

OnoM@p : a Spatial Data Infrastructure dedicated to noise monitoring based on volunteers measurements

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Introduction

OnoM@p : System components and standards

NoiseCapture application

Web Services

OnoM@p : Operating mode

OnoM@p : Data issues

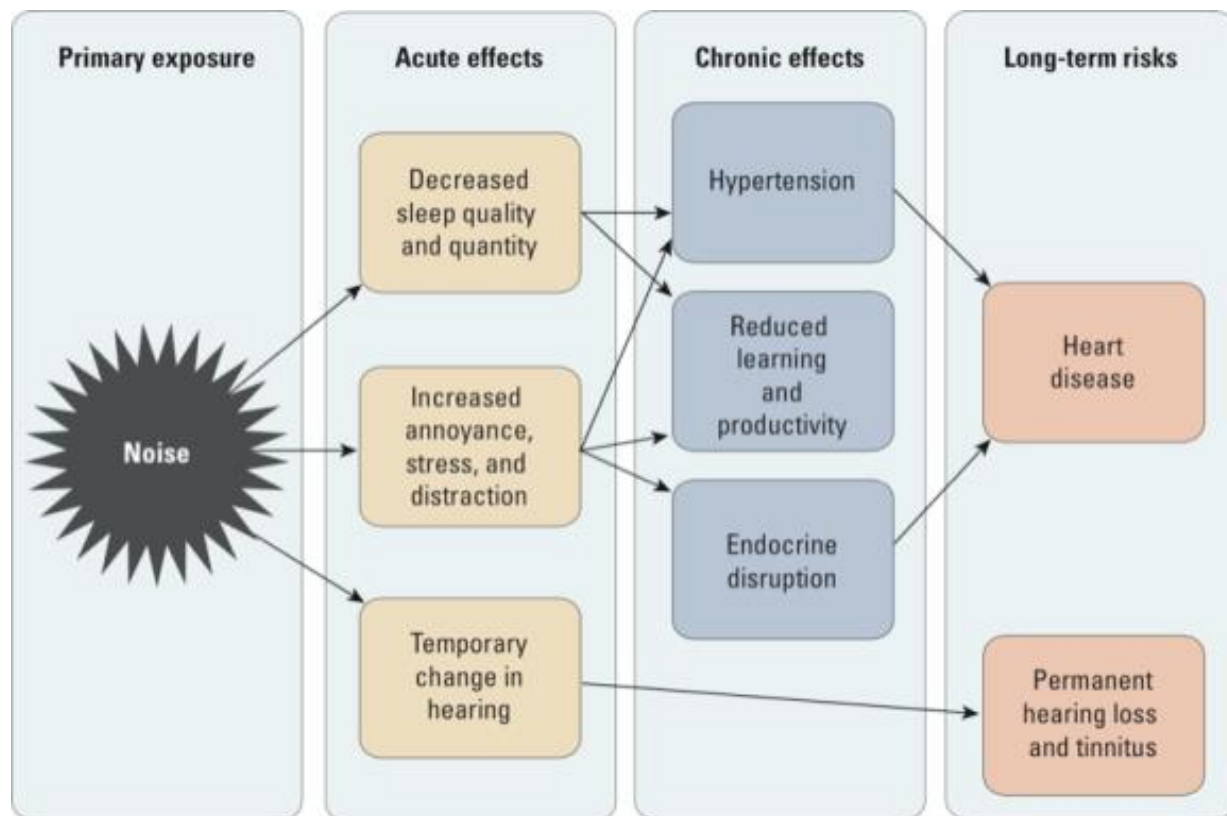
Quality control

Mapping sound indicators

Noise societal and environmental issues

European Communities reports about 80 million people are exposed to unacceptable daytime noise levels > 65 dB(A) .

Environ Health Perspect;
DOI:10.1289/ehp.1307272



At european level

The Environmental Noise Directive (END) 2002/49/CE relating to the assessment and management of environmental noise aims at defining a common approach planned to **avoid**, **prevent** or **reduce** the harmful effects, including annoyance, due to the exposure to environmental noise.

Four main axis:

- **monitoring** environmental noise;
- **informing** and **consulting** the population;
- **addressing** local noise issues;
- **developing** a long-term european strategy.



Introduction

European NEtwork for Redistributing Geospatial Information to user Communities - Open Data

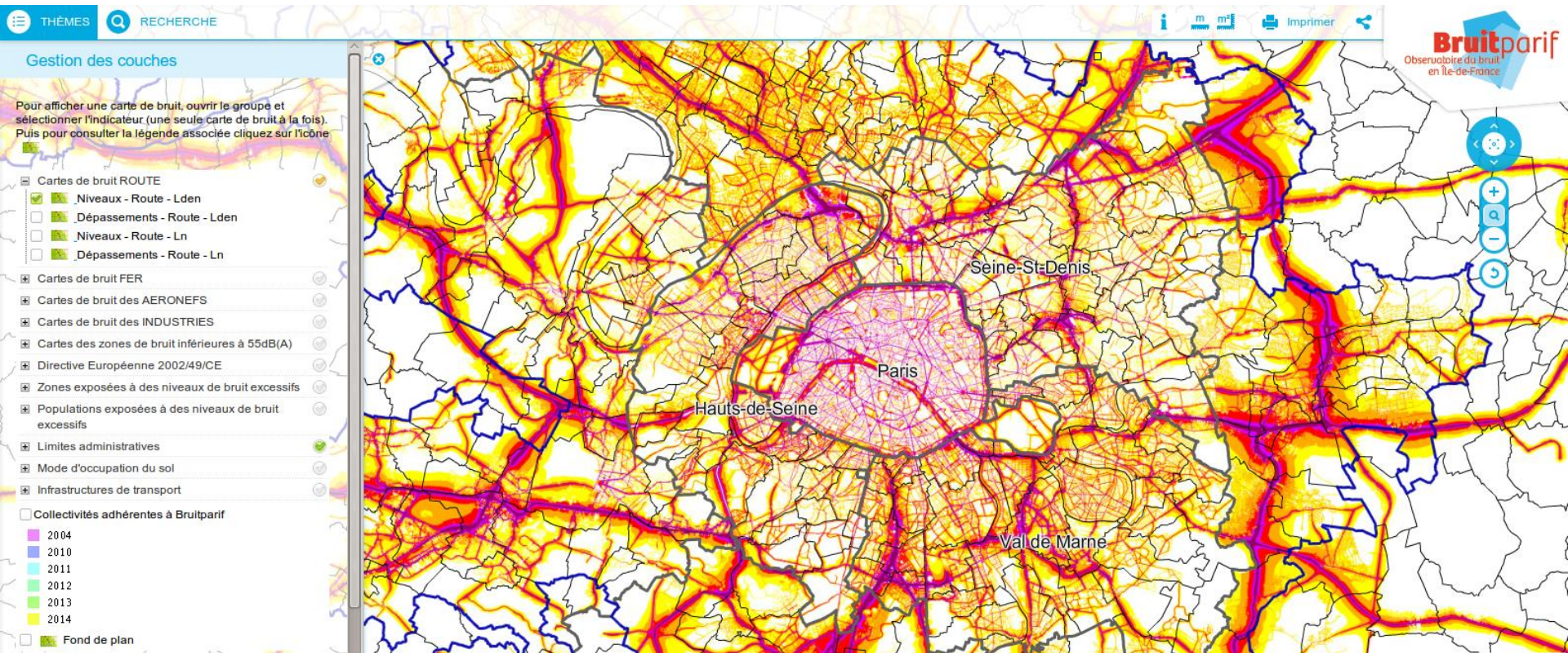
... in the context of noise monitoring - the drawing up of strategic noise maps for **cities of more than 100 000 inhabitants**.

In both **urban** and **suburban areas**, methods to contend with noise pollution consist in various actions (e.g. road resurfacing, acoustic screens insertion, speed limits reduction, traffic deviation, new public transportation policies setting up, etc.).

The action plans can be evaluated, before their implementations, through **noise propagation simulations**.

Simulation-based noise maps

European NEtwork for Redistributing Geospatial Information to user Communities - Open Data



<http://carto.bruitparif.fr>, June 2015

But...

- modelling of the main urban noise source, mainly the road traffic, requires many information (e.g. traffic flow, light/heavy vehicles proportion and respective speeds, etc.).
- input data are, most of the time, not available over the study area.
- simulations can only take into account mechanical sound sources (e.g. transports, ...) and not the sound levels fluctuations (i.e. sound events).
- Noise simulation maps are static and always out of date (outdated traffic volume).

→ It's difficult to analyze the noise impact at different spatio-temporal granularities.

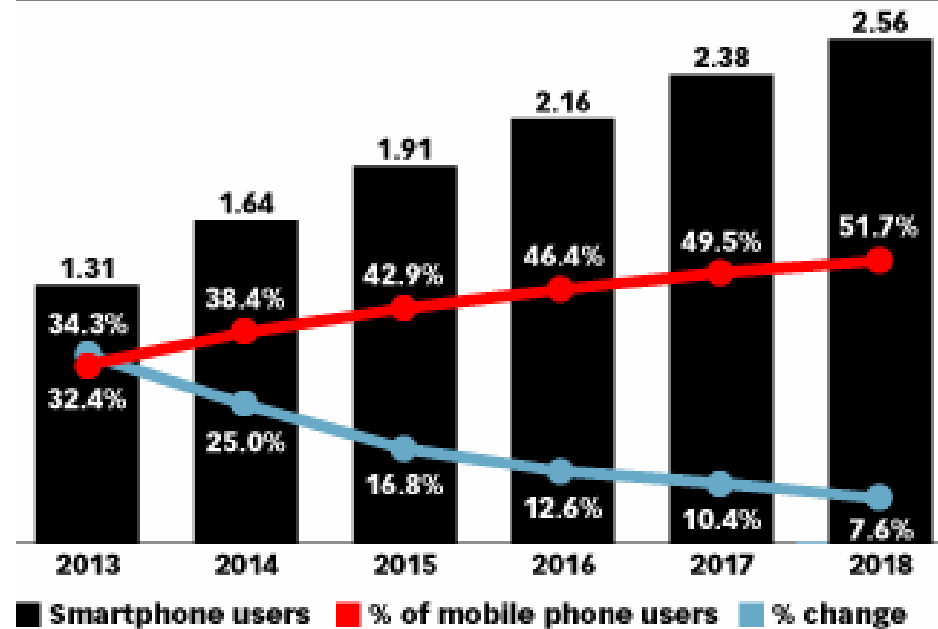
Multiple sensors:

- **position sensors:**
 - a **GPS**,
 - a magnetometer,
 - a gravity field sensor,
 - a proximity sensor,,
- **motion sensors:**
 - a 3-axis accelerometer,
 - a gyroscope,
- **environmental sensors:**
 - a camera,
 - a temperature sensor,
 - a lux meter,
 - a barometer,
 - an air humidity sensor;
 - a **microphone**.

87% of the world's population owned a mobile phone subscription

Smartphone Users and Penetration Worldwide, 2013-2018

billions, % of mobile phone users and % change



Note: individuals of any age who own at least one smartphone and use the smartphone(s) at least once per month

Source: eMarketer, Dec 2014

182903

www.eMarketer.com

<http://www.emarketer.com>, June 2015



The project 2014 - 2017

European NEtwork for Redistributing Geospatial Information to user Communities - Open Data

The project objectives are to:

- Develop Virtual Hubs (VHs)
 - different scales: regions, member states, Europe
 - a unique point of access to heterogeneous data sources for end-users and machines.
- Demonstrate the validity of VHs through
 - a set of **innovative applications in different domains**,
 - the use of public and private open geospatial data.

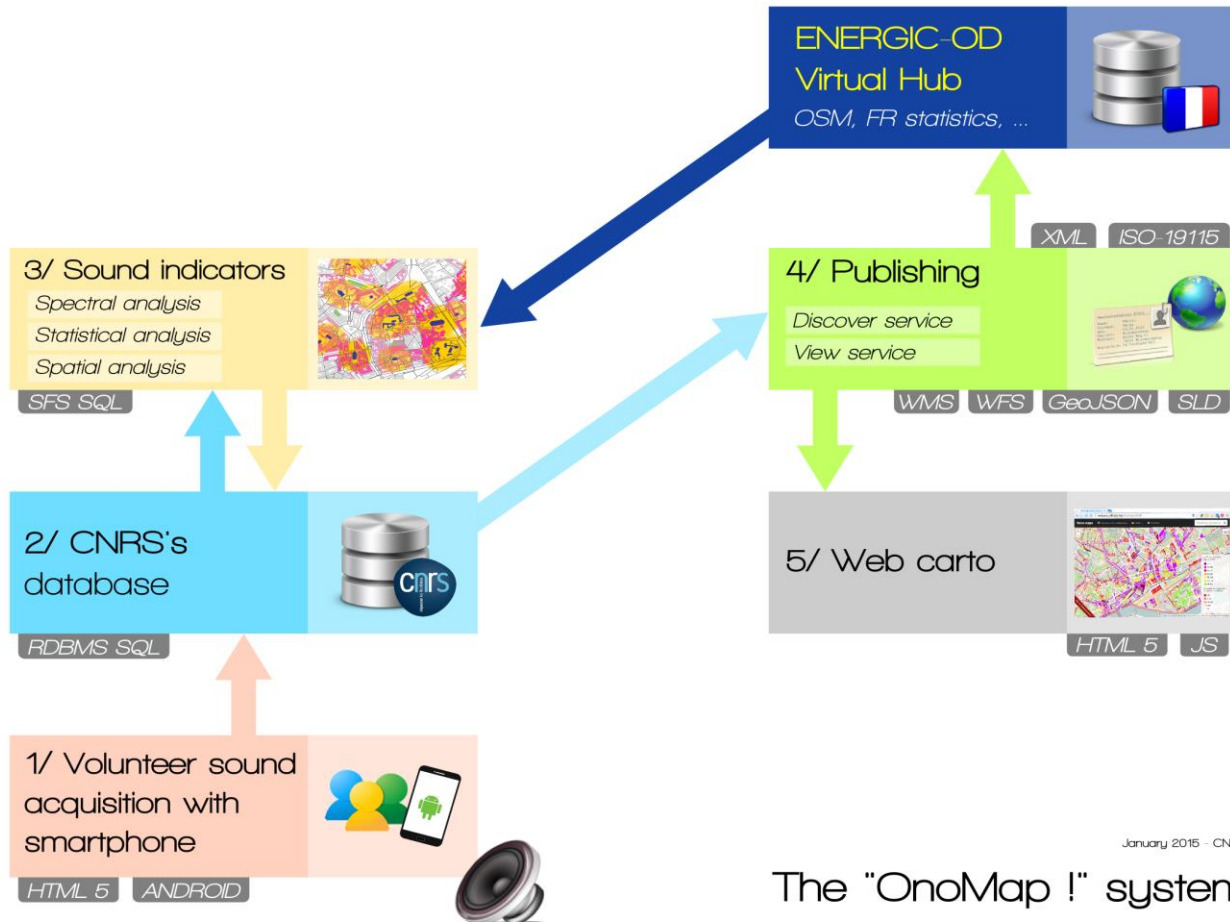
Already exists

- Applications: **participative noise map**
- Using smartphones (*i.e.* citizens) for a massive acquisition of noise data in urban environment
- Some existing apps: NoiseTube, WideNoise, NoiseSpy, ...

Our contribution

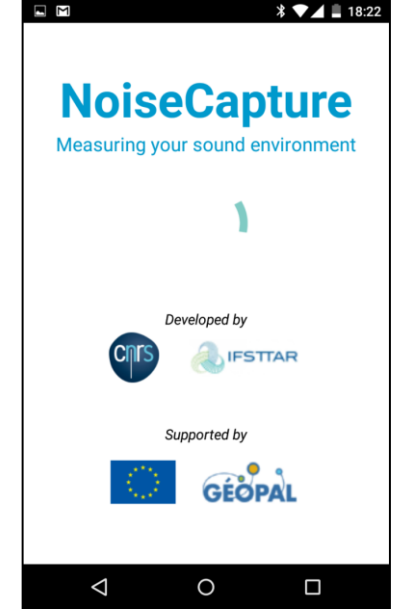
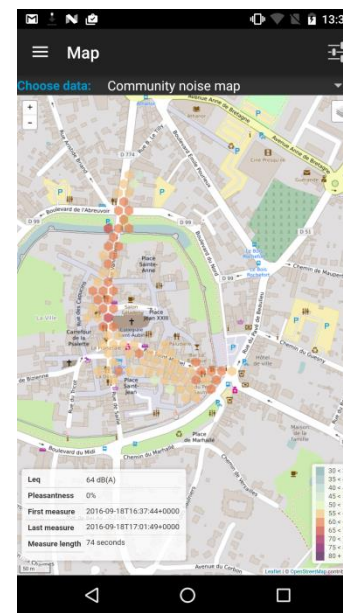
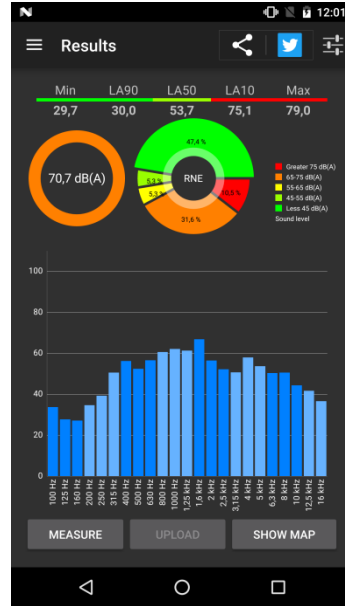
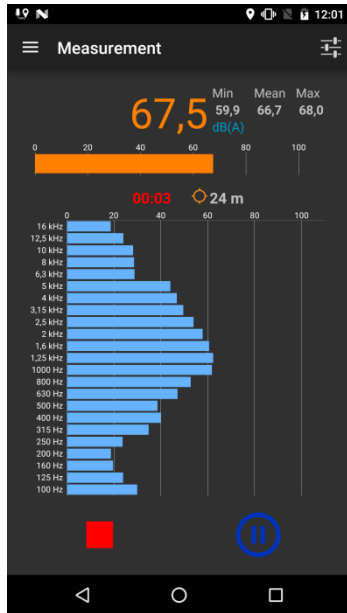
- Build a “qualified” noise database,
- Produce “added value” noise maps (with aggregated indicators, ...),
- Open the database to the community.

- A “global infrastructure” made by specialists in Geomatics and in Acoustics.
- Development of specific treatments to qualify the noise.
- Use the database to build noise maps and indicators (with mixed data from participative measurements, laboratory measurements and simulations).



January 2015 - CNRS

The "OnoMap !" system



MEASUREMENT

- Instantaneous data dB(A)
- Global sound level
- Third octave band spectrum
- Min, Max and Mean values

RESULTS

- Equivalent SPL dB(A) (1s)
- Sound Exposure Level (SEL)
- Repartition of Noise Exposition (RNE)
- Noise spectrum
- Noise indicators: L_{A90} , L_{A10} , L_{A50} , L_{Amin} and L_{AMax}

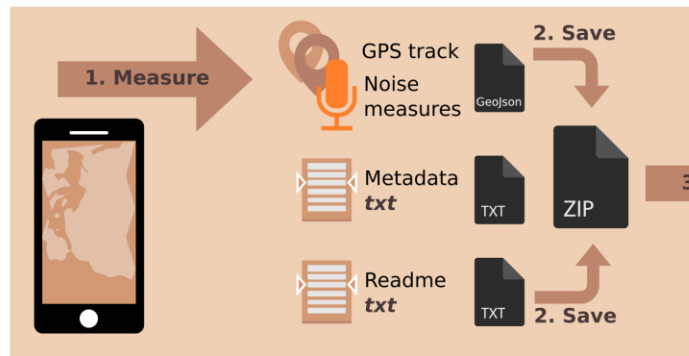
MAP

- Noise maps: geo-referenced SEL along the path (every 1s)
- Show:
 - last measurement
 - user's measurements
 - all users' measurements
- Internet access of the data with many information

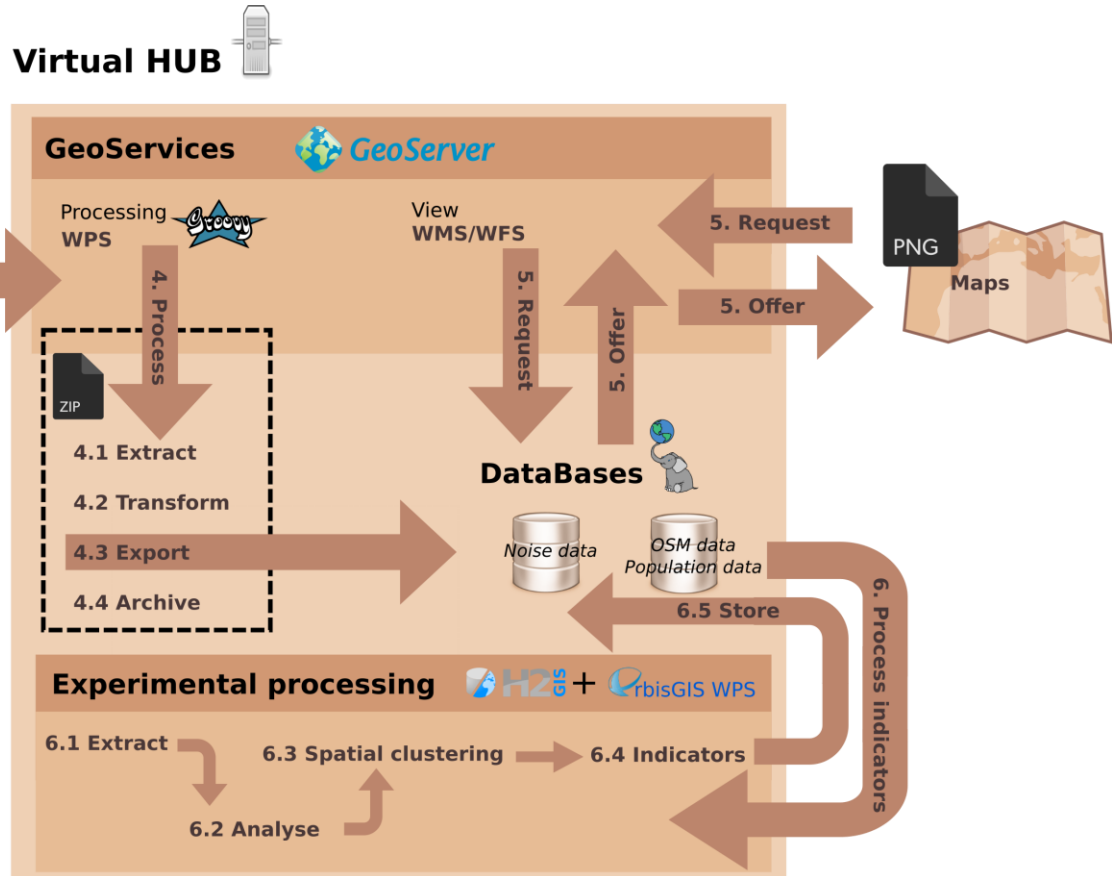
ADDITIONAL CONTENTS

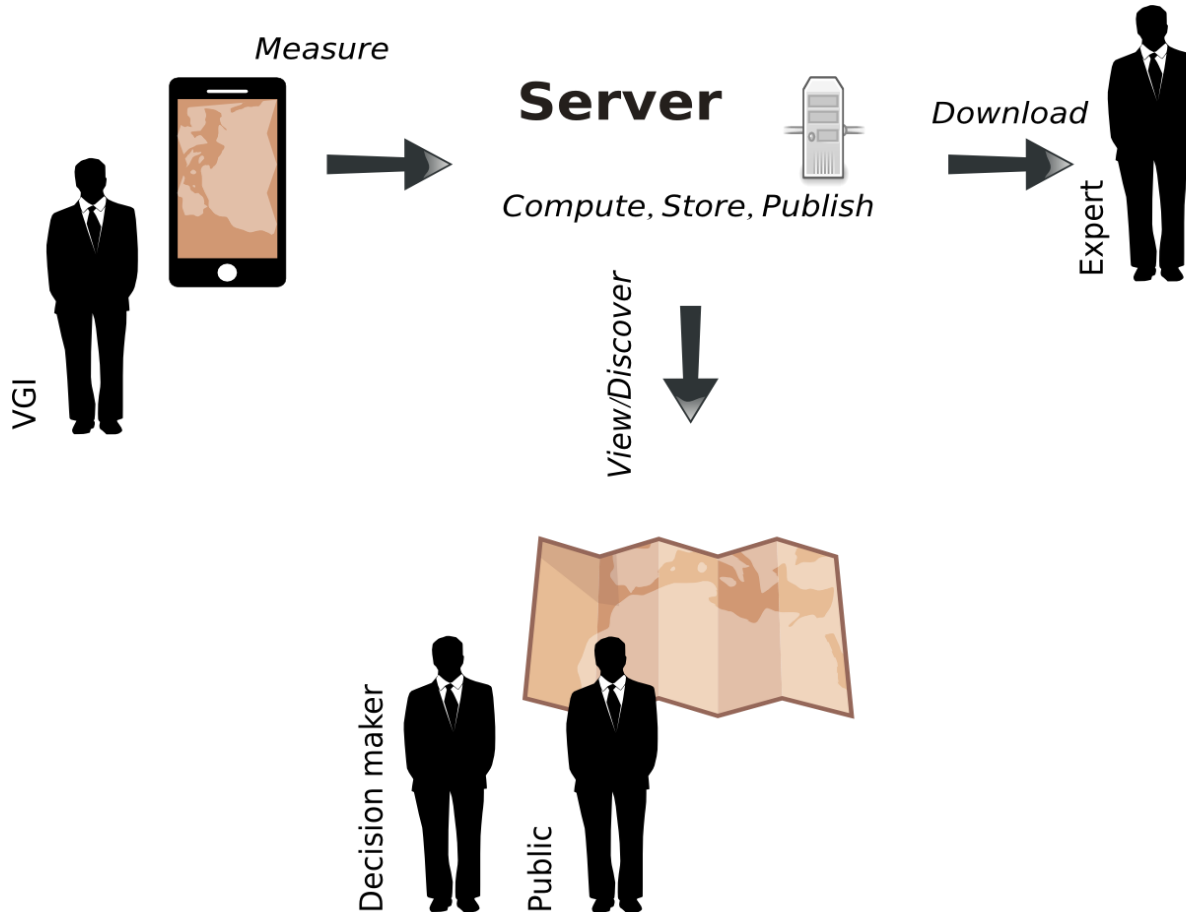
- About: project information
- Help: how to use the application
- History : manage data in the webphone
- Settings: manage user parameters

