



Towards the practical implementation of the holistic approach to urban sound planning

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ABSTRACT

The holistic approach to urban sound planning concept, states that in order to achieve restorative sonic environments, acoustic characteristics should be considered from the beginning of the urban planning process. At this stage it is still possible to avoid the generation of noise, to design solutions that will inhibit noises but also enhance the existing soundscape and to coordinate different stakeholders' perspectives into a coherent solution. The challenges presented by this approach demand more than the traditional noise engineering tools. Therefore the traditional toolbox focused on urban noise reduction was extended to include soundscape analysis, auralisation (audio and visual), improved prediction/modelling methods, but also urban planning concepts and effective communication techniques. This paper will present an overview of the new approach, from the development of the holistic concept to its practical implementation at real test sites.

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1. INTRODUCTION

Everywhere in the world cities are growing at a speed never seen before. It is estimated that by 2050, around 75% of the world's population will live in cities (1). In order to respond to the increasing population an unprecedented transformation of the landscape and the environment is taking place. Large-scale developments are being planned in order to face this movement (2, 3). The need to improve mobility within the city and the city outskirts will consequently rise and result, in most cases, on the expansion of transport infrastructures. Consequently, noise and air pollution, which are two of the most relevant environmental pollutants within the urban environment, are also expected to rise. Within SONORUS – The Urban Sound Planning project the need for the inclusion of sound urban planning within the broader urban planning process was already identified (4,5). Despite individual actions (noise action plans or noise mitigation measures) are implemented by cities to tackle individual problems; there is still a need for an integrated approach to urban sound planning. A holistic approach to urban sound planning is proposed within SONORUS project to connect all the stakeholders and the different aspects of liveability into a coherent urban plan.

This paper will start by providing an analysis of the traditional urban planning process and its interactions with different stakeholders followed by a description of the holistic concept applied to urban sound planning. A reflection on the practical implementation of this approach based on the work developed at four test sites will conclude this paper.

2. Traditional urban sound planning process

In this section, we try to identify all the stakeholders and interactions that are involved in a traditional approach to urban sound planning. This approach mainly consists in noise engineering

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actions with the objective to limit noise emission or exposure, to comply with noise limits.

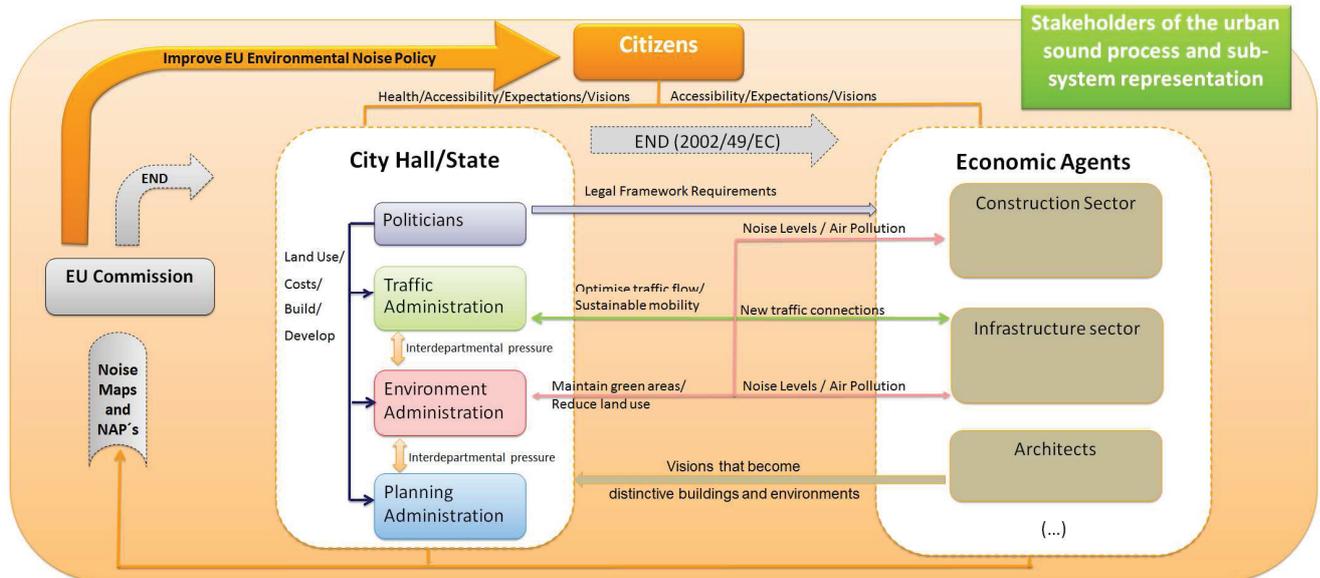


Figure 1 – Urban Sound Planning Process: identification of stakeholders and sub-systems representation

Figure 1 shows a general representation of the main stakeholders and potential expectations / interactions, involved in traditional urban sound planning processes. The main stakeholders are: citizens, city administration offices and economic agents. The citizens have health and environment concerns (pollution exposure), but at the same time have expectations related with housing, economic welfare, mobility, assessibilities, etc.(6). The main interest of this group is on reducing the exposure to noise pollution, but sometimes conflicts can happen when actions to tackle this hazard implies a change in the behaviour, like for examples limiting or even banning road traffic in affected areas.

