

# Harmonized Strategies for the Development of Noise Action Plans

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## Introduction

One of the main problem for the application of END Directive in members state legislation is the harmonization of National Law with EU acoustic legislation. In Italy there are now three legislation disposals concerning environmental noise action planning: one of them requires to City Councils the Local Action Plans derived by Acoustical Classification of territory; another one requires to Transportation and Infrastructures companies their Noise Reduction Plans; the third one put in the National legislation all the requirements of the END directive. As well as in all the European countries where a former Legislation about noise planning was present at the moment of END Directive adoption, to harmonize methods for noise action planning is then a general need and has to be considered a main purpose for planners and administrators.

## Harmonization of Plans

The harmonization of Plans can lead to important savings in terms of costs for design and realization of designed solutions. Considering the high level of optimization that can be reached applying the methodology to large scale planning, an approximate quantification of the achieved reduction of costs can be found around one fourth of the cost of all interventions for a city agglomeration (like Florence).

A possible answer to the above described need of harmonization is given by a procedure which has been developed in collaboration with Florence city council and other partners and can be described as follows:

### *Step 1 – Normative Conflict Analysis*

The planners collect all the International, National, Regional Acoustics laws and regulations concerning noise reduction action planning as well as management of noise, that can be applied to the territory, even if published for different contexts and with different timing.

Normative conflicts between regional and national levels are pointed out. also by means of specific indicator that could be defined to express the quantity of Normative Conflicts (NC). This index will be used, together with others, to monitor and evaluate the overall impact of harmonization procedure.

### *Step 2 – Data Collection*

The local Govern office, competent for the agglomeration, collects and organizes all the general territorial data already available in all existing platforms for local noise abatement plans. At the meantime, the national and local transport companies shall provide all data concerning the planned actions for reduction of transport system noise. All these databases are compared and put together in the same Geographical Information System (GIS). Available data are analyzed and compared with requirements set out by National, Regional and European regulations. The comparison of databases and methods available among

European countries will contribute to define a final work platform.

### *Step 3 - Case studies review*

Solution cases for the reduction of noise in urban areas are collected providing a significant contribution to further development of the work platform. Collected data are analyzed and compared with the state of art. Starting from data analysis and collected experiences, problems encountered during the acoustic design phase are catalogued and solved.

### *Step 4 – GIS creation and area selection*

A specific Geographical Information System (GIS) is built up. Procedures and data are implemented into the GIS environment, according to goals and solutions proposed in previous actions. Pilot cases are selected and data acquisition criteria are defined in order to validate the whole system. All the existing plans are considered and the selection of areas in which interventions have to be realized is performed. In each selected area specific noise measurement campaigns (long and short period measures) are carried out. The ante-operam analysis of selected areas, considering acoustic and non-acoustic data, is focused on knowledge acquisition about receivers, with particular attention to sensitive ones (schools and hospitals), and surveys on people's disturb perception of annoyance as well as on people's contentment about implemented abatement solutions.

### *Step 5 – Strategic and direct interventions design*

Acoustic and civil design of strategic interventions (road systems, traffic regulations, transports) and of direct interventions on pilot areas is performed. The planning of interventions and the selection of areas in which interventions are to be realized are acquired.

### *Step 6 – Strategic and direct interventions execution*

Planned and designed interventions are put into execution. For each solution a specific task is defined and becomes object of specific entrusting to a specialized firm. In progress control during the execution of pilot cases' interventions is performed, giving feedback information that could lead to a review of the plan and to the procedure optimization.

### *Step 7 – Monitoring and control*

After each intervention, a detailed noise measurement campaign is carried out. For each intervention, noise measurements under controlled traffic conditions, in the key test positions, are performed. This action aims to guarantee both the system optimization and evaluation. In particular, database and procedures will be optimized referring to experimental data obtained by pilot cases. System evaluation will be carried out by using performance indicators for the planned action and for the designed interventions.

### *Step 8 – General Feedback*

Proposals for revision of Regional and National legislation and regulations and, why not, of END Directive (in the frame of periodic review of legislation).

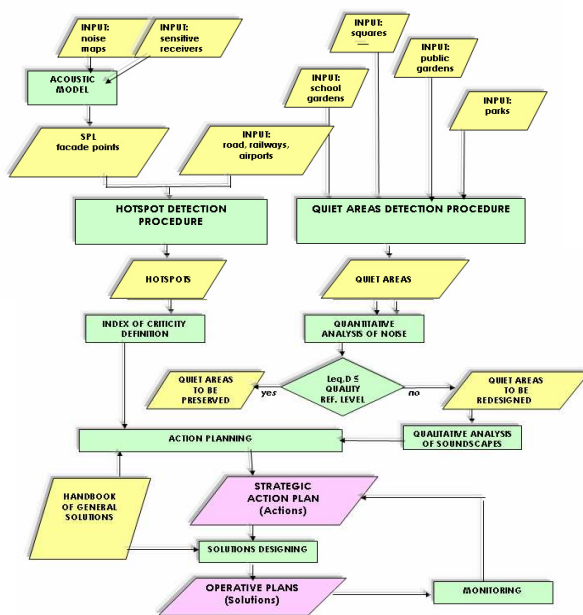
Spread of results among other cities and agglomerations. Dissemination through dedicated website and printed matters.

## Developing the Integrated Action Plan

Noise planning has to be included in the more general Urban Integrated Management Approach that provides general criteria applicable to all administrative levels, addressing urban processes governed by the city or town administration, as well as those governed by other administrative levels including the regional level, state, EU, and global levels.

Particular importance is given to the integration of plan making and plan delivery mechanisms.

