information on environmental quality that people want to receive.

✓ The interest in participating.

Open to all citizens, the GQ focused on the fundamental aspects of the study (environmental quality of public spaces and comfort) so that a wider audience could make contributions focused on end-user perception vision.

General Questionnaire advantages

✓ It provided a broader view on the perception of the public spaces that allowed us to complement and contrast the results.

✓ It helped to disseminate more the project.

✓ It approached a project with a very technical profile to a larger audience.

How it was organized

- It was based on the project objectives, taking into account the complementarity with the more extensive questionnaire that volunteers dully filled in the Smartphone.

- Definition of supports

The General Questionnaire is attached in Annex II.

C 2.2 Creating Community

The dissemination and promotion of the GQ was done through the following activities:

1. Vitoria – Gasteiz CITI-SENSE website: vitoria.citi-sense.eu/en-gb/citisense.aspx

2. Vitoria – Gasteiz CITI-SENSE Facebook profile: facebook.com/Citi-Sense-Vitoria-Gasteiz-785414554863775/

3. Open participation tent (Street Information desk)

The General Questionnaire was implemented in an on-line platform and published through the CITI-SENSE website and Facebook profile. Moreover, the GQ was distributed among the population, and an information desk was placed in the city centre promoting the participation in the project. The information desk was located in a strategic position to analyse the space where there were more people spending time or transiting.

The GQ was composed of 12 closed questions, and it was possible to be accessed online and/or offline: http://udalonink.ibatuz.com/index.php/317916/lang-eu.

Figure 3. Vitoria – Gasteiz CITI-SENSE Facebook profile

Figure 4. Vitoria – Gasteiz CITI-SENSE web portal

Open participation tents

An information desk was set up in the street, creating a space to provide information to anyone interested in CITI-SENSE project, as well as to get citizens' ideas or suggestions. The open participation tents were located in a strategic position to engage the citizens. The main purpose of the public information desk was to contribute in the Environmental Citizens' Observatory for Public Places project and General Questionnaire dissemination among the people.

Participation Tents Advantages

✓ Public, close and simple spaces where citizens could make their proposals.

✓ It was simple to perform.

✓ Very accessible, easy to understand, adapted to the people´s available time. It was an open space where everyone could be as long as desired and it remained open for several hours.

✓ Allowed public visibility of the initiative and the promoters.

Distributed materials

▪ Information flyers

▪ General Questionnaire

C.3. Co-Design with citizens

CITI-SENSE is a project that is based on the empowerment and active participation of the stakeholders and citizens. Therefore, in the Vitoria-Gasteiz EI, a co-design workshop was organized with a group of volunteers during the recruitment period. This meeting was organized after the presentation workshops in the Civic Centres.

The materials used in the co-design workshop are presented in Annex IX.

The participants were selected from the initial workshops, described in C.1.2 chapter. The objective of this Co-Design workshop was to invite volunteers playing an active role in the development of the project and not only as simple "observers".

C.4. Tools and products

The solution defined for the empowerment initiative combines hardware and software tools that measured the objective and subjective parameters of the environmental conditions in urban spaces and a protocol for guiding the participants on doing a conscious observation of the urban places, using the tools in an appropriate way, considering the empowerment objectives. It also gave feedback about the results of the individual observation directly at a public place, and also access to the results of all the observation made at a web page.

The solution comprises:

- A smartphone that supports the observation and its camera to take photos. It also allows post-processing acoustic signals.

- An external microphone for measuring noise levels.

- An external equipment (connected to the smartphone using Bluetooth) to measure thermal conditions.

- Smartphone apps that allow citizens to make their evaluation in a user-friendly way, to upload the collected data and information about their perception of the area, and to show results as a direct feedback on the screen.

- Procedures for measuring acoustic and thermal conditions, calculate acoustic (application of the ESEI index) and thermal comfort (application of the PET index), and general perception, based on the state-of-the-art regarding soundscape.

- Definition of a protocol for making the observations that gives clear instructions for the participants.

- Visualization of results of all the observation made at a web page.

The quality of the data measured by the sensors was analyzed and it was considered to be accurate enough for the purposes of the project. The two topics that have more influence on the accuracy of the results are: the number and representativeness of the sample of users that carried out the observations and the way the protocol for making observation was followed by the users.

A detailed description of the tools and the quality analysis made is included in Annex III.

C.5.   Empowerment evaluation

As mentioned in deliverable D5.1 (Bae Brandtzæg et al, 2013), one of the aims of the Environmental Citizens' Observatory for Public Places project is to genuinely empower people, encourage discussion and build citizenship skills. According to Chamberlin (1997: 4), the empowerment is defined taking into account a number of qualities, and some of them fit within CITI-SENSE Experience empowerment goals:

- ✓ Having decision-making power

- ✓ Having access to information and resources

- ✓ Having a range of options from which to make choices

- ✓ Assertiveness

- ✓ A feeling that the individual can make a difference

- ✓ Leaning to think critically; unlearning prejudices; seeing things differently.

- ✓ Not feeling alone; feeling part of a group

- ✓ Understanding that people have rights

- ✓ Effecting change in one´s life and one´s community

- ✓ Learning skills that the individual defines as important

- ✓ Changing others' perception of one´s competency and capacity to act.

Community empowerment initiatives are seen as an effective way of aiding in decision making. Citizen Empowerment should be considered as early as possible and throughout the whole process with clearly defined objectives for the whole process. Moreover, Stakeholder analysis is essential to develop tailor made methods for empowerment and participation. One should keep clearly in mind that local as well as scientific knowledge are an essential factor for a positive outcome of the participation process.

The main aim of the Environmental Citizens' Observatory for Public Places is to empower citizens, particularly in the public places design from an environmental perspective (including comfort criteria). Therefore, the EI phase in Vitoria-Gasteiz has been an experimental action to analyse the interest of the municipality and citizens in adopting the CO as an approach to enrich it and to increase the citizens' participation in the decision-making processes of the local Administration.

The EI process involved the following methodological stages and actions to evaluate the empowerment achieved.

C 5.1 Feedback workshops

Following a focus group methodology, *feedback workshops* were carried out with selected participants (or a sample). Focus group methodology is defined as a data collection method, and involves a semi-structured group interview process. The CITI-SENSE facilitators lead the workshops, assisting participants in understanding the goal of the workshop and to share their points of view within the group. The facilitators collected all the suggestions, ideas and subjective perceptions from the participants, and analysed this information following qualitative research techniques (discourse analysis).

Figure 5. CITI-SENSE Workshop in Jesus Obrero School

So, using a *focus group* methodology, feedback workshops were carried out with the participants in order to report to them the results collected during the data gathering (both objective and subjective data). Participants took an active part in the feedback workshops, making contributions and discussing public spaces improvements.

The collected data, comments and remarks were analysed and comprehensively assessed. The feedback workshops were carried out in November – December 2015. Those workshops were planned previously to be able to achieve the EI's objectives and the plan defined for it is reported in the Annex IV: feedback workshop plan. Furthermore, the working material for the feedback workshop has been reported in Annex V.

The results were presented in a second feedback workshop to the students from Jesus Obrero Studies Centre in December. For the empowerment evaluation analysis, the focus group leaders collected all information, suggestions, ideas and recommendations provided by the participants during the discussion session.

At the end of the feedback workshop, participants were asked to complete a quick survey. The short questionnaire was made to evaluate the whole CITI-SENSE experience, including the workshops. This evaluation was crucial for the empowerment evaluation process, mainly because it reflects the level of commitment reached with urban quality, public spaces and environmental comfort.

Evaluation Questionnaire

At the end of the feedback workshop, the participants filled in a short questionnaire evaluating the whole process. Results coming from evaluation questionnaire were analysed and the

conclusions are presented in D4.1 chapter. The evaluation questionnaire is attached in Annex VI.

C 5.2 In-depth interviews

Additionally to the data gathering, feedback workshops, general questionnaire and information tents, in-depth interviews were carried out in order to explore the empowerment potential, particularly among authorities. The best way to achieve this goal was to establish contact with the City management staff responsible of Environment and schedule with them in-depth interviews.

In-Depth Interviews Methodology

Understood as a qualitative research technique, in-depth interviews are concentrated interviews with key respondents. According to Berry (1999), "In-depth interviewing, also known as unstructured interviewing, is a type of interview which researchers use to elicit information in order to achieve a holistic understanding of the interviewee's point of view or situation; it can also be used to explore interesting areas for further investigation. This type of interview involves asking informants open-ended questions, and probing wherever necessary to obtain data deemed useful by the researcher".

Hence, an interview guide was designed to conduct the interviews and get the information from key respondents. The Interview guide was designed according to the Empowerment Checklist facilitated by CITI-SENSE Work Package 5 (WP5). The main aim of WP5 is to propose and help implement a sound, coherent and productive approach to citizen participation and empowerment, to the engagement of public authorities, and to better decision making, in each empowerment initiative of CITI-SENSE and across CITI-SENSE as a whole.

Particularly, the main goal of the empowerment evaluation checklist is to explore if empowerment has taken place (among citizens, authorities, relevant actors…) and if the product (sensor) has been useful. Moreover, it is checked if there has been any knowledge transmission, and potentially what citizens, authorities, schools, NGOs… may learn about this experience.

The interviews were recorded after having obtained the interviewee's consent, and have been transcribed. Permission for recording was asked before the interview began and they were informed about the guaranteed anonymity and confidentiality. It is possible to check the In-Depth interview guide in Annex VII.

