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Summary:

Mapping changes in noise annoyance to monitor the efficacy of noise reduction efforts

This paper describes a system for connecting the noise exposure mapping proposed by Statistics Norway to socio-acoustic studies in a set of 40+ study areas that are representative for Norwegian noise neighbourhoods. Work in order to establish measurement instruments for factors that may significantly modify the relationships between exposure and annoyance are also described..

The end result of the modelling effort is a mapping of changes in noise annoyance that is representative for the Norwegian population. When related to information on noise exposure and controlling for modifying factors and inter-area differences are taken into account it will be able to ascertain which noise combat techniques work and which that don't. It will also be possible to decide how far the national efforts go in attaining the target of a 25% noise annoyance reduction in Norway before 2010.

The system proposed by Statistics Norway and the Institute of Transport Economics makes heavy use of geographical information systems for performing spatial analyses and providing a stratification of Norway in different types of noise neighbourhoods. Both the technology itself and the data necessary to implement the strategic noise annoyance mapping system, has recently become available. The system is innovative not only in a national sense but also with respect to the efforts undertaken in Europe to chart changes in health relevant exposure and effect indicators.

A stratification of Norway in noise neighbourhoods is achieved by the spatial algorithms. The stratification provides the basis for extracting a sample of 40+ sub-areas that are representative for Norway. Establishing such a set of sub-areas allows for more qualified noise exposure modelling for instance by SINTEF. Use of a representative sample of sub-areas translate into substantial reduced costs in tracking changes in noise exposure in Norway over time

The national representative sample of noise neighbourhoods (the 40+ sub-areas) will by means of statistical sampling methods provide simple indicators of noise exposure, noise annoyance, changes in noise emissions, the extent of noise abatement measures being implemented and the resulting changes in noise exposure and noise annoyance for the whole of Norway. These results will follow from simple extrapolations from the representative sample and survey results to the whole of the population. In addition to the extrapolation of data by sampling statistics, it will also be possible to produce high quality exposure-effect relationships relating noise exposure and noise annoyance.

The working report can be ordered from:
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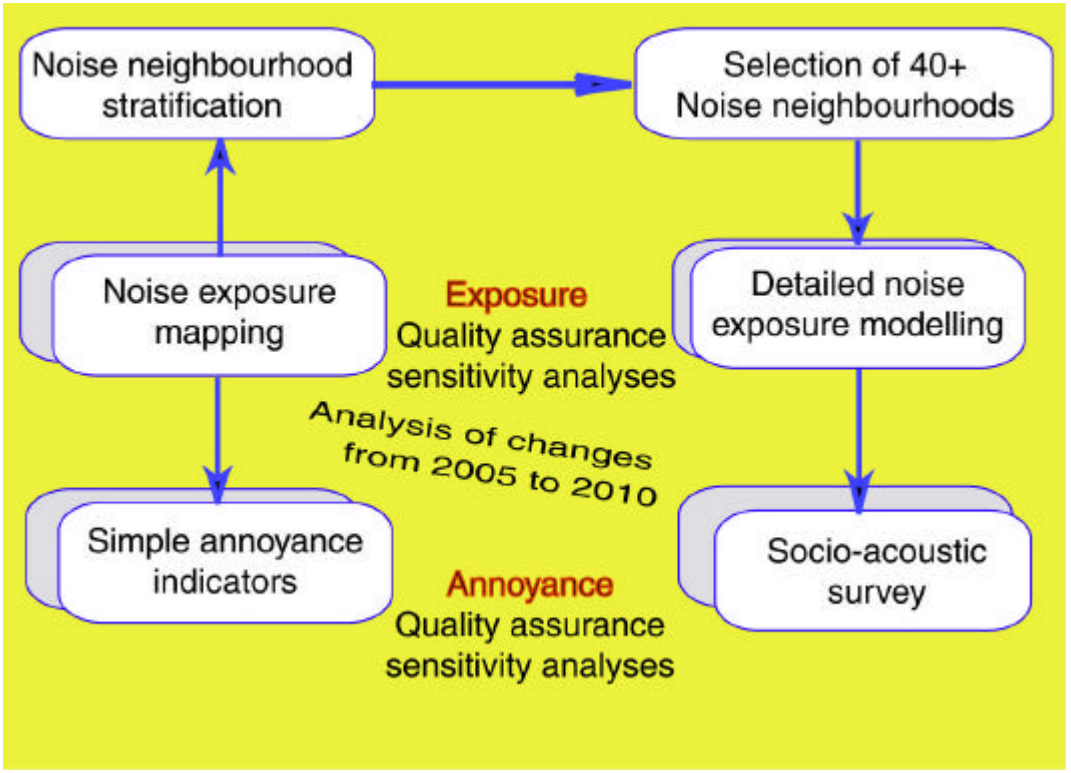

Figure S.1: Schematics of the Noise exposure-noise annoyance mapping system for Norway. As socio-acoustic surveys are costly, we have described a comparison of two surveys 5 year a part.

This multi level hierarchical structural equation modelling effort will be able to take into account differences between urban and rural areas, areas with multiple exposures contra single pollutant situations etc. This uniform, but at the same time flexible system is achieved by making use of multilevel structural equation modelling techniques. