

**QUI**etening the **E**nvironment for a **S**ustainable  
Surface **T**ransport



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## QUIETENING EUROPEAN ROADS

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# General information



## **SEVENTH FRAMEWORK PROGRAMME**

**Theme: Transport (including Aeronautics)**

**FP7-SST-2008-RTD-1**

**Activity: 7.2.1 - The greening of Surface Transport**

**Area: 7.2.1.1 - The Greening of Products and Operations**

**Topic: SST.2008.1.1.3 – Holistic Noise and Vibration Abatement**

**Project duration: 36 months**

**Total cost: 2,5 million (DG RTD contribution: 1,95 m€)**

**Project team including 13 partners from 8 EU countries**

# FP7 Surface Transport – European overall objectives



- Develop “greener” and “smarter” Surface Transport
  - Benefit citizens and society (mobility, safety...)
  - Respect the environment and natural resource
- Secure and develop the role of European industry in the global market

Staple elements for **Sustainable Mobility**

# Sustainable Mobility



“The ability to meet the needs of society to move freely, gain access, communicate, trade, and establish relationships without sacrificing other essential human or ecological values today or in the future”



World Business Council for  
Sustainable Development

# Traffic Noise



**Noise reduction is an indispensable measure to ensure the sustainability of surface transport.**

The European Commission clearly addresses transport noise through the **2002/49/EC** Directive. Its main aim is to provide a common basis for tackling the noise problem across the EU and to encourage environmental noise reduction. Within the END (Environmental Noise Directive) surface transport is one of the main targets.

# QUIESST



**QUIESST** acts on the **global effectiveness** of Noise Reducing Devices - **NRDs**, including both **product aspect** and **in-situ aspect**:

- the **initial intrinsic acoustic** characteristics of the industrial products used, and the long-term durability of those characteristics;
- their **relevant design** (intrinsic acoustic performances, flat /non flat - homogeneous / heterogeneous devices, dimensions and location) in function of the vehicles, the infrastructure and the concerned environment;
- the **whole sound propagation process**: intrinsic performances which directly affect the near field propagation could affect the far field performances in a complete different way.

# Noise reducing devices (NRD's)



EN 14388 standard:

- Noise barriers
- (Absorptive)  
Claddings
- Covers
- (Structural  
Elements)
- Added Devices



# The near field - far field relationship



## CURRENTLY

Debate on how to get a better noise reduction in the **far field**.

Sound absorptive and/or shaped devices ???

## QUIESST 1st objective

**To master the NRD performance in the far field considering both, sound absorptive characteristics and shape**

## STEPS

- develop a **numerical simulation method** for the conversion of near-field sound reflection patterns to far field effects of sound reflections with NRD of different sound absorption and / or shape;
- validate the numerical simulation method against measured data acquired in near and far field;
- develop an **(analytical) engineering computation method** for the translation of near field measurement data into far field reflection effects to validate the engineering method against the results of the numerical simulation method and the available measurement data;
- define an appropriate **indicator for the rating** of the NRD sound reflecting characteristics based on the far field effect.

# In-situ measurement method



## CURRENTLY

NRDs' intrinsic acoustic performances analysed in closed and / or reverberant field (reverberant rooms in relevant laboratories) while NRDs are used in open spaces

## QUIESST 2<sup>nd</sup> objective

**To characterize NRDs in-situ** taking into consideration the problems faced in ADRIENNE

## STEPS

- develop the **new measurement method** for sound absorption/reflection and airborne sound insulation of NRDs with regard to: choice of sound sources and signals, use of multiple sensors, signal analysis and the essential physical representativity (near field/far field, whatever the shape of the NRDs);
- to assess the uncertainty of this new method = assessment of accuracy

# Database: labs and in-situ results



## CURRENTLY

no comprehensive database of the NRDs acoustic performances does exist yet

no working method to relate the new in-situ test results to the existing laboratory results

## QUIESST 3rd objective

To build database comparing the European NRD intrinsic performances according to the different test methods,

and establish the relationships between the different results.

## STEPS

- collect and analyse laboratory and in-situ tests results concerning sound absorption and airborne sound insulation;
- build a comprehensive database of test results, taking into account different European NRDs types;
- establish the relationship between laboratory and in-situ measurements and to supply data for an easy comparison of the two methods in terms of applicability;
- provide a guideline helping manufacturers and road administrations to assess NRDs performances and, thanks to the in-situ methods, to also fairly assess the lifetime acoustic behaviour of products.

# The holistic approach



## CURRENTLY

No guide about NRDs has an holistic approach considering i.e.: the “true” intrinsic performances, considering the optimized combination of their acoustic characteristics and design shapes, considering the best situation in order not only to reduce noise, but also the amount of people exposed to noise, without forgetting the cost / benefit ratio and the sustainability...

## QUIESST 4th objective

To develop a comprehensive strategy on how to optimize NRDs within a true holistic approach

## STEPS

- develop an optimization strategy adapted to typical road and railway traffic noise configurations where both urban and rural areas are addressed;
- apply this methodology to intrinsic performances, considering NRDs shapes and surface impedances;
- apply this methodology to extrinsic and holistic NRDs optimization, considering acoustic, non acoustic and environmental (site) parameters, building a database of results from these optimizations;
- provide the expected global impact of optimized noise abatement solutions in terms of reduced number of exposed people in typical urban and rural situations;

# Sustainability



## CURRENTLY

no method allowing the assessment of NRDs' sustainability

## QUIESST 5th objective

To provide a relevant method for assessing the overall sustainability of ground transport noise reducing devices.

## STEPS

- to define the relevant generic sustainability **criteria** for NRDs;
- to research relevant **methods** for assessing the overall sustainability of NRD;
- to build a **database** of those generic relevant criteria and indicators for existing European NRD;
- to **apply the method/s on existing NRD** in order to compare and rank them from the point of view of their overall sustainability.

# QUIESST partners





**Thank you**

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