In Figure 1 the general procedure for developing an action plan is shown. Both the strategic Action Plan and each operative Action Plan must consider the satisfaction not only of END Directive requirements but also those that come from the other regulations concerning plans.



**Figure 1:** Flowchart of the procedure for Action plan development

The procedure considers four decreasing levels of possible integration:

- Integration of strategic action plans with strategic plans for the reduction of noise
- Integration of operative plans for the optimization of the roadmap and the definition of deadlines, that have to be coherent.
- Integration of planned actions (i.e. all different plans must contain (or refer to) the same integrated action.
- Integration of direct solutions.

Higher is the level of integration, lower are the critical points that could bring to duplication of actions and solutions or to useless actions.

Actions are defined on a territorial macro-areas division basis, each macro-area being characterized by all the contained hotspots and quiet areas as well as by all the requirements coming out from the different plans and regulations that can be applied to it.

One significant part of the Florence strategic action plan is the Handbook of General Solution, a systematic collection of two-page records containing good practice suggestions,

strategic and technical solutions for planners and for citizens too.

Authors are convinced that Planners at Local, Regional, National and European level, must work aiming to define common methods for designing strategic and specific solutions, like a new development system of procedures and databases for action planning, also producing guidelines to support Regional, National and European Law reviews.

## A matrix for common strategies

The Working Group Noise of EUROCITIES network is now collecting data in a Matrix of Common Strategies, containing experiences of the cities in detection, classification, prioritization of quiet areas and hotspots. This can be a useful instrument for finding harmonized solution.

The matrix is conceived not as a space for theoretical discussion but as a space for the definition of a roadmap, moving from choices operated by member cities towards joint procedures. This matrix take into account several factors:

- level of noise
- contribution from each different noise source,
- relative and combined effects of different noise sources in a multisource scenario,
- number of exposed people
- number of exposed buildings,
- population density,
- type of area,
- landuse,
- upper limits, trigger or target levels contained in existing legislation,
- distance of buildings from main transportation areas and links

Each city working on Action planning is required to send a paper about the adopted method with reference to the listed factors or to other factors that may be added to the list. Then the matrix has to be filled with synthetic normalized values that can be linked to a corresponding document or table or formula that shows the relative consideration of each factor in the adopted method.

The development of a prioritisation matrix is based on Noise Filters like:

- Noise Level filter
- Area filter
- Cost-Benefit filter
- Possible (practicable) measures
- Combined filter

For the Noise Level filter, that requires a specification of noise limit, 55 dB(A) for L<sub>day</sub> and/or 50 dB(A) for L<sub>den</sub>, seem to be good and acceptable values, also considering the requirements of END.

For Area filter specifications, a minimum dimension of the area that lies within the above defined noise limit, in presence of at least one main source on the border (major road, railway). has to be specified (e.g. 10 hectares). Another possibility (Minimum sub-Area filter) is given by the specification of a minimum area (i.e. 5 hectares) that lie within the noise limit when is located inside a wide annoyed

area where less than 50% of the area falls within the specified noise band.

For the Cost-benefit filter, the specifications are:

- identification of the noisiest locations
- identification of location with most people affected by noise
- identification of location of nearby sensitive buildings
- definition of interventions
- minimising calculated cost
- medium and long term planning

For the Possible (practicable) measures filter specification are:

- a) speed reduction measures
- b) traffic flow relocation measures
- c) traffic volume optimisation measures
- d) improvements to running surface
- e) low-noise road surfaces useful for high speed roads
- f) low-noise road surfaces useful for low speed roads
- g) roundabouts in the place of traffic lights
- h) environmental noise barriers.

In figure 2 some examples of pages of the matrix are shown.

page		Amsterdam	Antwerp	Belfast	Birmingham
1	considered factor				
3	c) relative and combined effects of concurrent noise sources in a multibounce scenario	WATCH COMMENT(1)			
8	d) number of exposed people	WATCH COMMENT(1)			
10	e) number of exposed buildings	WATCH COMMENT(1)			
12	f) population density	WATCH COMMENT(1)			
14	g) type of area / landuse	WATCH COMMENT(1)			
16	h) upper limits, trigger or target levels compared in existing legislation	WATCH COMMENT(1)			
18	i) distance of buildings from main transportation axes and lines	WATCH COMMENT(1)			
20					

page		Amsterdam	Antwerp	Belfast	Birmingham
1					
2					
3	a) Speed reduction measures	WATCH COMMENT(1)			
4	b) Traffic flow relocation measures	WATCH COMMENT(1)			
5	c) Traffic volume optimisation measures	WATCH COMMENT(1)			
6	d) Improvements to running surface	WATCH COMMENT(1)			
7	e) Low-noise road surfaces useful for high speed roads	WATCH COMMENT(1)			
8	f) Low-noise road surfaces useful for low speed roads	WATCH COMMENT(1)			
9	g) Roundabouts in the place of traffic lights	WATCH COMMENT(1)			
10					

Figure 2: Pages of the urban matrix for common strategies

## Summary

The paper moves from the evidence that in some European countries there are different national legislation disposals concerning environmental noise, which have to be respected as well as the END Directive disposals. This situation leads to a uneasy coexistence of several noise plans in the same area and to consider harmonization methods for noise action planning as a general need.

An approach to the integrated action planning is shown. Authors have recently managed the project of the noise strategic action plan of Florence and, as members of the

Working Group Noise of Eurocities, they have developed the structure of a Urban Matrix for sharing and exchanging knowledge and experiences in action planning, with special regards to the detection and prioritization of hotspots an quiet areas.

The definition of common strategies could be performed in a project context and carried on by an international board, where acousticians and researchers, together with planners, architects, engineers, will meet their own experiences in design, specification, and construction of interventions, providing new international standards and compatibility rules.

## References

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