PROJECT

SILENCE

Quieter Surface Transport in Urban Areas

**Funding:** European (6th RTD Framework Programme)

**Duration:** Feb 2005 - Jan 2008

**Status:** Complete with results

**Total project cost:** €15,689,025

**EU contribution:** €8,900,000

**Call for proposal:** FP6-2003-TRANSPORT-3

**CORDIS RCN:** 75809

**Background & policy context:**
For decades, European policy-makers have concentrated on regulating noise emission from sources such as road and rail vehicles, aeroplanes and other equipment by fixing maximum sound levels, which has resulted in significant noise reduction from individual sources.

For example, noise from individual cars has been reduced by 85% since 1970 and noise from trucks by 90%. However, no consideration has been given to reducing noise emission in urban areas and for some sources, such as railways, there was no EU legislation setting noise creation limits. As a result of this, and in response to the regulatory gap, the Commission Directive 2002/49/EC, relating to the assessment and management of environmental noise, was adopted.

Its main aim was to provide a common methodology to address noise problems across the EU and it is in this context that the activities of SILENCE are to be seen.

**Objectives:**
The main objective of SILENCE was to develop an integrated methodology and technology for improved control of surface transport noise in urban areas looking at:

- noise control at source;
- noise propagation;
- noise emission;
- human perception of noise for road, rail, infrastructure and cities.

SILENCE would provide:

- relevant and world-leading technologies to assure efficient control of surface transport noise;
- innovative strategies for action plans for urban transport noise abatement and practical tools for their implementation;
- a significant reduction of people's exposure to noise, especially under real urban conditions.

The expected outcome of the project was a reduction of noise emission in urban areas of up to 10 dB(A).

**Project outputs included:**

- identification of annoying acoustic components of vehicles in order to develop guidelines for individual source-oriented noise reductions;
- a global modelling tool for road and rail applications to predict noise radiation into the environment;
- design and hardware solutions for noise reduction with respect to vehicle/tyre/road interaction, under typical (sub-)urban conditions;
- experimental and calculation tools and advanced noise reduction technologies for road vehicles;
- highly efficient systems and technologies for trams, metros, freight and suburban trains for noise reduction and control;
advanced integral design and maintenance of lower noise road surfaces;
noise reduction solutions for rail infrastructure and operation;
a tool-kit for cities with practical urban traffic management techniques for noise reduction;
guidance for implementing noise action plans in cities.

Methodology:

SILENCE research is both vertically and horizontally integrated. Two vertical working areas - I) Vehicle Noise and Source and II) Transport Infrastructure, Operations and Management - integrate both rail and road sectors within urban environments. The horizontal sub-projects integrate road and rail in terms of analysis, parameter definition and applications such as scenarios.

The SILENCE approach starts with three steps: the assessment of urban noise situations based on data from European cities, the definition of two urban noise scenarios as reference basis for the whole project, the identification of the related noise abatement priorities and noise reduction potentials. On this basis, the RTD activities are developed and integrated to an unique system of noise abatement technologies and tools and methodologies for noise reduction and policies.

Thereby, the essential categories of urban traffic vehicles are considered, such as cars, light duty trucks, buses, trams, metros, trains and others. One key element of this RTD approach is the global modelling for the prediction of noise effects on urban scenarios. Based on models for individual traffic elements developed in previous EU projects the global model predicts the overall noise emission of complex traffic situations and allows the prediction of noise emission by a source model coherent with the models used in HARMONOISE. This global model is used to apply the noise abatement technologies developed to the two reference noise scenarios, to predict their noise reduction effects and to validate the noise reduction potentials.

Thus, the expected key results and deliverables of SILENCE are

- a noise abatement technology platform for road and rail vehicles, urban transport infrastructure and traffic flow aspects, and
- tools, methodologies and input data for decision support systems, urban action plans and future noise scenarios.