The public sector/local level municipalities have the responsibility for the compliance with noise ceilings. The definition of a noise exposure strategy for the city and in some situations the production of noise maps and/or noise action plans to be submitted to the EU as part of the European Noise Policy are some of the obligations of municipalities. The usual intervenients of this process are: environmental departments, urban planning departments, traffic administrations, among others. It is clear that conflicting interests are usually present: land use planning (qualification of urban areas), traffic planning strategy, costs of mitigation measures, are just a few examples of possible interfering interests. These usually represent a risk to a correct urban sound planning or to the implementation of noise abatement measures.

Another relevant group of stakeholders are the economic agents such as projects developers (investors), construction companies, transportation companies (railways, airports, roads infrastructures). These stakeholders have economic interests that might conflict with the implementation of a good urban sound plan. Nevertheless, the observation of legal requirements imposed by local/national/european environmental legislation must be complied.

A well-defined European Noise Policy is essential to provide a strong legislative framework that can be applied nationally or locally in the definition of an urban sound policy. However, if acoustic requirements are considered in a planning stage, synergies between the stakeholders can be created and better sound planning can be achieved as it will be discussed in the next section.

3. The holistic approach to urban sound planning

While at present, there is a great pressure on urban environments due to the rural-urban migration movements and the added need to create the right infrastructures in terms of transportation, accommodation or supporting services, this is also the right moment to exploit the opportunities to create good sonic environments. In such a dynamic environment the urban sound planning has the opportunity to combine synergies with other planning activities by aiming the avoidance of noise generation and define strategies that can value the existing sound environments. Nevertheless, such task is only possible if an effective integration of acoustic requirements is considered from an early

planning stage.

SONORUS holistic approach relies on the prevention of noise, by not limiting the interventions to the obvious noise engineering solutions but to include a combined approach: coordination of actions from different acoustic fields (prediction methods, soundscaping and noise control engineering) and the application of innovative tools such as dynamic noise maps, sound sources' dominance maps, FDTD numerical methods applied to urban contexts, or the combination of auralisation and visualisation tools to promote the involvement of citizens in the definition of future acoustic environments (5,7)). Therefore the holistic approach to urban sound planning as seen within the SONORUS projects can be summarised in the following stages:

1. Interact from an early planning stage with all the stakeholders of the planning process and concentrate on preventing the occurrence of noise;
2. Consider all dimensions of a site: the existing sound levels, the soundscape, the landscape, the heritage, the economic/social/cultural and political background;
3. Definition of acoustic objectives: beyond noise limits, consider the human perception of sounds (inhibit noises but also enhance sounds). Identify the acoustic characteristics of a site that might contribute to improve the quality of a site;
4. Integrate the acoustic knowledge from different technical fields in the overall planning necessities: traffic planning, environmental planning, etc.
5. Design an integrated, global and sustainable solution to create quality environments.

This task is clearly not under the scope of existing urban planners and defines the need for a new type of specialists that combines practice and experience in the urban planning processes adding the technical knowledge that is required to an acoustic expert. Within SONORUS such future professionals have been trained to embrace the necessary technical knowledge, but also innovative techniques that might facilitate the integration of sonic requirements on the overall planning.

4. Reflection on the practical implementation of the holistic approach to urban sound planning

The feasibility of the practical implementation of the holistic approach was tested at four test sites provided by the cities of Antwerp, Brighton, Gothenburg and Rome. The planning challenge proposed by each site, demanded a rethinking of the current practice in sound environment and beyond the traditional noise legislation-oriented thinking. Four working groups composed by early stage researchers worked and applied their research on the challenges proposed by the cities.

From a SWOT analysis conducted to this process that is described in (5), it was concluded that the (lack of) awareness of the main stakeholders on the implications that an adequate/inadequate sound environment might have in the future site was one of the main concerns among all working groups. Additionally, the level of interaction with the decision-makers was identified as the main constrain to the future integration of proposed actions. The complexity of interactions, interests and number of stakeholders is the main threat to the implementation of a holistic approach to urban sound planning. Therefore it is necessary to promote a permanent dialogue with stakeholders (including citizens) in order to understand and, up to some point, meet their expectations optimizing the chances of a successful outcome for the sound environment. Following this strategy, SONORUS promoted several workshops (one at each city-partners) involving not only SONORUS researchers but also external experts and also other city-partners participants, where the challenges presented by each test site were discussed and solutions were proposed. At these events, some of the innovative urban sound planning tools were presented to demonstrate their applicability to support the practical implementation of the holistic approach.

5. CONCLUSIONS

Presently, the main objective of an acoustic intervention is defined in the regulations as a noise ceiling and usually considered after the urban plan project is already decided, limiting the opportunities of different approaches than the traditional engineering noise control. This approach is usually restricted in space (to the most exposed receivers) and in time (short-term perspective),

missing the opportunity to contribute to improved environments. SONORUS holistic approach to urban sound planning relies on prevent the occurrence of noise, by not limiting the interventions to the obvious noise engineering solutions but to include a combined approach that coordinates actions of different acoustic fields to provide an integrated solution.

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