Advantages

✓ Get an expert view on the fundamental aspects of the project.

✓ Strengthen the qualitative aspects of project evaluation

✓ Lack of risk associated with the generation of citizens' expectations as they are confined to a personal meeting.

✓ Receive a feedback from Authorities.

C 5.3 Feedback from other stakeholders

The Environmental Citizens' Observatory for Public Places was carried out and implemented in Vitoria – Gasteiz. Besides this, since this Empowerment Initiative has been implemented in a single city only, it was considered taking actions to test the experience potentiality in other cities.

A plan was defined to collect indirect evaluation of stakeholders from other cities. Tecnalia looked for meetings with other European cities, conceived as opportunities to open a dialogue with stakeholders to receive their feedback about the interest of the tools developed in CITI-SENSE to build citizen empowerment processes in the management of public places in their cities.

The material for those meetings was:

- A story-teller, conceived as a tool to share the narrative of the practical experiences about the initiative carried out in Vitoria-Gasteiz EI, based on the results presented in Annex X,

- Description of the lessons learnt and of the requirements that a city would have to take into account in order to replicate the initiative at their city,

- A kit of the products developed ready to do demos about its use.

In those meetings, the aim was to open a dialogue with assistants to receive their feedback about the tools developed in CITI-SENSE, to build citizen empowerment processes also in the management of public places in their cities.

Finally, an evaluation questionnaire was designed to collect the potential interest on the CITI-SENSE product and their usefulness for assessing public places. This questionnaire was composed by 6 open questions that allow free answers, and by 3 closed questions where the participant were selecting their answer among pre-defined choices. The survey measures comprehensively the project potentiality and possibilities in other cities and urban spaces. Annex VIII shows the feedback questionnaire presented to other stakeholders.

In addition, dissemination activities in terms of presentations of this experience at conferences also contribute to the objective of collecting interest from other stakeholders.

C.6. SOCIAL IMPACT INDICATOR

Finally, after the implementation of the different mechanisms of citizens' participation and involvement, social impact **indicators** have been developed to measure the Vitoria-Gasteiz EI **impact on the community.** These indicators include the following items:

1. Number of completed questionnaires, both "online" and in paper version.

2. Number of people who picked up the brochure of the project.

3. Number of "Likes" received for publications in the Vitoria-Gasteiz EI Facebook profile.

4. Number of Facebook followers in the Facebook profile.

5. Number of users who shared our publications in their Facebook profiles.

6. Size of the media audience attending the meeting with the press.

To evaluate such indicators, **each of the indicators listed above were linked to a Control Variable** (an estimation of comparable figures for environmental campaigns carried out in Vitoria-Gasteiz as whole), and, for each, a formula for a coefficient ratio is given and it is presented in detail in Annex XV. The **formula** used is in general as follows:

$$\sum \frac{CITI - SENSE\ Vitoria\ EI\ Variable}{Control\ Variable} x\ Weighing\ Coefficient$$

The indicator is based on diverse factors generating social impact in the short-term, and it establishes a link between the citizens and the project throughout time:

Short-term impact:

(1st factor) Number of completed questionnaires, both online and paper.

(2nd factor) Number of people that received the CITI-SENSE project information brochure.

(3rd factor) Number of "likes" received on CITI-SENSE Vitoria–Gasteiz Facebook site.

We assign an impact (of total) of 0,1 to each variable due to their importance.

Long-term impact:

(4th factor) Number of people following Vitoria-Gasteiz CITI-SENSE Facebook profile

(5th factor) Number of people sharing on social network Vitoria-Gasteiz CITI-SENSE Facebook posts.

(6th factor) Media Impact.

We assign an impact (of total) of 0,2 to each variable due to their importance, with the exception of Media Impact, which takes 0,3.

No impact   Maximum impact
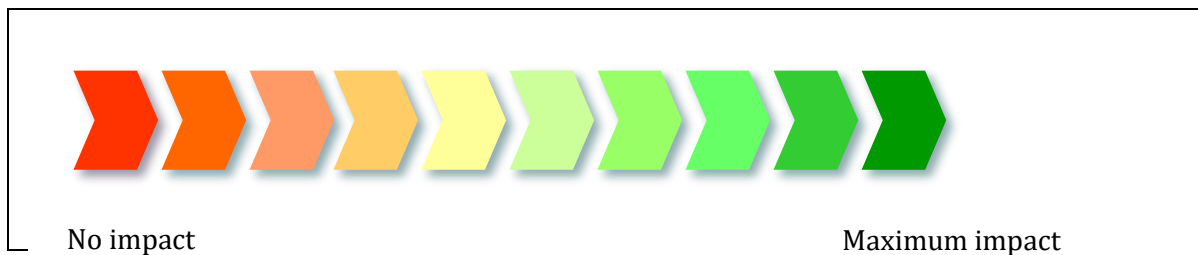
Finally, **the global social impact of CITI-SENSE EI on the society of Vitoria-Gasteiz** was obtained through **the sum of all the data obtained in the above formulations. This social impact indicator ranges from 0 to 1,** where 0 represents no impact to 1 major impact expected in environmental campaigns on the whole population.

D. Results

D.1. Recruitment of Users

D.1.1. Sample

To evaluate how representative the volunteers are for the project, we have to consider that this was not a project that was looking for a statistical representation. It is better to talk about plurality of the people involved in the project than about representativeness.

Overall, **55 participants were engaged in the experience**, accomplishing the initial goal of 50 participants.

TARGET POPULATION	PARTICIPANTS RECRUITED
49 local organizations potentially interested in environmental issues	30 members
8 members from the Environmental Research Centre	7 workers
17 people not linked with environmental organizations	7 people
1 environmental sciences professor from Jesus Obrero Studies Centre	9 students
Casual volunteers	2 people
TOTAL ENGAGED	55 PARTICIPANTS

The participants made more than **267 comments** in the open questions, they took **104 pictures** and they judged and made remarks about the public spaces while they were measuring and collecting data. Moreover, during the data gathering days in April 2015, another 2 volunteers appeared, joining the research group. Thus, **55 people were engaged in this project**, making **up to 139 observations** in the following public spaces:

1. **Constitution Square**: located in the city centre

2. **Los Herran street**: a street where the old bus station was located (close to the city centre)

3. **Salinillas Park**: a green area surrounded by houses.

4. **Olarizu Park**: located far from the city centre in a green area (close to wetlands)

The places are described in Annex X.

As seen below, the sample of participants was quite plural. It is gender balanced: 54% of the observations were made by women, while 46% were made by men. The academic background was noticeably heterogeneous. Most of the participants were living in Vitoria-Gasteiz (92%).

In addition, there are no relevant social or demographic differences between the people observing each of the places, so it can also be considered a good sample to validate the solution to assess comfort levels in those places.

Table 2.- Characteristics of the sample group of participants in the observations made in Vitoria-Gasteiz and in each place.

N of observations	33	42	34	30	139		
	Constitution Square	**Los Herran**	**Salinillas Park**	**Olarizu**	**% TOTAL**	**freq**	**Differences**
Women	51.6%	52.4%	61.8%	50.0%	54.0%	74	ns
Living in Vitoria - Gasteiz	80.7%	92.9%	94.1%	100.0%	92.0%	126	*
University studies	45.2%	43.9%	50.0%	46.7%	46.3%	63	ns
Secondary studies	32.3%	46.3%	35.3%	40.0%	39.0%	53	ns
Employed	45.2%	36.6%	41.2%	40.0%	40.4%	55	ns
Unemployed	6.5%	14.6%	20.6%	26.7%	16.9%	23	ns

Hence, we can consider that the sample was plural enough for the project purposes. Furthermore, it is a sample of people with different profiles that can be found in the city.

In addition, people and associations that make regular use of the observed areas were contacted, and they provided an important value to the study. We did not only collect opinions of people interested in environmental issues, but we also had the participation of citizens who use these parks and squares every day.

Final considerations

Considering the efforts made in the recruitment, we can say that we reached a relatively high level of recruitment success in this EI.

On the one hand, the response of civil associations of Vitoria-Gasteiz has been low, because only a small percentage of contacted associations have finally agreed to participate in the project, despite the big effort made for calling to attend the workshops with several emails and telephone calls.

On the other side, the active involvement of participants on engaging their personal contacts has worked well. We can conclude that personal contact (e.g., between friends) is much more effective than an "official" call.

Contacts with individuals interested on environmental issues had also a good response and in most cases we have obtained the commitment to participate in the project.

D 1.2 Expectations of the volunteers

The expectations of the participants were collected through an initial questionnaire, prepared in collaboration with WP5, as one of the tools to assess participation and engagement.

This initial questionnaire (Annex I) allowed us to know the motivations of people who were involved and their expectations to the project and its results. The answers to this questionnaire enabled us to assess, at the end of the EI, the degree of fulfilment of the expectations of the volunteers.

This questionnaire was also delivered to the students of Jesus Obrero Secondary School who were participating as volunteers. All the questions were filled in at the end of presentation/training sessions.

We have collected a total of 26 feedbacks from the questionnaire. Although we expressly asked people to do that, not all the people answered the 3 questions of the questionnaire.

As a conclusion of this questionnaire, we can highlight the following aspects:

- **Regarding the understanding of the project (the first question):**

  Most people answered about "a European project to evaluate or determine the degree of comfort in the public spaces".

