HARMONICA project (HARMOnised Noise Information for Citizens and Authorities)

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Introduction

In 2010, two local organisations in France, Bruitparif and Acoucité, specialised in the observation of environmental noise and specifically involved in facilitating the implementation of the 2002/49/EC European directive relating to the assessment and management of environmental noise (END) on their respective territories, have decided to join forces to set up the HARMONICA project. The acronym HARMONICA stands for HARMOnised Noise Information for Citizens and Authorities. The HARMONICA project aims to develop a new approach: providing information about environmental noise closer to the reality felt by the populations, more understandable by the general public and public authorities to increase the assimilation of the issue and to constitute leverage for noise abatement policies. Website of the project: www.harmonica-project.eu/en
The Harmonica project is cofinanced by the European program LIFE + 2012. This 3-year project started in October 2011.

Partners of the project

Coordinator of the HARMONICA project, **Bruitparif** was created in autumn 2004 by the Ile-de-France Region, as requested by the environmental associations, in order to characterise objectively the sound environment of Ile-de-France. Bruitparif has been developing the RUMEUR noise monitoring network: these data are available on http://rumeur.bruitparif.fr Moreover, Bruitparif supports public authorities in taking noise into account in urban development and transportation policies and organises awareness actions on the importance of the quality of the sound environment and the risks related to noise. Website : www.bruitparif.fr/en

Second beneficiary, **Acoucité** was created in 1996 at the initiative of Greater Lyon and the founding members (IFSTTAR, ENTPE, CERTU, CSTB...). Acoucité aims to work towards the development of professional knowledge and expertise in urban soundscape. It is a competence centre on the urban sound environment, which has the role to support the exchanges between the operational research centres and the cities, in particular in regards to the management of the urban noises related to transportation. Since 2006, Acoucité has been setting up a noise monitoring system in Greater Lyon Website www.acoucite.org .

The Working Group Noise (**WGN**) is chaired by DCMR Rotterdam (Mr Henk Wolfert) and was launched in 2006. The working group has around 30 members from cities and institutes all over Europe and deals with the noise issue - http://workinggroupnoise.weblog.nl. There is a specific network about noise monitoring for cities: FONOMOC.

Context

Noise generated by human activities is a very present environmental nuisance, especially in urban areas as they gather most of the citizens of the Member States. According to the Green Paper published in 1996 by the European Commission, around 40% of EU citizens (i.e. 80 million people) were suffering from no ise levels which were considered as unacceptable by scientists and health experts. With the enlargement of the European Union, near 100 million people are now exposed to noise levels considered as dangerous for their health. These nuisances are caused by transportation infrastructures, industries and various hobbies.

However, unlike other environmental issues such as air quality, the general public seems to be quite fatalistic and consequently little involved. There is no feeling of urgency to reduce noisein the environment. This is all the more paradoxical that the noise issue is often mentioned among the 3 main environmental nuisances in the different surveys. For instance, a recent perception survey carried out in 2009 by the European Commission in 75 major cities shows that more than half of the respondents consider noise as a major nuisance on the same level as air pollution. (European Union regional Policy, Survey on perceptions of quality of life in 75 European cities March 2010 Fieldwork: November 2009) A first level of information on the sound environment of agglomerations over 250,000 inhabitants is now available thanks to the publication of the strategic noise maps made for the 2002/49/EC European directive. However, it is necessary to complete this information with measurements and to make it more pedagogical.

As a complement to the noise maps, measurements make the diagnosis more precise and show the temporal variability of noise, from a daily to a yearly scale. In contexts of multi-exposure to several noise sources, measurements help decision makers to priories the actions to implement. They are also useful to identify, qualify and preserve quiet areas on their territories. Truer to the reality of noise, measurements offer a wide range of information. They follow the temporal evolutions of noise during the day and at night, the background noise levels and the identification of particular events such as horns; planes, trains or noisy motor vehicles. Currently, the information provided by observatories, whether as noise maps or as measurement data, is difficult to understand by non-specialists. Indeed, many indicators are used (Lden, Ln, LAeq, LA10, LA90, LAmax, NA... to mention only a few), they are difficult to explain and rather far from the feeling of the populations.

Possible noise abatement actions, especially preventive actions, are still little known from the general public and public authorities.