Parent Programmes:

FP6-SUSTDEV-3 - Global Change and Ecosystems

Institute type: Public institution
Institute name: European Commission
Funding type: Public (EU)

Lead Organisation:

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Organisation Website:
http://www.bruitparif.fr
EU Contribution: €0

Key Results:

The following results have been achieved within the different activities of the project:

1. Noise Perception and Annoyance Evaluation of Traffic Noise Reduction
   • Various traffic noise scenarios have been analysed out of source libraries;
   • Annoyance of residents in different EU cities and countries have been determined in combination with noise maps;
   • Guidelines and targets for annoyance reduction have been defined.

   • A global Modelling Tool has been developed and validated for rail and road vehicle exterior noise;
   • Source models and noise sources have been defined and characterized;
   • The model has been validated also with respect to annoyance.

3. Noise reduction of tyre-road-interaction
   • Low noise tyre/road combinations have been investigated under urban traffic conditions;
   • Simulation tools for tyre noise have been developed;
   • Vehicle concepts for tyre noise suppression have been defined with respect to development of advanced noise reduction technologies, methodologies and software tools for urban road vehicles.

4. Experimental- and Simulation Tools for Road Vehicle Noise Reduction
   • Advanced simulation tools for vehicle noise source reduction have been developed;
   • Experimental noise source identification methods have been set up and validated;
   • Advanced noise reduction technologies and materials, based on damping and absorption have been demonstrated in hardware.

5. Noise Reduction of Rail Vehicles in Urban Areas
   • Noise source ranking of rail platforms for definition of the noise reduction potential;
   • Low noise diesel powerpack systems including cooling and auxiliary systems have been developed;
   • Measuring campaigns for noise reduced traction equipment and running gear have been performed.

6. Design and Maintenance Aspect of Low Noise Road Surfaces
   • New production technologies of quieter road surfaces have been developed;
   • Acoustic effects of new road surfaces at tyre / road interactions have been optimised;
   • New low noise road surface materials have been tested;
   • Systems for maintenance of low noise roads have been investigated;
   • Noise classification methods for urban road surfaces have been developed.

Policy implications

The policy recommendations from the SILENCE project have been presented in 'Practitioner Handbook for Local Noise Action Plans'. The handbook is targeted to the three main groups concerned with noise issues at local level:

- Local decision makers
- Transport planners and urban planners
- Transport Engineers

Decision makers will find basic information about the requirements of noise action plans, the approach towards the action planning process and possible noise abatement measures. For planners, more detailed information is provided on how to organise the planning process, on advantages and problems of abatement measures and their links to other policy fields, as well as on long-term strategies to mitigate noise. Engineers will find comprehensive technical information about the presented measures, and references to relevant technical SILENCE reports containing in-depth information.

In most EU Member States, local authorities are responsible for drawing up the noise action plans. Many cities already have experience in this field, as even prior to the European Noise Directive (END), national legislation in many countries obliged them to take action. However, requirements might have changed due to the European directive and local authorities need to learn about their changed obligations. For other cities, noise action planning might be a completely new task.

This handbook aims to support local authorities in the process of setting up action plans. It is
divided into six parts:

- Part 1 presents the noise problem and the obligations related to noise action planning.
- Part 2 introduces the main objectives, benefits and characteristics of noise action planning.
- Part 3 suggests a step-by-step approach to the process of action planning. Such an approach however, does not imply that one step is to be taken strictly after the other. Several steps are closely interlinked and might need to be addressed in parallel. However, with respect to local experience and local particularities, cities will find their own way to successfully development of a local noise action plan.
- Part 4 presents long-term strategies to avoid and abate noise.
- Part 5 presents a range of concrete noise abatement measures.
- Part 6 is the annex with the list of sources and examples for the sound-scape approach.

Documents:
Local Noise Action Plans - Handbook (Other project deliverable)

STRIA Roadmaps: Other specified
Transport mode: Multimodal transport
Transport sectors: Passenger transport, Freight transport
Transport policies: Environmental/Emissions aspects
Geo-spatial type: Urban