  The idea of devices to be used in the observations is repeated.

  There is no clear reference to CITI-SENSE as a project being carried out in other cities.

  The project is not perceived, or at least not understood, as an empowerment project.

- **Regarding the motivations to participate (the second question):**

  Motivations of each participant were classified according to the number of entries from highest to lowest.

  - Topic of interest (6 mentions).

  - Professional and academic interest (5 mentions).

  - Improve the city and/or the evaluated areas (4 mentions).

  - Curiosity about the project and the tools used (3 mentions).

  - No interest (1 mention).

In these answers, it seemed clear that people who have participated in these sessions were concerned about environmental aspects and public spaces.

Professional and academic interest was mainly collected on the Jesus Obrero Secondary School (4 out of 5). In fact, considering only people from the civil associations, this option is the worst scored. There was also one student who showed no interest.

It is interesting the number of people motivated by the possibility of facilitating the improvement and/or change of the city and the areas under study. Especially because this

answer could balance the lack of references to empowerment in the open explanation of project (first question).

The curiosity about a scientific experiment and the use of sensors has also caught the attention of some people.

- **Regarding the expectations about the usefulness of the results (the third question):**

The more repeated expectation is the possibility of using the project and its results to educate and raise awareness about these issues and about the need to improve comfort in public spaces with up to 9 mentions out of 26.

- o Educate and awareness raising (9 mentions).
- o Critical aspects of the project (4 mentions).
- o Useful for local government (2 mentions).
- o To help improving public spaces (2 mentions).
- o Do not know well what the usefulness could be (1 mention).
- o Improving Curriculum Vitae (1 mention).

Critical aspects of the project are:

- o sensors are not required in order to improve the comfort of public spaces; and
- o the difficulty to became more universal the use of these devices, since they are not available to a significant number of people.

D 1.3 General Questionnaire results

The General Questionnaire described in C.2 included the comments and remarks from citizens that did not take part into the data gathering and the assessment process. The survey was available both online and in the public information tents, and finally 26 people completed the general questionnaire via online and 22 people in the street information tents.

Overall, **48 people** sent their suggestions and recommendations through the General Questionnaire.

With regard to the respondents, some remarks need to be highlighted:

- ➢ There were more women than men among the respondents
- ➢ Most of the respondents were living in Vitoria-Gasteiz.
- ➢ Most of the respondents were employed and students.
- ➢ The sample was quite diverse with regard to age groups.

THE GENERAL QUESTIONNAIRE RESULTS

First of all, what outstands from the GQ results, is the fact that the environment is an important issue for Vitoria – Gasteiz citizens. According to the General Questionnaire results, the environmental quality is strongly linked to life quality, and public participation is needed to create Citizens' Observatories building an environmentally friendly community. Furthermore, the respondents demanded public information about environmental quality, and they believed that new technologies can definitely play an important role, particularly in public participation processes and empowerment initiatives. The following list shows the general questionnaire key results:

1. Acoustic quality has an influence in the public spaces individual comfort.
2. The lighting quality is related to the security/insecurity perception.
3. The thermal comfort is quite important for the respondents. They reported that it was necessary to receive information about Vitoria-Gasteiz' thermal comfort.
4. The smells are linked with public space cleanliness and maintenance.
5. A 67% of the respondents think that the public spaces environmental quality is related to the quality of life. In contrast, only 4% of the respondents believe that environmental quality and life quality standards are not related.
6. New technologies (43 mentions), media (50 mentions) and appropriate public information (23 mentions) were pointed out as necessary with regard to citizens information requirements.
7. Public participation is very important with regard to public spaces environmental quality, information and happiness.
8. Referring to environmental quality, some respondents reported that more information is needed. Hence, sensors may be useful instruments for monitoring.
9. Most of the respondents thought that the participation should be supported by new technologies (smartphone Apps in particular).

The general questionnaire was a valuable instrument to acknowledge the influence of the environmental quality in relation to the quality of life. Most of the respondents identified that environmental parameters measuring comfort and public spaces quality are influential. Moreover, citizens reclaim more public information about public spaces management, comfort and environmental quality, which has to be provided by authorities. New technologies, sensors and smartphones are seen as a highly valuable asset to get information and to measure public spaces quality. Overall, what comes clear is that life quality is closely related to urban comfort and citizens' satisfaction.

D.2. Co-design with citizens

This workshop was focused on the co-design of the visualization of the results for the Vitoria-Gasteiz EI on the webpage. The aim was to tailor the display of the results with the points of view and preferences of the citizens.

A "focus group" methodology was used during the workshop, to be applied in groups of 6 to 12 participants

All the volunteers engaged in previous meetings were invited to join this co-design workshop. The selection of the participants was made following the same criteria as for the main selection of the volunteers: geographical, gender, age and considering their participation in civic associations. We also considered their knowledge in this field and we invited not only environmental "experts", but also citizens without expertise in this field.
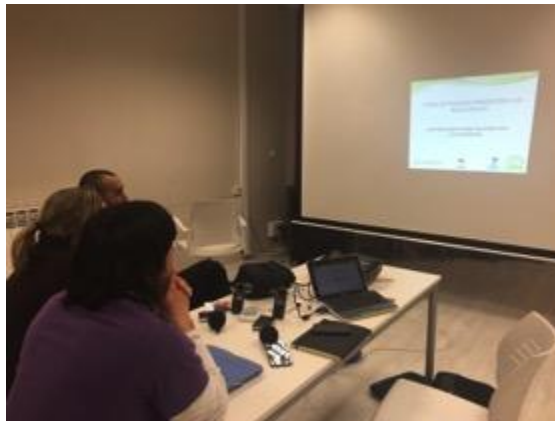

Figure 6. Co-design workshop.

This co-design workshop was held at the Europa Civic Centre at Vitoria, and 8 people attended. It lasted one and a half hours and was divided into two parts. The first part was focused on providing information for more active and rich discussion among participants, and the second part of the session was focused on the discussion and collection of their views. We did not aim to get consensus, but only wanted to get their views and opinions about what would be the best way to visualize the results of the observations on the webpage.

The outcomes of this workshop have been taken into account for the development of the "results" section of the webpage.

D.3. Analysis of data collected

The collection of data was made at four urban areas selected by the Vitoria-Gasteiz city council. Since the interest of the city council was to check the interest of the CO concept in different steps on the management process of public spaces, the areas selected are diverse representing different potential interests of the city.

D 3.1 Description of the urban spaces analysed

The following figure shows the location of the four spaces in the city. A more detailed description per area evaluated can be found in Annex X. The first part of the material included in this Annex was used during the final workshop to give feedback to citizens who participated in the observation of the four public spaces.
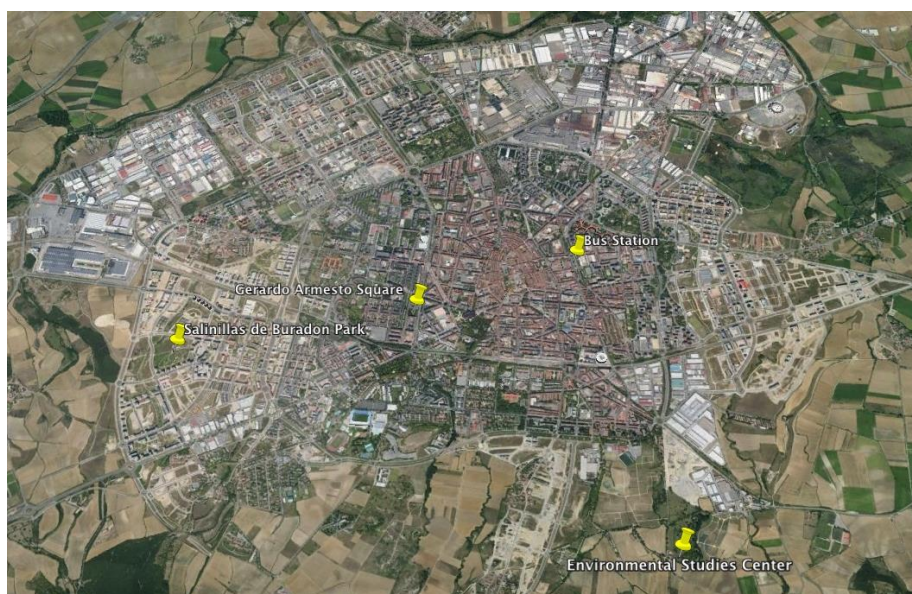
Fig 7 Location of the four spaces analyzed in the project

The areas selected are examples of different typologies of city environments and provide different situations and characteristics, as can be seen in the following table:

Table 3 Description of the characteristics of the four places

	Los Herran	Square La Constitucion	Salinillas park	Olarizu park
Time of development	Future intervention	Future intervention	Recent	Natural
Type of urban area	Residential. High density.	Residential. Medium density.	Residential. Low density.	Natural. Very low density.
Maintenance	N/A	Well maintained	Not well maintained	Well maintained
Greenery	Grass, bushes and scattered trees	Grass and trees	Grass	Grass, bushes, trees and water
Location in the city	City center	City center	Suburbs	Green Ring
Aim of the evaluation	Identify ideas for renewal	Identify ideas for renewal	Ideas for promoting use	Ideas for preservation

Citizens recruited to observe urban places were asked to make their observation at specific areas, assuring a good balance on the number of observation in each place.