Providing information closer to the reality felt by the populations, more understandable by the general public and public authorities will increase the assimilation of the issue and will constitute leverage for noise abatement policies. The Harmonica project will develop a new approach on this environmental stake.

General objectives: Analysis and proposals

The HARMONICA project comes from the previous observations and the following general objective: noise pollution and the means to correct it are insufficiently known from the general public and public authorities. In order to increase the assimilation of the issue and consequently the efficiency of noise prevention or reduction policies, the project suggests the creation of a simple noise index (CNI), closer to the feeling of the populations than the usual averaged indicators, in a similar way to the ones used for air quality. Besides, a database on noise abatement actions will be created; it will be published along with the noise pollution index on an interactive platform. Thanks to this innovative tool, all relevant information should be made available in an easy-to-understand way, and the assessment of the impact of noise abatement actions should be facilitated. The tool will be assessed by the general public and public authorities and optimised before its dissemination. The heart of the project will rely on an implementation and evaluation stage on the territories of the two partners. It will be a full scale application.

The improved access to information on noise pollution and abatement initiatives should increase assimilation of the environmental noise issue by the general public and public authorities in the project areas. It should also facilitate the transfer of information to additional European agglomerations, who will hopefully join the platform in the future.

The following sections describe the main operational activities of the project.

Project activities

Harmonise technical aspects of noise monitoring systems and prepare the transfer of information to other European agglomerations

This preparatory phase of the project consists in analyzing and assessing the existing noise monitoring networks within the territories of the two partners, as well as in other European agglomerations. A full detailed questionnaire has been sent to gather the information from identified technical partners around Europe. This questionnaire had a specific focus on the technical aspects related to the setting up of noise monitoring terminals. The answers have been collected with email, phone conversations and on-site visits. An internal report and fact sheet for Urban noise monitoring network have been made. Fact sheets will be published on the internet portal www.noiseineuro.eu. All existing noise monitoring networks with the exception of Dublin are able to generate a row data: LAeq,1. The analysis of the information collected during this preparatory phase defines a common nomenclature of noise monitoring terminals based on their monitoring objectives (evaluation of impacts of noise abatement actions, long-term evolution strategy…), the context in terms of noise sources and the physical installation of the microphone (distance from the dominant noise emission source, placement regarding the nearby buildings, height of the microphone from ground…). A proposal for classification terminals networks operating according to a simple typology was proposed in the workshop of July 2012. This proposal will be implemented by both partners in the demonstration phase of the project with the joint display of results from all noise monitoring terminals from the networks in Ile de France and in the Greater Lyon into a common interface.

As a complement to the technical questionnaire, a simplified questionnaire was created with the help of the Working Group Noise of EUROCITIES aimed at the authorities of the European cities that are members of the EUROCITIES network (this network gathers more than 140 cities in 30 different European countries). Cities of Vienna, Zurich Frankfurt and Malmö are waiting the results of the demonstration phase in Ile de France region and Greater Lyon to decide to join the forum network. Cities of Antwerp, Zagreb, Chemitz, Nice, Dublin, London, Stockholm answered they are ready to participate in the forum networks FONOMOC about noise monitoring networks and are interested to be inform about the new index CNI. This preparatory work was done during the first 8 months of the project in order to be able to present the results of all noise monitoring terminals into a common interface : the platform to display the index available at the end of 2013.

Build original tools to publish information on environmental noise in an easy-to-understand way

The HARMONICA project intends to develop original noise tools in order to harmonise noise monitoring methods and therefore make easier the comparison between the different European territories. The access to noise information will be simpler for the general public. These tools will be the Common Noise Index (CNI), the platform to display the index and the database on noise abatement actions. These will be available at the end of 2013 on the portal www.noiseineu.com.

