

Sub-Project A: Noise Perception, Annoyance

AD2: Progress and refined plan for following 18 months

Workpackage number:	A1	Start and end month:				1-36		
Workpackage Title:	Simulation and evaluation. Guidelines for noise reduction.							
Participant ID:	IfADo	IA UAM	SINTEF					
Person-months per participant:	13	19	2.5					

Objectives:

The overall objective of Sub-Project A is to provide the SILENCE IP with guidelines for noise abatement measures by the detection of individually (concerning single vehicles) and globally (concerning noise scenarios) annoying components of traffic noises. On request SP-A evaluates attenuation measures that are developed within the SILENCE IP.

This Workpackage A1

- collects noises as a basic tool for simulation and evaluation,
- analyses and treats the noises of single vehicles for the design of scenarios,
- supports other Sub-Projects by identification of annoying elements and traffic means to make directed abatement possible (Guidelines for individual source-oriented noise reduction),
- identifies acoustic features of noise scenarios as a guideline for noise abatement by traffic management (Guidelines for source-oriented noise reduction by management).

Description of work (Tasks)

A1.1: Acquisition of noises from various vehicles. Establishment of a source library. This library will be composed of noises recorded at different distances, speeds, and accelerations from pass-bys of vehicles. Noises that are provided by other Sub-Projects for psychoacoustic evaluation will be added to this pool. These data will be used in Tasks 2 and 4 of this WP1.

Task leader: SINTEF. Participant: IA UAM, IfADo

A1.2: Composition of various noise scenarios. The noises collected in Task 1 are analyzed and – if necessary and possible – acoustically treated. Thereafter noises of individual vehicles of the library will be arranged for simulation of vivid traffic situations. The scenarios will be varied with respect to the temporal structure (rather even and rather uneven/clustered) and with respect to traffic composition (percentage of light and heavy vehicles, number of vehicles for public transport). Short 10-minutes scenarios will be produced for the determination of acute annoyance and 2-hour scenarios for validation, i.e. the determination of annoyance and the effects on performance. These tests will be performed within Task 4 of this WP.

Task leader: SINTEF. Participants: IA UAM, IfADo

A1.3: Guidelines for the individual (source-oriented) reduction of noise of single vehicles. This task is designed to support other Sub-Projects by performing selected experiments to help them to develop and to establish directed noise-reducing measures. Studies concern annoyance related to sound power spectra and velocity of individual vehicles and curve squealing noise of trams. Priorities of noise abatement will be determined for selected problems by comparing annoyance caused by single vehicles (e.g. truck, bus, tram) and noises from shunting yards while using psychoacoustic listening tests. The results will be transferred to the other Sub-Project for further action.

Psychoacoustic listening tests are performed in the well-controlled situation of the laboratory with male

and female participants. Different noises are presented in permuted orders and the participants compare and evaluate them while using suitable scales or by completing preference judgements.

Task leader: IA UAM. Participants: SINTEF, IfADo

A1.4: Guidelines for noise reduction by traffic management. This task aims at the evaluation of noise scenarios provided by A1.2. The evaluation will be performed with psychoacoustic listening tests and validation tests as described below. These tests concern the evaluation of

- differently structured traffic flow (even, uneven/clustered),
- traffic composition concerning the percentages of light and heavy vehicles,
- traffic composition concerning vehicles for public transport (busses, trams),
- variability of maximum levels.

Psychoacoustic listening tests are performed in the well-controlled laboratory situation with male and female participants. Various 10-minute scenarios will be presented in a random order and rated for annoyance immediately after the cessation.

The questions used for the evaluation are standardized. They were developed by Team 6 (Community noise) of the International Commission on Biological Effects of Noise (ICBEN) in order to compare the results from inquiries performed in various countries worldwide. Thus the results are expected to apply to most citizens of the European Union.

Validation tests: These elaborate tests concern that annoyance results from interference of noise with actually exerted activities. During extended exposures to the various scenarios the participants do mental work and evaluate actual annoyance repeatedly during the session. They complete some tests that are highly demanding for working memory and focus on executive functions which originate in the frontal lobe of the brain and which were successively applied in just completed experiments. During these tests physiological functions, the release of the stress hormone cortisol, subjective assessment, well-being and mood will be ascertained.

Task leader: IfADo. Participants: IA UAM

Deliverables

A.D1: Report: A source library of vehicles (road and rail), month 9

A.D2: Report: Progress and refined plan for following 18 months (workshop), month 18

A.D3: Report: Provision of various noise scenarios, month 15

A.D4: Report to partners: Guidelines concerning priorities of noise abatement, month 24

A.D5: Report to partners: Guidelines and transfer of knowledge concerning temporal structure and composition of traffic, month 30

Milestones and expected result

A.MS1: Transfer of a source library to task A1.2, month 12

A.MS2: Transfer of noise scenarios to task A1.4, month 18

A.MS3: Guidelines for (priorities of) noise abatement measures for single sources. Month 24

A.MS4: Guidelines for noise abatement by means of traffic management. Month 36

Workpackage number:	A2	Start and end month:			7-36			
Workpackage Title:	Annoyance of residents and evaluation of developments within SILENCE							
Participant ID:	IfADo	IA UAM	SINTEF					
Person-months per participant:	6	8	3					

Objectives:

Workpackage A2 aims at

- the determination of annoyance in urban areas,

– the evaluation of attenuation measures developed within the SILENCE IP.

Description of work (Tasks)

A2.1: Annoyance in urban areas. A questionnaire will be developed to determine annoyance in residents living in urban areas and to relate annoyance to selected demographic variables (age, gender) and personal traits (noise sensitivity) and to the noise load.

Concerning annoyance, the questionnaire contains questions that were developed by Team 6 of the International Commission on Biological Effects of Noise for comparability of studies performed in different countries. Noise load will be estimated on two levels (1) by questions concerning the residential area (e.g. type of street, type of traffic heard) and (2) by the address (Town, Street, Number) so that noise load can be determined by noise maps (L_{DEN} , L_{night}). These two levels are necessary as the questionnaire will be presented via internet and as the respondents should decide themselves on the degree anonymity.

Noise sensitivity questionnaire. Annoyance caused by noise depends on the physical parameters of the respective noises as well as on several individual and situational factors. One of the most important moderator variables is noise sensitivity which is a stable personal trait. Its knowledge is essential for the interpretation of the results. A recently developed test, the Noise Sensitivity Questionnaire (NoiSeQ) will be used. It evaluates global sensitivity as well as sensitivity concerning work, living, and sleep. The questionnaire which is available in 8 languages was already successfully applied in international research projects.

Task leader: IfADo. Participants: IA UAM, SINTEF

A2.2: Evaluation of abatement measures developed within 'SILENCE'. This task is focused on and integrated into the developmental process of attenuation measures performed within the SILENCE IP. On request of partners who develop abatement measures during the SILENCE IP SPA evaluates the benefit of these measures while comparing original and resulting noises with listening (psychoacoustic) tests. The results are successively reported to the partners.

Task leader: IfADo. Participants: IA UAM, SINTEF.

Deliverables

A.D6: Report: Annoyance of residents living in urban areas, month 36

A.D7: Transfer of evaluation of noise attenuation measures developed within the IP, month 36

Milestones and expected result

A.MS5: Workshop on annoyance of residents living in urban areas, month 36

A.MS6: Review of evaluation of attenuation measures developed within SILENCE, month 36