Los Herrán	Square La Constitución	Salinillas park	Olarizu park
28 observations	32 observations	27 observations	26 observations

Table 4 Number of observations made at each place

At each place, 2 or 3 specific evaluation sites were proposed in order to concentrate the observations and to collect enough comparable assessments. Therefore the analysis could give a global overview of the environmental comfort in the most frequently used sites of each area.

D 3.2 Analysis made of data collected

The aim of the data collected was:

- Making a diagnosis of the conditions of the place.

- Assessing the quality of the place: how it is perceived and which elements people most like or dislike.

- Collecting ideas or proposal to be taken into account in the management strategy of the place.

Most of the information was registered using the smartphone at the site and it was complemented with the ideas and comments shared at the final workshop.

Table 5 Type of data collected during the project

	Collected by the Smartphone				Shared at the Workshop
	Measurements	**Perception**	**267 Comments**	**104 Photos**	
Diagnosis	X	X			
Assessment		X	X	X	X
Ideas / Proposals				X	X

The amount of proactive information given by participants by the app, in terms of comments written in the open questions and of photos uploaded, reflects the involvement of participants with the Empowerment Initiative. In general, the amount of positive contributions (comments or photos) is higher than the negative ones: 139 positive "most liked elements" and 76 negative "most disliked elements".

Each observation comprises 170 variables, quantifying several items. The method to measure, analyse and visualize each item is described in the following table.

Table 6 Variables/items analysed and methods used to measure, analyse and display them

Items quantified			How is			Visuali-zation
			measured?	analysed?	represented?	
Previous experience	Valuation		Questionnaire (Q)	Close Option	per space (/ S)	% answers/class	Fig 1
	Use	reason					
		frequency					
		duration					
	Accessibility	from where					
		distance					
		transport means					
	Perceived health and emotions			EVA Scale	Personal reference		
Observation at site	Urban landscape	Perception		Semantic differential (SD)	/space + avge	average of agreement	Fig 2
		Liked elements		Open question: Taxonomy	per space	% ans/class	
		Disliked elements					
		Liked elements	Photo	Number of pictures		Counting and examples	
		Disliked elements					
	Potential	Use for relax	Q	Question		% answers	
	Acoustic conditions	Noise level	Sensor	LAeq,dB		Average + distribution	Fig 3
		Nr positive event	S + Q	Detected and annotated			
		Nr negative event					
		Perceived sources	Q	Close Option		% ans/cl	Fig 4
		Soundscape	Q	S.D.	/s + avge	Average of agreement	
		Comfort	S + Q	ESEI indicator	per space	Average + distribution	
	Thermal conditions	Temperature	S	°Celsius			
		Perceived T	Q	Close Option		% ans/cl	
		Humidity	S	%		Average + distribution	
		Perceived H	Q	Close Option		% ans/cl	
		Wind speed	S	m/s		Average + distribution	
		Perceived W	Q	Close Option		% ans/cl	
		Average Radiant Temperature	Model	°Celsius		Average + distribution	
		Thermal Comfort	S + Q	PET Index		Average + distribution	
		Thermal Stress		Close Option		% ans/cl	
	Light	Comfort	Questionnaire	Close Option	/s + avge	% of positive ans	Fig 5
	Perceived emotions and health	Calm		EVA Scale	per space + average	Difference with personal reference	Fig 6
		Happiness		EVA Scale			
		Sadness		EVA Scale			
		Anger		EVA Scale			
		Stress		EVA Scale			
Suggestions		Improvements		Open Comments	/ Space	Number and Examples	
			Workshops	Focus Group		Text	

One of the variables that was calculating the Physiological Equivalent Temperature Index (PET) is the average radiant temperature. This variable is previously modelled in each observation point proposed in different scenarios representing periods of the day and sessions of the year. Results of this model were uploaded unto the server. The app at the smartphone downloads the value of average radiant temperature corresponding to each observation and calculates the PET integrating those data with other variables measured or reported by participants (data fusion).

D 3.3 Visualization widgets

Since CITI-SENSE considers the feedback given to participants and to citizens interested on the project outputs as very important, the visualization widgets designed or selected are outputs of the project. Each variable or item quantified in the observation was presented in the format that best suited its content, to give to citizens clear (easy to understand) and friendly information of the obtained results.

The Table above (table 6) presents the whole correspondence between variables (items) and widgets used. The following figures show an example of each of the visualization widgets used during the project.
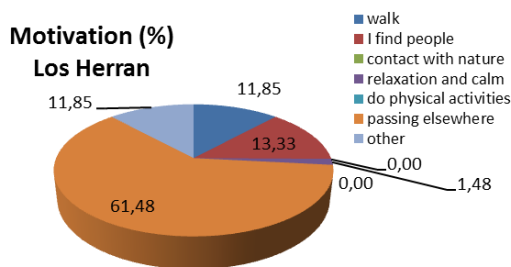

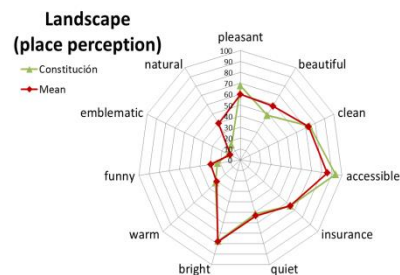Figure 7- Visualization of % of answers per class

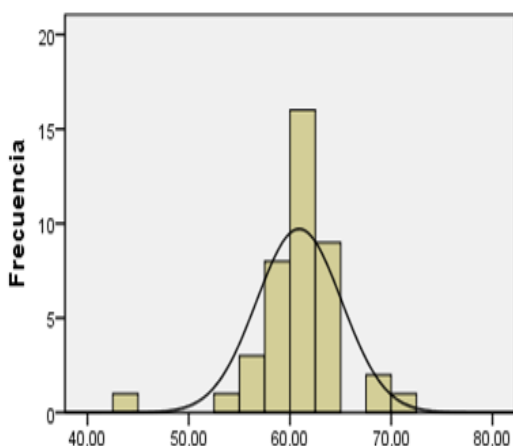Figure 8- Visualization of Semantic Differential results

Figure 9- Visualization of distribution of values among observations per space
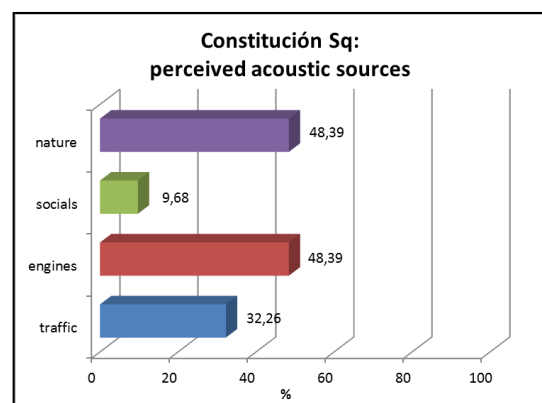

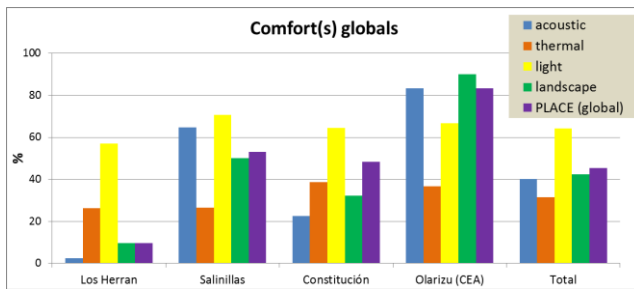Figure 10- Visualization of perceived noise sources per place
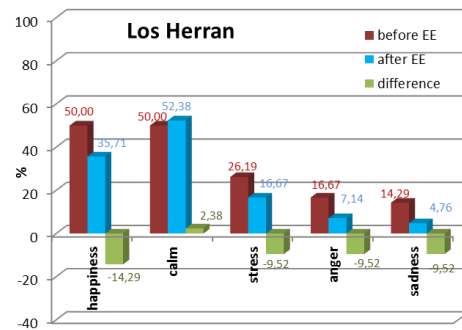
Figure 11- Visualization of perceived comfort

Figure 12- Visualization of perceived health and emotions. Quantification of benefits

Representation of objective and subjective values

The CITI-SENSE team considered it very important to analyse objective and subjective values and visualize their relation, if any. In fact, this was the content of the co-design exercise carried out in the project inviting participants to a workshop. As a result of this workshop, the procedure to analyse the data and the visualization widget to be used at the web portal were defined.