The Common Noise Index (CNI)

The CNI should be, in so far as possible, closer to the feeling of the populations and easily understandable. The building of the index will take into account the intensity of the noise (through indicators of sound energy) but also the contextual aspects of the noise (emergences coming from the sudden appearance of particular sound events that come on top of the background noise: aircraft overflights, trains, especially noisy motor vehicles, horns...) and the diversity of the different noise sources. The index is based mainly upon measured data from noise monitoring network and other estimated data as noise maps. The new noise index will be

easier to understand for populations with the use on a simple value scale from 0 to 10, in a similar way to the ones used for air quality**.** During the first semester of 2012, a statistical analysis (PCA principal component analysis**)** was performed to determine the most relevant variables to compose an index of noise by the use of the raw data Laeq,1s. This PCA method has been applied is a range of sites already documented and representative (over 30,000 items). A little more than 70% of the physical acoustic information about a site can be restored on the basis of variables from 3 major noise indicators families distinguished in the analysis: background noise (as example L90), noise dynamic (as example L10-L90), noise event disturbing the quiet periods (as example number of events exeding 55 dB(A) noted NNEL55) .

The Harmonica project introduces the consultation of the general public in the very conception of the index. The 4 propositions of indexes based on different approaches, but all integrating both the continuous and the sporadic nature of noise are adjusted and evaluated through interviews with general public, associations, elected technicians and experts in acoustics. Results of the surveys are also compared with values supplied by usual indicators. To perform the evaluation of proposals of indexes, 8 territories were selected. Two sites in rural or peri urban areas with low background noise and a source of transport noise predominant or emerging, 3 sites in dense urban areas with background noise already important and a source of transport noise dominant or emergent situation ; one site multi-exposal several noise sources related to transportation, one site situation quiet areas in the urban environment: low background noise and not source of transport-related noise dominant one urban site with noise traffic and recreation. The study sites were selected from those with a noise monitoring from Bruitparif and Acoucité

The assessment campaign of the indexes was based on both on-site and laboratory surveys realized in the second semester of 2012. The on-site surveys aimed at the inhabitants of the 8 territories selected to assess the index. They based on face-to-face interviews and carried out door-to-door in order to gather the reactions of the inhabitants of the 8 territories on the different index proposals. The interviews followed a methodological guide developed by Acoucité. There were a minimum number of 30 interviews per site, for a total of about 240 surveys.

The laboratory aimed at 3 different groups: a representative panel of the general public, a group with representatives from associations and a group with representatives from local authorities. The methodology relies on a face-to-face interview with audio reconstitution of each territory for the 3 different groups : general public, associations and elected, technicians and experts in acoustics. There is about 20 people per group, for a total of 60 respondents on the Greater Lyon territory and 60 respondents on the Ile-de-France territory.

All the results of this important work of the project about the elaboration and the evaluation of new index CNI will be presented in September 2013.

The platform to display the index

Designing and development of the platform to display the index will be achieved at the end of 2013. With this interactive web service, available to all, it will be possible to compare the sound situation of the different territories on the long term and to make it public in a pedagogical way. The platform is not intended to replace the existing websites of the partners, but to complete them with a common space to consult data of the two territories more easily. At the beginning, the platform will be based both on the monitoring networks of the two partners and on the strategic noise maps made for the 2002/49/EC European directive in the agglomerations in question. The platform aims to integrate the data produced by other European agglomerations equipped with noise monitoring networks. Thus, it will be easy to join the service for all the existing networks. The partners will keep expanding the web service over a 10-year period after the end of the project to let new European agglomerations join the service. From a technical point of view, every agglomeration that wants to will be able to transfer its measurement data by FTP (file transfer protocol) to the central server hosted by Bruitparif, where the function to calculate the index will be implemented.

The database on noise abatement actions

Designing and development of the web database will be done at the mi-April 2013. The database will create an operational repository of effective noise abatement actions. The objectives are to compare the situation before and after the noise abatement actions and to assess the effectiveness of these solutions thanks to the Common Noise Index (CNI).

The database will be structured so that the operations can be classified according to their typologies: Traffic management actions - Actions on the infrastructures - Awareness actions - Actions on the equipment. The actions will be presented in detail in reviews including the context, the entities involved, the objectives and the stakes of the action, the cost and the duration of the works. They will be illustrated with photo/audio/video reports. It will be possible to provide additional information, in particular when perception surveys have been carried out.