NoiseCapture



Virtual HUB





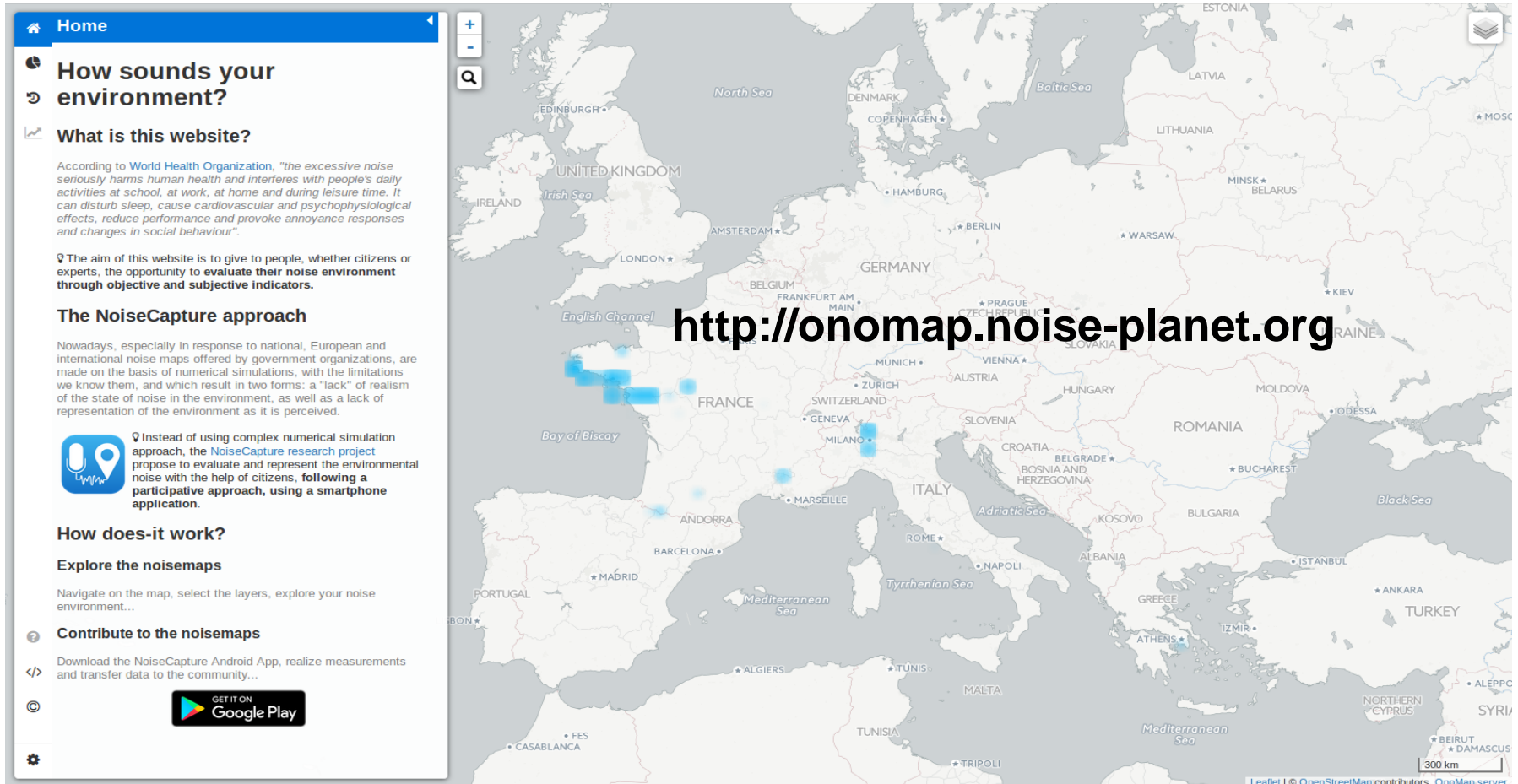
- Acquisition (quality of the sound measurement, accuracy of the GPS position, user practices).
- Data storage (time dimension, spatial relations).
- Data processing (availability, scale, statistical representativeness...).
- Visual display (map, dataviz...).



LAeq: equivalent noise level in dB(A), on the whole measurement duration. It is a standard environmental noise indicator, used for the evaluation of noise annoyance.

LA50: A-weighted noise level that is exceeded for 50% of the measurement period. LA50 is the median sound level

The A-weighting account for the relative loudness perceived by the human ear.



Home

How sounds your environment?

What is this website?

According to [World Health Organization](#), "the excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour".

¶ The aim of this website is to give to people, whether citizens or experts, the opportunity to **evaluate their noise environment through objective and subjective indicators**.

The NoiseCapture approach

Nowadays, especially in response to national, European and international noise maps offered by government organizations, are made on the basis of numerical simulations, with the limitations we know them, and which result in two forms: a "lack" of realism of the state of noise in the environment, as well as a lack of representation of the environment as it is perceived.

¶ Instead of using complex numerical simulation approach, the [NoiseCapture research project](#) propose to evaluate and represent the environmental noise with the help of citizens, **following a participative approach, using a smartphone application**.


How does-it work?

Explore the noisemaps

Navigate on the map, select the layers, explore your noise environment...

Contribute to the noisemaps

Download the NoiseCapture Android App, realize measurements and transfer data to the community...

GET IT ON 

<http://onomap.noise-planet.org>

Leaflet | © OpenStreetMap contributors, OnoMap server

Thanks for your attention

Questions ?

Want to reuse data ? There will be a contest:

- Contest is open to everyone. Contestants can form teams of max 4 people.
- Contestants submit a short business model and application mockup – no more than 20 person hours of work.
- Contest opens in December 2016.
- Prizes are cash (1,500 for the 1st place, 1,000 for the 2nd, and 500 for the 3rd) and half-a-day consultation with ENER GIC-OD technology and business experts.
- For more information, visit ENER GIC-OD forums (<http://www.energic-od.eu/>).