The graphs shown at the web (Fig 13) represent the comfort perceived by the participants (subjective). The figures below present the average values of comfort indicators (objective) of observations with similar perception values.
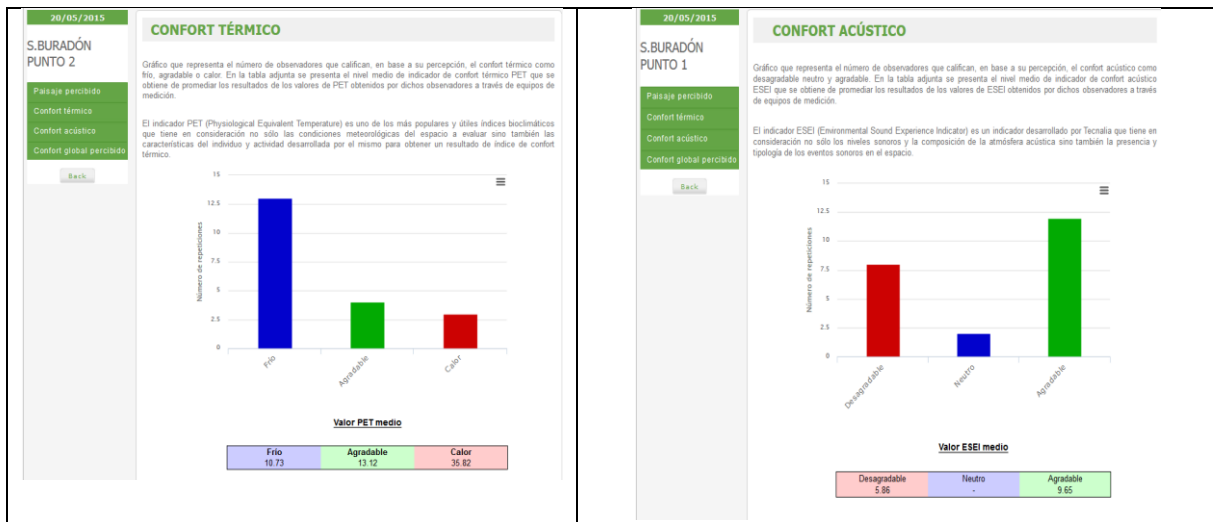
Figure 13 Visualization at the web portal of the objective and subjective assessment

D 3.4 Main conclusions for the analysed areas

The detailed information of the results of the analysis made in each area is included in Annex X. Following a summary of the conclusions extracted from the observations and assessments made in the areas is presented. They contain the results we want to stand out from the analysis: conditions observed and perceived in each area, the global valuation of the places and some hints

for their management. This information is presented as an example of the type of collaborative reflections that could result on the implementation of a Citizens' Observatory on the environmental quality of Public Spaces.

Los Herran:
- Comfort indicators represent correctly participants` perception.

    - The acoustic comfort is very low. Traffic noise levels are very continuous (≈60 dBA) with very few sound events, but valuated as negative.

    - Average thermal comfort is also low. The observations are carried out in diverse weather conditions: most of the observations were made with cold weather for Vitoria-Gasteiz (15º) and with little wind (0,2m/s), but in some observations the temperature was 20ºC and there were no clouds and humidity varies (55-85%).

- The place was valued as: **Known and Accessible**.

- Traffic shapes the place, BUT…. nature green elements are highly valued: **"It is a small oasis".**

- The main USE of Los Herrán Boulevard is CROSSING from one place to another, but 24% of participants would go there to RELAX, due to the presence of natural elements and sounds. In this area there is an OPPORTUNITY FOR IMPROVEMENT of its quality.

- During the final workshop it was mentioned that the area had already improved since the observations were made and they thought it would be interesting to repeat the experience to assess the change.

Plaza de La Constitución:
- Both the questionnaire (70% values as pleasant) and the workshop highlighted that the square is pleasant.

- The activities carried out at the Square are varied. 20 % considered it a **meeting place** with others, although the **time they use it is short**.

- Although the square is generally well valued, global comfort is medium-low (49 %).

    - During the observations, the acoustic comfort was low. The traffic noise is stable (≈60 dBA) with few sound events, more positives than negative ones. Soundscape perception during observation is more negative than the objective data measured.

    - Thermal comfort is medium because most observations were done in **hot weather (20º),** but there are some cases with 12º. It is a bit windy (0,6m/s) and wet (50%) and the sky is half covered (50%).

- 61,3% of participants **would use the square for relaxing** because of the **sounds & green elements (the water and the lake).**

- It seems that the square **needs a renovation to**:

    - Give more social attractiveness to it.

    - Make it more "funny" and emblematic

    - Reduce concrete ground.

Parque de Salinillas:
- It is rated as good or excellent (51 + 17%).

- It is a bit unknown space ➔ OPPORTUNITY for its improvement

    - 71% would use it to relax because it is considered quiet and due to the presence of natural elements

    - It is considered very comfortable, thanks to the sounds, its landscape and the light.

        - During observations acoustic comfort is high. The atmosphere is quiet (≈53 dBA) with events, more positive ones but also some negatives.

        - Thermal comfort is low because mostly it was cold for Vitoria-Gasteiz (16 °), wind (1.3 m/s) and overcast and relatively high humidity (80%), although one day it was 20 ° and much lower humidity (45%).

    - The comments reflected the positive effect on perceived health (emotions and stress) related to visit this park.

        - Participants dislike ➔ the presence of houses, noise and weather conditions.

- It is proposed to promote being more emblematic and funny:

    - Adding trees and/or hedges to reduce the wind effect, although it is recognized that this could lead to feelings of insecurity, since they could reduce vision of the surroundings.

    - Encourage some recreational economic initiatives (bars or terraces)

Parque de Olarizu:
- It is a place where people have contact with nature and walk.

- It is visited for one-hour, monthly, and cycling (33%).

- It is VERY PLEASANT & VERY COMFORTABLE in all its variables.

    - They like most ➔ Nature (green), landscape & surrounding environment

    - They like least ➔ noise & houses

- Almost all participants (96,7%) would use it for relaxing because of its calm & natural elements, landscape……

- During the observations acoustic conditions were diverse, but mostly quiet (**≈50 dBA**), with some acoustic events, mainly positive. Although in some observations 60 and even70 dBA were measured.

- Thermal comfort is low because it was a bit cold for Vitoria-Gasteiz (**16º**), some wind (1,3m/s) & some humidity (68%).

    The visit offers **perceived benefits on health**.

- It is suggested that **more significance** should be given to the park:

    - Bigger trees.

    - Create a small mark that can attract more people

D 3.5 Comparative analysis

As presented in the previous chapter, the implementation of a Citizens' Observatory on the environmental quality of Public Spaces gives support to the understanding of specific public places. Moreover, the comparative analysis of the whole set of observations made in 4 places, that is the data from the 139 observation contained in the database of 170 variables each, can improve the general understanding on what citizens most valuate in public places, at least in the city of Vitoria-Gasteiz, and about how they perceive them.

The main conclusions made up to now in the analysis of some of the variables are the following:

1. **Positive effect on health**

    The analysis of the results concludes that spending time at the places and doing the observations increases the calm (positive valence emotion with low activation), decreases negative emotions (low and high activation) and reduces the stress. These results support previous research made by Tecnalia with similar measurement parameters applying traditional procedures to quantify perceived emotions: face to face questionnaires made on site.

    This result was highlighted by the participants in the final workshop when receiving feedback of the experience results.
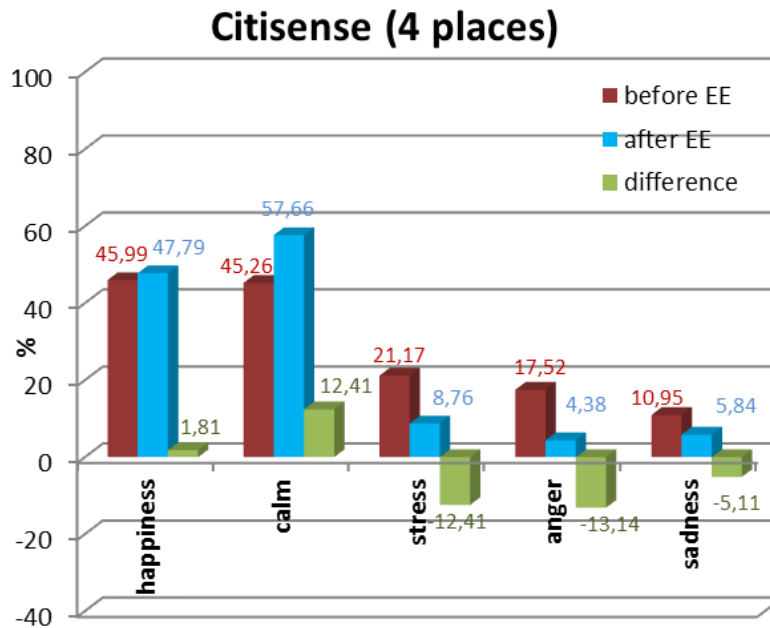
Figure 14 Comparison between perceived emotions reported by participants before and after doing the observation.

We can also conclude that urban spaces can be considered as places to relax, even though their quality is not optimal. This result is also supported by other research that shows that the attractiveness of urban places for relaxing activities is highly influenced by other variables, such as the congruence between landscape and environmental conditions.

2. **Perception of urban places**

The analysis of the description of the quality of the four spaces observed gives the following conclusions:

- A good accessibility, safety and cleanness, although being variables that influence the global perception, do not determine the pleasantness of a space. This is the case of La Constitucion square. This is only true when those variables are positively rated or none of them is extremely negative.

- Olarizu Park gives a complementary conclusion: a general positive perception of urban places provokes positive perception of other variables. In this case, for instance, accessibility is highly valued, although 93% of citizens said that it is further than 1 km from the places they usually use (work, home,…)..
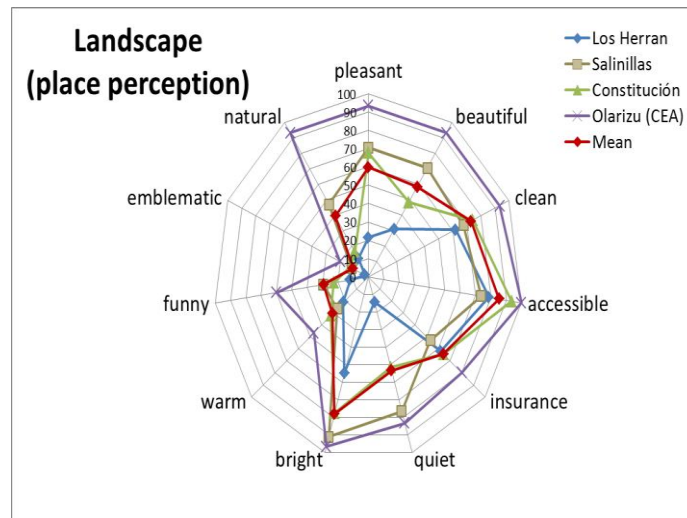
Figure 15 Comparison of the landscape perception of the four places, quantified with a Semantic Differential analysis.