The database will be filled with different noise abatement actions that have been assessing before (around 20 actions) or during the project (around 10) by measurement campaigns conducted by the partners of the project. The CNI will be used to qualify the sound level before/after the operations. A multimedia report will also be done in order to present each site. Here are a few examples of pilot noise abatement actions conducted by public stakeholders where measurement campaigns are currently carried out for their assessment within the project: Pilot experimentation of low noise road pavement on the Paris ring road [8]; Reduction of the speed limit to 30 km/h on a major Paris road (avenue de Clichy); Increase in the altitudes of the airplanes going to Ile-de-France airports; Awareness actions with the clients of businesses like pubs and consultation actions organised with the different stakeholders

Organise a large study case with a wide experimentation territory : demonstration phase

The final objective of the HARMONICA project is the operational use by the general public and public authorities of the tools developed during the project for an easier assimilation of the noise issue and a better knowledge of

noise abatement solutions. It is therefore very important to implement these tools on a large territory and to assess them with different audiences.
The two territories where the demonstration will be done are the Ile-de-France region and the Greater Lyon agglomeration. They represent a wide experimentation territory, with a total surface area of more than 12,500 km2 and a population of 13 million people.
At the end of 2013, a major stake will be to quickly make the project and its tools well-known to the main targets: the general public and public authorities such as the technicians and elected representatives involved in the implementation of the 2002/49/EC European directive. To do so, the partners will use complementary communication tools: the communication media of the two observatories (websites / newsletters...) and the website of the Harmonica project www.harmonica-project.eu/en . They will rely on the press and their local partners (cities, Regional and General councils, associations...).
In order to validate that the project is operational for the general public and public authorities, three survey campaigns will be drawn up and conducted on the territories of the partners.A specific survey campaign will assess the impact of the project. It will compare the state of the respondents knowledge on environmental noise before the tools are made public and after. It will also assess the basic knowledge level of the public on noise in general and their assimilation of the issue. The results of the survey conducted before the tools are developed were made public at the end of June 2012. The survey was conducted by phone with 800 inhabitants. This survey highlighted the following ideas:

- No strong differences appeared between the two urban territories studied.
- Road noise is the main noise nuisance for about 1/3 of the inhabitants. Air noise is twice as perceived in the Paris region as in Greater Lyon.
- The respondents' knowledge of acoustics (measurements, methods, noise levels, regulations…) was very fragmented.
- Information on noise levels based on emergence indicators could be a good complement to the ones based on average levels.
- A quarter of the population (mostly the people declaring they are impacted by noise) expect information mainly provided by specialised organisations and local authorities.
- Finally, nearly 3/4 of the respondents are ready to change their behaviour to fight against noise and to accept actions aiming to implement traffic restrictions or change their mobility habits.

At the end of the project, a similar survey will be conducted with the website users in order to assess their understanding and assimilation of the issue.
As a complement, another specific survey campaign will be carried out in 2013 in order to assess the tools with the users of the portal. It will validate the tools in terms of ergonomics, knowledge, pedagogy, expected contents...
Finally, the results of the demonstration will be essential to the dissemination of this approach to other European agglomerations.

Disseminate this new approach and these new tools to other European agglomerations

In order to make the dissemination of the project wider, the European agglomerations interested in the project will be invited to join an information sharing network specifically created for this purpose. Their contribution will enrich the platform to display the index and the database on noise abatement actions. The partners will develop and manage a community in order to create synergies through knowledge and experience sharing. They will provide decision-makers with recommendations on noise abatement actions. The expansion to other agglomerations will strengthen the value of the project and will make it more well-known. This network will rely on the Internet. A dedicated space will be developed on the portal in order to give access to the resources and the experience sharing section. The network of the project will gather the local authorities of the two territories, potential partners that have already expressed their interest in the project (Brussels Environment and members of the WGN, the beneficiaries of current LIFE+ projects on noise issues, as well as the new French observatories that have been created at the end of 2010 following a call for projects launched by the French Ministry of Ecology, Energy, Sustainable Development and Sea). The project also relies on the exchange network FONOMOC created by the WGN. FONOMOC is an acronym that stands for Focus group On Noise Monitoring Cities. In order to ensure the dissemination of the HARMONICA project to public authorities, a methodological guide will be published.
At the end of the project in September 2014, an event gathering all the European agglomerations interested in the project, the French public authorities and the European institutions will be organised in Brussels.
All these tools will be available on the portal http://www.noiseineu.com .

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