

# Urban sound observatories



# Why a sound observatory?

## Main objectives

- **Objectify and follow medium- and long-term evolutions** with regard to changing social expectations, technologies and travel/transport.
- **Better understand phenomena linked to context** (speed, weather, urban fabric, etc.) and to which inhabitants are particularly sensitive, and act upon these parameters.
- Deal **with a main environmental concern of inhabitants** with regard to their quality of life.
- **Provide information** on and a quantification of noise exposure that is more precise and more targeted than that provided by calculated mapping.
- **Determine the impact of measures** taken over a prolonged period or from time to time and **evaluate the effectiveness of these actions**.
- **Favour the consideration of noise with regard to urban-planning** (housing, public spaces) and housing initiatives, beyond the simple regulatory requirements.
- **Anticipate and evaluate the means to implement in order to meet the requirements of the European Directive**.
- **Centralize the information** and data currently scattered among various bodies (traffic, weather, etc.).
- **Constitute a "sound heritage"** unique to each city and neighbourhood.
- Propose a framework for **epidemiological studies on the long-term effects of noise on human health**.
- **Provide the mappings and more qualitative approaches with additional and overlapping information**.

# Examples of existing observatories and observatories in creation

- Noise observatories are already operating in several European cities: Lyon, Paris, Lille, Brussels, Madrid...
- Acoucité is currently supporting four cities of the southeast quarter of France in the creation of noise observatories : Saint-Etienne, Grenoble, Nice, Aix-en-Provence.

These 4 cities, partners of acoucité for several years, were selected by the Ministry of ecology, sustainable development, transportation and housing (MEDDTL).

Acoucité has also an agreement with the MEDDTL noise department : we are working for a standardization of the organization in the observatories in creation.

In a city, various departments can be responsible for the management of an observatory project.

We can list at least four possibilities :

- **The roads departments** (the case of Lille Métropole).
- **The urban ecology departments** in partnership with another structure (case of Grand Lyon);
- **Those departments specifically in charge of noise control** (case of the Police Prefecture of Paris).
- **The health and hygiene departments**

Management can also be attributed to an **outside body**.

# The fundamental needs

The network manager will have to identify those players liable to meet the basic needs of the observatory.

The following table lists the fundamental needs along with the potential suppliers/service providers.

The project manager can thereby identify the type of contractual relationships to be implemented.

Needs	Public/semi-public		Private service provider
	Internal	External	
	<i>to the Manager</i>		
Fixed sound stations			
Traffic stations (fixed and mobile)			
Weather data			
Transmission			
Energy			
Data storage			
Sensor installation			
Monitoring, equipment maintenance			
Data processing, analysis			
Information, communication			

**VALIDATION**

The very concept of a permanent noise-measurement network implies a rapprochement with numerous departments, each with its own field of expertise essential to the proper implementation of the measurement network.

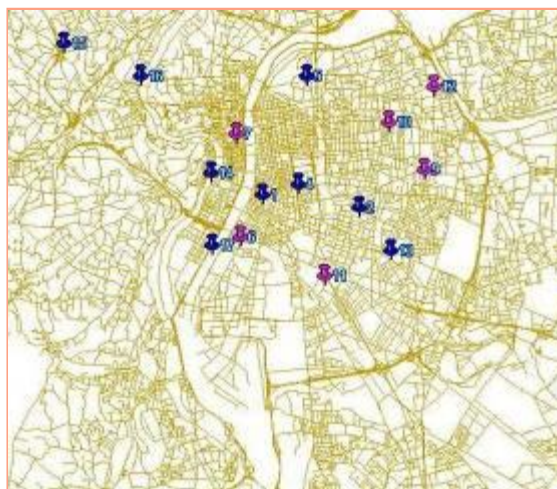
- Geographic Information System (GIS) manager ;
- Transmission network manager
- Traffic data manager
- Manager of the computer system and network
- An energy manager required at the measurement stations (permanent electrical power supply via cable or autonomous electrical power supply)
- Intervention services within the public domain

# Number of measurement stations

The number of measurement stations depends on 4 criteria, which are non-acoustic but decisive:

- The budget allocated to the network project.
- The cost evolution of the sensors.
- The size and diversity of the territory in question.
- The opportunities to rely on existing networks.

Nevertheless, between 15 (or even less for a very targeted objective) and 50 stations should allow the network to meet local objectives.



# Typologies for the measurement stations location

## Typology according to the pre-existing noise environment:

The location of the measurement stations is based on a goal of diversity and representativeness of the territory soundscapes:

• emblematic sites: squares, pedestrian areas, tourist attractions, etc.

• acoustically saturated zones

• quiet sites, for their preservation

• sites subjected to diverse events (construction/work sites, organized events, etc.)

• various environmental specificities (urban, semiurban, rural, industrial, etc.)

• different types of dominant noise sources : traffic (transport service, urban motorway, etc.), industry, activity

• projects to transform the urban fabric and/or the infrastructures.

T

T

•e

•a

•c

•s

•v

•d

•p



# Typologies for the measurement stations location

## Typology according to measurement duration:

Measurements can be characterized according to three distinct temporal scales:

The "permanent" scale

The "long-term measurement" scale

The "short-term measurement" scale

T  
M  
•t  
•t  
•t

## Typology according to a emission or reception position

Depending on their location, the measurement stations can be considered as being placed in emission or reception.

The choice of this typology depends on what we want to characterize: a sound source or the noise levels perceived by local residents, pedestrians, etc..

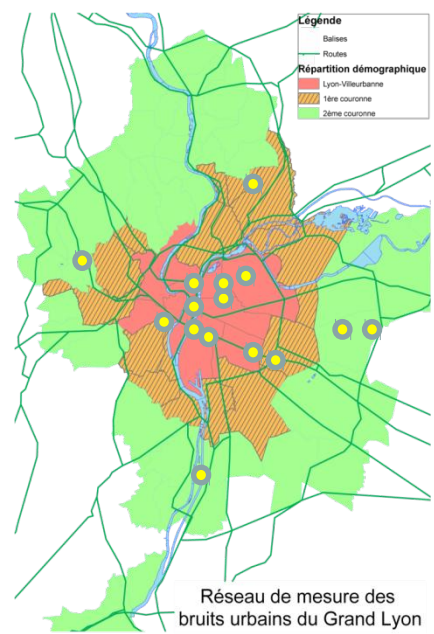
# Typologies for the measurement stations location

## Distribution on the territory:

The distribution of the measurement stations on the territory is an additional criteria in the choice of the stations location (for instance, if in principal city of the territory is living 50 % of the total population, one will try to install there 50% of the stations).

Distribution of the 17 stations on the territory:  
 10 stations in the city center,  
 7 stations on the 1st and 2nd ring

Example of the Grand Lyon:



# Typologies for the measurement stations location: ideas to be explored

- Is it possible to define common rules for the location of the measurement stations, in order to be able to make comparisons between the sound levels measured by each stations of an observatory on the one hand, and between different observatories on the other?
- What about the representativeness of the measurements in terms of typology of location (stations located in emission or reception, for example), in terms of measurement conditions (weather, etc. ..)?

- How to link modeling (acoustic maps) measurements (noise observatories) and perception ?
- What knowledge can bring the observatory on the perception of dynamic noise in urban areas (special events...)?