3. **Perception of global comfort is strongly related to visual perception**
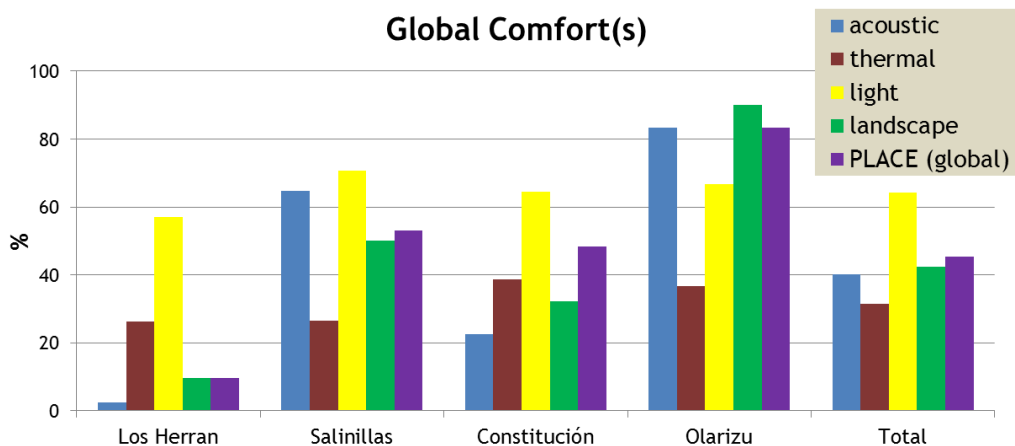
Figure 16 Comparison of the mean level of comforts reported by participants in each urban space.

The comparative analysis of the rating of different aspects of comfort versus the global perception induces us to say that the variable most related to global comfort is visual pleasantness, followed by acoustic comfort. On the contrary, the light conditions, most of the time positively valued, and the thermal comfort, quite diverse, do not seem to affect too much the global perception. It must be said that since the thermal conditions may vary highly in the observations made at different period of the day, the comparison of the average thermal comforts could not give a clear view of the role of this variable in the global comfort.

Answers to the General Questionnaire indicate that global comfort in urban spaces, in general, is mostly linked to air quality (96%) and, secondly, to acoustic conditions (71%).

However, in this questionnaire acoustic comfort was considered as the main factor to decide using an urban space (71 % for acoustic conditions, and 50% for thermal conditions or 52% for air quality). The decrease of the relevance of air quality (from 96 % in terms on comfort to 52 % in the decision making) to decide using an urban place can be understood as a consequence of the feeling that they cannot choice the best moment to use those places, since they consider air quality will not easily change during the day.

4. **Common most liked and disliked elements**

   What participants most like in any of the places was the presence of natural elements and the quality of landscape. And they do not like noise and traffic.

5. **Positive effect of natural elements:**

   The four selected urban places are diverse in terms of presence of natural elements, from a city centre boulevard to a peri urban natural park.

   Table 7 shows a summary of how participants perceived the four urban places and how natural they are.

Table 7 Summary of the analysis of the influence of the presence of natural elements on perception.

	Los Herran Boulevard	Constitución Square	Salinillas Park	Olarizu Park	Average
Presence of Nature	10	10	50	90	40
Acoustic Comfort	2	20	65	80	40
Visual Comfort	10	30	50	90	40
Landscape Pleasantness	20	70	50	90	60
Soundscape	45	40	60	85	60
Use for relax	25	60	70	97	60

There are clear benefits linked to the presence of nature in the city in terms of:

- Improvement on the perception of environmental conditions (comfort, pleasantness, landscape).
- More people would use the place for relaxing.
- Perceived health: reduction of stress and increase of positive emotions.

The analysis of perceived health results in the four spaces show a stronger positive effect in the urban places with more presence of natural elements.

Urbanized places	Natural places
↘ Negative emotions and stress decrease.	↘ ↘ Anger and stress decrease drastically.
↘ But positive emotion of high activation (joy) also decreases.	↗ ↗ Positive emotions (joy and calm) increase clearly.
↗ Calm increases but slightly.	⇨ Sadness does not vary.

D 3.6 Potential interest of data

The data collected and analysed is interesting for **citizens** participating in the empowerment initiative. Their awareness about the importance of the quality of urban spaces was increased, and also they learned that the importance of having access to good quality places for their health and their quality of life is not only a concept, but it can be also measured and demonstrated.

The data collected is **valuable** to **research** about the factors that influence the perception of urban spaces and how environmental conditions can affect their experience. This research field needs data as realistic as possible that could represent how local experts on urban place, citizens, perceived those spaces. And the database created during the Empowerment Initiative is a source of information that addresses the key requirements for this research field, since it is data collected in the field, by real users, and linking tightly objective and subjective data.

The comparison analysis made and the conclusions made from it are very interesting for **urban planners and designers of urban spaces**, since they can support their qualitative knowledge about the key elements of a place to be successful, that is, to be really used and enjoyed by citizens, contributing to their quality of life.

The **city** environmental managers, in this case from Vitoria-Gasteiz, were not surprised about the objective data about environmental conditions and results obtained on the observations of the four places. As they know the city and manage its environmental quality, they thought that results were predictable. The most interesting set of data for them was the subjective data, since it showed them new information. They gave a strong connection between social awareness and empowerment initiatives, so for them it was also interesting to know that people believe that are more aware about environmental aspects related to urban spaces.

D.4. Empowerment evaluation

The Empowerment Initiative within Vitoria-Gasteiz CITI-SENSE project, led and coordinated by WP3 in collaboration with WP5, sought to empower citizens in environmental comfort and urban quality with regard to public spaces configuration. The participation of citizens in the management and design of public open spaces involved measuring and transmitting objective-subjective feelings such as:

- ✓ Overall satisfaction with the environment
- ✓ Perception of the urban landscape
- ✓ Acoustic comfort
- ✓ Thermal comfort
- ✓ Perceived health and emotions

In chapter D4.1, we show the findings and results coming from the empowerment initiative carried out in Vitoria-Gasteiz. Therefore, citizens' and stakeholders' empowerment potential was examined in order to assess the full implementation goals previously described.

D 4.1 Citizens and participants evaluation

At the end of the feedback workshop, participants were asked to complete an evaluation quick survey. The short questionnaire was made to evaluate the whole experience and the workshop. Analysis of their answers concluded that, on average, participants assessed the experience with **3,6 marks** and the workshops with **4,0 marks**. Considering that *1 is identified as totally negative and 5 as totally positive*, both experience and workshops were seen as rather positive and described as useful. Moreover, the participants reported that:

➢ The experience helped to feel part of a community (citizens' observatories).
➢ The participants felt empowered when they noticed that their comments and remarks were assessed and evaluated by the scientific community.
➢ The participants could help and contribute in the environmental governance.

Accordingly, the empowerment evaluation showed that the participants identified the environmental evaluation within the selected spaces (Olarizu, Salinillas, Los Herrán and Constitution Square) and the toolkit as useful. Collecting data, giving opinions and assessing diverse public spaces with regard to environmental conditions were perceived as a beneficial experience by them. Besides, participants said that they were going to keep an eye on the spaces where the data was collected, in order to monitor the environmental quality of these areas.

The empowerment happens when the right to know and the right to participate is acknowledged. In this sense, the participants said that the sensor and toolkit gave to them appropriate information that was considerably helpful for public spaces assessment. The use of new technologies was described as an opportunity, and the participants learnt considerably one from each other during the focus groups sessions. Since they reported that authorities and scientific community must be involved in the environmental improvement, the **Vitoria-Gasteiz experience must be evaluated as a successful project that increased the awareness among the participants**. Although some limits and barriers were identified (authorities commitment with citizens observations and the use of user-friendly technologies to monitor the environmental quality), the aim to collaborate in the public spaces assessment implies that citizen's observatories were created during the EI process.

Empowerment happened among those participants who felt involved in the project. Moreover, they reported that during the data gathering they were feeling **more relaxed and less anxious**, and they said that it was **very valuable** to know of the **use and implementation of new technologies** for public participation and environmental monitoring.

The Environmental Citizens' Observatory for Public Places project in Vitoria-Gasteiz created a group of **citizens' observatories for environmental comfort**. Participants said that they wanted to continue monitoring the spaces where the data were collected, and they informed that **Vitoria-**

Gasteiz municipality must listen to them and make decisions taking into account citizens observatories suggestions and recommendations.

In the "**Annex XI: Citizens and participants empowerment evaluation results**", it is possible to check a detailed analysis of the empowerment evaluation. The study has been made following the empowerment checklist designed by WP5, which evaluated a number of variables among the participants. Particularly, through the data gathering and workshops, participants gave their opinion about the following Items and variables:

a) CITI-SENSE Product

- ✓ Usefulness
- ✓ Actions to be taken
- ✓ Opportunities, barriers and conditions for actions with regard to environmental improvement.

b) Empowerment evaluation of Empowerment Initiative collaboration

- ✓ Collaboration
- ✓ Learning opportunities
- ✓ Empowerment initiative responsibilities
- ✓ Opportunities, barriers and conditions for actions within the empowerment initiative

D 4.2 Evaluation from Stakeholders of the city

IN-DEPTH INTERVIEWS WITH AUTHORITIES

According to deliverable D5.1 (Bae Brandtzæg et al, 2013), stakeholders are described as "any person, group, organization or member of a system who affects or can be affected by an organization's actions, objectives or policies". Accordingly, as detailed in the C.5. Empowerment Evaluation chapter, two local authorities linked to the ESC were contacted and interviewed aiming to know their feedback with regard to the citizens' observatories and CITI-SENSE experience carried out in Vitoria-Gasteiz. Their influence on the environmental management is crucial, since the ESC is the main institution dealing with environmental policies and public participation processes within the city.

Largely, the **local authorities**, in contrast to the citizens, were **more critical with the CITI-SENSE experience**. On the one hand, they found that the product and sensors were interesting and potentially attractive for environmental monitoring, and they recognized that **new technologies implementation was a fundamental step** for this monitoring. On the other hand, the managers said that this experience **did not create a considerable empowerment** among participants, and they recall that the obtained outcome and results were not surprising, or even predictable.

During the interviews, they showed their interest with regard to the use of technology and sensors, but when it came to the empowerment aspects, they said that **sometimes it was not possible to carry out public participation processes.** Particularly, they remembered that there were **some barriers that must be taken into account** (fundamentally budget limits and legal conditions) and they assessed the **CITI-SENSE experience** in Vitoria-Gasteiz as **something sophisticated, but not so useful** for the general population.

Overall, the **Environmental Citizens' Observatory for Public Places project was evaluated as rather useful**. The CITI-SENSE plan and approach was defined as a "great idea", but still as an experimental trial. The CITI-SENSE project for the municipality is something that **still needs more development** to have a considerable impact among Vitoria-Gasteiz citizens. The local authorities indicated that there are considerable limitations that they have to face when they undertake public participation and empowerment processes. Thus, their assessment about CITI-SENSE was quite critical. However, the experience was **described as potentially interesting**. Furthermore, during the interview they made a **strong connection between social awareness and empowerment initiatives,** particularly among the public participation processes that employ new technologies. That is to say, **In-depth interviews informed them of the importance of empowerment**.

Interviewee 1

"If there have been people participating that previously never had considered these topics, the impact would be positive (…) However, I think that CITI-SENSE goal wasn´t the improvement of Vitoria-Gasteiz environment. I don´t understand it so".

Interviewee 2

"It is something experimental. I think that you have done a kind of pilot (…) Learning ecology and increasing awareness is the way to generate empowerment. If we haven´t people with criteria, nothing can be demanded"

In the **"**Annex XI: Municipality of Vitoria-Gasteiz" it is possible to find a detailed analysis of the In-depth interviews. Moreover, the empowerment evaluation checklist summary is attached, giving a comparison between the citizen and ESC authorities' feedback. Thanks to the empowerment initiative summary (Annex XIII: CITI-SENSE empowerment evaluation checklist), where the contrast between citizens and city managers is shown, we can assess **how the participants feel rather empowered and demanding with authorities, while authorities are somehow reluctant since they carry out public participation processes**.

D 4.3 Feedback from other stakeholders

Following the plan defined to collect indirect evaluation of stakeholders from other cities, Tecnalia developed several activities:

- Presentation of the story-teller in the Eurocities Noise Working Group, where 32 participants represented some companies, regional administrations and several European cities, such as Gothenburg, Dublin, Oslo, Zagreb, Stockholm, Utrecht, Florence, Munich, Ljubljana, and Helsinki.
- In May 2016, thanks to the coordination with the CITI-SENSE Local Officer in Ljubljana, Tecnalia presented the project findings to urban planners from the Ljubljana Urban Institute - LUZ.
- Linked to dissemination activities of the project, the Vitoria-Gasteiz case study was introduced and presented during scientific conferences held in Bilbao, Berlin, Madrid, Hamburg, Florence, Pisa, Malaga, Sabadell, and Oporto.

The answers to the feedback questionnaire were analysed. Most of them were collected in the meeting with the Ljubljana Urban Institute – LUZ and in the Eurocities Working Group about noise. The feedback questionnaire provides a vision about the Vitoria-Gasteiz project potentiality, not only for Vitoria-Gasteiz, but also for implementation in other cities.

Overall, 8 stakeholders and urban planners answered the feedback questionnaire. According to them, it was fundamental to carry out citizen empowerment initiatives for decision-making on public spaces (4,6 average score out of 5). Furthermore, they assessed that it was important to integrate the environmental comfort as a variable into the design and improvement of urban areas (4,1 average score out of 5).
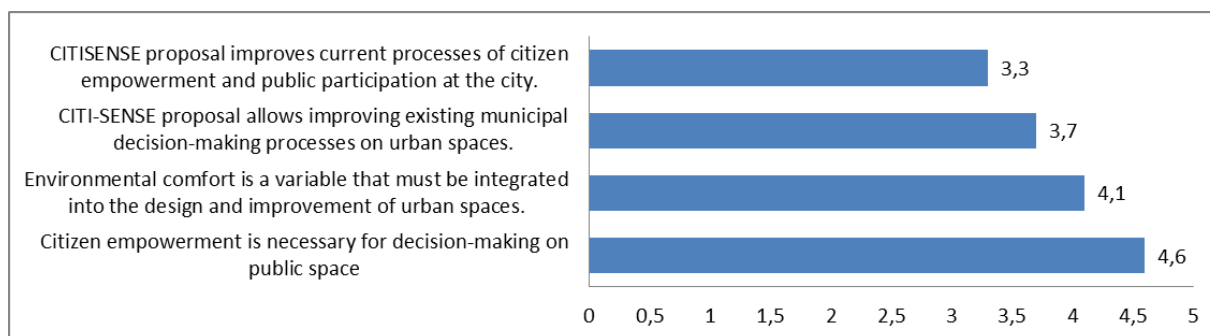

Figure 17 Mean values of the quantitative assessment made by other stakeholders.

The Environmental Citizens' Observatory for Public Places EI was assessed as positive and perceived as useful for respondents. Stakeholders reported that it would be useful for environmental improvement, and that municipalities can benefit from citizens observatories in the decision making process. Therefore, the Environmental Citizens' Observatory for Public Places project **has accordingly the potential to be extended, implemented and adapted in other cities** according to stakeholders that filled in the feedback survey.

In this way, they identified **main contributions** of CITI-SENSE Urban Spaces into current municipal decision-making processes on urban spaces:

- It gives valuable information to authorities when preparing physical plans at the local scale.
- It gives data about people's feelings about a certain place to urban planners.
- It allows personal involvement: "to define what people need the most important thing is to involve people to be active in the city".
- People can become more aware of the importance of public space.
- To show to local government, based on data, how important is the open space and how the structure of the city can affect human health.

They consider that this approach can be useful for spatial planning and urban design, linked to the renovation of urban spaces or to the design of measures to mitigate negative situations (environmental pollution). The types of spaces where it can be applied could be: green public spaces, big residential neighbourhoods, child playgrounds, watersheds or squares.

Most answers pointed out the Municipality (Urban planning department) as responsible for the application of this concept in the city, although the local community and companies for public infrastructure were also mentioned.

Main barriers identified by them to implement this approach in a real situation in the city are: lack of resources (money for equipment and software and staff capable of analysing results and data); little importance to people engagement or to the importance of public space; community organization and people involvement.

Regarding the contribution to existing processes of citizens' empowerment, a point mentioned was the possible positive effect of using new technology to attract young people into these processes, compared to the traditional questionnaires.

Finally, it was suggested to apply the same concept into services of the city, e.g. water, waste, transport, spatial planning and CITI-SENSE was understood as a tool for open government.

D 4.4 Evaluation of Key Performance Indicators

KPIs to evaluate the Empowerment Initiative for Public Spaces were previously defined (D3.3 "Recruitment Assessment and Plan for Phase 2: Full Implementation"). Detailed information of the evaluation of these KPIs is included in Annex XIV. There, we can see the quantification of the successful level per indicator (25 indicators). The following table shows a summary of this evaluation. We can see that the general level of achievement of the KPIs is Good, being excellent in indicators that evaluate the performance of sensors, platforms and products and medium for indicators that evaluate the performance of the EI referred to the users' perspective (users' indicators).

Table 8 KPI results for the Empowerment Initiative for Public Spaces

KPI Type	No of questions	Max score	Successful level	Score (%)
Sensors' indicators	2	10	10	100
Platform's indicators	1	5	5	100
Products' indicator	9	45	41	91
Users' indicator	9	45	35	77
Others	4	20	16	80
	25	125	107	**86**

	Excellent	90 - 100%
	Good	80 - 90%
	Moderate	60 - 80%
	Poor	<60%

Compared to the evaluation of the KPIs for the pilot studies developed previously to the Full Implementation Phase (D3.2 "Pilot study evaluation and protocol for phase 2"), the level of success has increased considerably.

The final evaluation is clearly affected by the low involvement of the city of Vitoria-Gasteiz in the project, since this leads to that the users' indicators score moderate values, lower than other scores. They conceived from the beginning the project as an experimental exercise and their involvement was conditioned by the lack of resources to answer to potential citizens' expectations. Anyway, they gave interesting contributions in the final feedback, likely being a fair representation of the real position of municipalities about these innovative approaches. This moderate success has been compensated with a high effort on getting feedback from other stakeholders (chapter D4.3), although this is not considered in the KPIs.

Nevertheless, the KPIs helped in understanding the possibilities for improvement related to the products: making the products more friendly to non-young participants, improving the stability of the platform and the communication of the smartphone with the server. Finally, the degree of accessibility of the product to users could be improved by implementing the product on their own smartphone.

D 4.5 Social Impact Indicator

Once the project has ended, *the social impact indicator* expects to measure the Environmental Citizens' Observatory for Public Places project impact capacity within the Vitoria-Gasteiz citizens' collective consciousness. With that purpose in mind, a "rate" has been created to quantify to what extent the CITI-SENSE project has influenced the citizens collective consciousness and the urban environmental quality awareness.

Having identified the six factors (explained in C.6 chapter and in Annex XV), the following impact level was reached:

X 10 = **5,07 IMPACT LEVEL**

Rank from 1 to 10, being 0 No-Impact and 10 Whole-Impact (in environmental campaigns)

Consequently, **the influence of the environmental Citizens' Observatory for Public Places project has reached the 50% of Vitoria Gasteiz citizens engaged in environmental campaigns or actions**, which means quite high social impact.

The methods and variables used to quantify the social impact indicator within the Vitoria-Gasteiz case-study are shown in **Annex XV**.

E. Recommendation for Public Bodies

The experience developed in the CITI-SENSE project, that applies Citizens' Observatories to empower citizens in the understanding, management and/or improvement of urban spaces, supports the following recommendations for local authorities:

- It is strongly recommended being open to this application of Citizens' Observatories, since the global valuation of the experience deployed in the city of Vitoria-Gasteiz, although being only experimental, is positive. Key points are:
    - It can complement participation processes supported by traditional methodologies. It can update those methodologies with new technologies that are changing the way people interact with the world, and can increase the attractiveness to engage on the governance of the city, especially to the younger population.
    - Engaging citizens on observing urban places at the city and collecting their perception at sites increases their awareness on the role those places play and the importance of their quality.
    - The products allow collecting a "calibrated" subjective opinion of citizens, since they also collect the exact objective conditions occurred during the observations and they can be compared to citizens' perception.
- We recommend being very clear on the framework type of empowerment that the city deploys, in order to manage citizens expectations: key aspects to be considered, status of the decision making process, existing limitations on the process, type of participation launched (what and why or how and when).
- There could be some reluctance to open participation process with an ambitious level of empowerment, linked to the fear of receiving complaints only, instead of opening an ideal collaborative framework. However, the experience developed during the project showed that the majority of the comments, elements selected as more relevant and suggestions made, were positive, even in the spaces with poorer quality.
- Products developed in the project can be adapted to the peculiarities of each situation. We recommend doing so, adding the elements required to support the type of empowerment or participation process defined. Also, each place can require an adaptation of the products: for instance, final feedback from the city asked us for the possibility of having a baseline of the questionnaire that could be expanded and adapted according to the challenges or opportunities identified previously in each space.
- In that sense, the adaptation of the product and the definition of its implementation in each situation could be a clear opportunity for co-design initiatives.

F. Final Conclusions

## F.1.	Contribution to Citizens' Observatories

The experience developed in the CITI-SENSE project that applies Citizens' Observatories to empower citizens in the understanding, management and/or improvement of urban spaces, provides the following contributions to Citizens' Observatories:

- City Authorities should be engaged and, even better, be the leaders or at least participate in citizen observatories experiences happening in their city.
- The field of the management of urban public space is a proper issue to apply the concept of Citizens' Observatories. Citizens are the real experts who know the quality of urban places and how they choose where to go determines the success or failure of any public space in their city. Therefore, city authorities can see this as an opportunity to improve the success of their urban places and, therefore, improve the main functions of urban spaces: social cohesion in the city, the identity of the citizen with their city, its attractiveness and citizens' wellbeing.
- Products designed in the project contribute to improving citizen participation in the urban design of cities, providing collaborative frameworks for specific decisions to improve, preserve or create urban spaces.
- The Public Spaces Empowerment Initiative in CITI-SENSE has created tools to manage the "hot" topic of Privacy issues related to Citizens' Observatories. We could be afraid of discouraging citizens to participate in COs if we require them to sign complex legal texts. Nevertheless, in the experience carried out in the city of Vitoria-Gasteiz the citizens signed, without any problem, the documents about privacy of the data and about the list of rights and duties linked to their participation on the initiative.
- The experience developed confirmed the importance of the quality of the feedback information given to participants, both in terms of being as clear and friendly as possible, and doing it as close as possible to the moment they collected data. The information can be given using different means and with different level of detail or of analysis.
- Another potential barrier to adopt Citizens' Observatories using new technologies could be the difficulty of engaging equally to people of different ages; the risk of falling into lack of social equity in the participation processes (generational gap). This can be solved by conceiving a Citizens' Observatory as a complementary tool to traditional means of participation. In fact, in our experience the tools used to make the observations were evaluated as friendly and easy to use by younger people, and exactly the opposite way by older ones. However, in the experience carried out in the city of Vitoria-Gasteiz participants did the observations in groups of mixed ages and the younger helped the older in the operation of the tool. The consequence is that the whole group created high emotional ties among them and that the older people evaluated positively the fact of learning about the use of new technologies in a practical and communal way.
- Finally, considering the outputs of the project and the novel tendencies in policy and in research, the concept of Citizens' Observatories can find good synergies with emerging

topics, such as: Smart city strategies, Promotion and valuation of Nature based Solutions, Open Government, Citizen Science, and Responsible research and innovation.

F.2.   Lessons Learned

Here we try to identify the critical elements for success or failure for future similar initiatives.

- Products could be improved, making them more flexible to answer to the specific needs of different urban spaces, in terms of being able to measure or evaluate a broader set of potentially critical variables identified in each situation.
- There is a clear limitation to the use of the product developed, since currently citizens cannot use it with any smartphone, so they cannot use their own smartphone. To ensure the technical quality and robustness of the measured acoustic data, it was decided to calibrate the acoustic app for a specific smartphone model, meaning that its use cannot be generalized. Moreover, the need of using an additional thermal sensor increases this limitation. The product, as it is now designed, must be used as part of a process that includes providing the kit to participants. Tecnalia will do research on a new version of the product that will be more universal, while keeping a technical quality fit for purpose.
- Nevertheless, despite future work that may improve it, the product developed in the project can be already applied to develop different empowerment initiatives in noise and quietness management. These include:
  - Evaluating quiet areas and collecting ideas for their improvement.
  - Identifying priorities for Noise Action Plans including citizen perception
  - Participatory co-design of actions within the Noise Action Plan framework.
- There is an open question about the best way to display results from different observations carried out at the same place but in different times, since calculating average values is not always the solution. For instance, in the case of the assessment of thermal conditions and thermal comfort it has no sense calculating averages of temperature in different periods of the day or of the year. It would be better calculate maximum and minimum values in similar periods.
- Finally, a more in-depth research will be carried out to analyse the database created in the empowerment initiative. For instance, Tecnalia will work on validating the Environmental Sound Experience Indicator (ESEI), by analysing this new database as well as data from previous soundscape studies. The indicator combines objective and subjective data, in accordance with the state-of-the-art in the field of soundscape, and this research can help understanding relationships between those types of data and set the basis for the algorithm to calculate the indicator.

F.3.   Expectation of Impact

In this chapter we present how the Empowerment Initiative in Public Spaces addresses the impacts proposed initially by CITI-SENSE.

- Impact in Competitiveness. The aim of CITI-SENSE was to promote the development of novel applications and tools.
    - Outputs of this Empowerment Initiative imply a step in the definition of indicators that could contribute to measure the value of outdoor public spaces in the city as specific ecosystem services. These indicators will be the basis for a future tool to be applied in the field of the study of the urban ecosystem services. In that sense, it is considered that some impact on competiveness is addressed.
    - During the project, a better understanding of what the stakeholders want and need was achieved. This has enabled a specification of future improved products, described in chapter F 2. Therefore, it is considered that, regarding this aspect, an impact in competitiveness was achieved.
- Impact in evidence-based decision making for EU policies:
    - Analysis of the data obtained during the observations of public spaces provides evidence of the increase in the general positive effects of the quality of public spaces on perceived health and emotions derived from the presence of nature in the urban environment. These finding can contribute to the European strategy to promote the benefits of Nature Based Solutions in cities.
- Societal Impact
    - The Empowerment Initiative has achieved positive results in promoting participatory processes, as inclusive as possible and on increasing public awareness regarding the benefit of spending time at public places with good environmental quality. In that sense, the initiative has achieved a local societal impact and is a contribution to be transferred and replicated in other cities, increasing its societal impact.
- Scientific Impact:
    - The analysis of the database created during the Empowerment Initiative can increase the knowledge about environmental perception processes. In fact, as an output of the project, Tecnalia is in the process of publishing two scientific articles in acoustic journals about the contribution of acoustic and non-acoustic factors in the urban acoustic comfort.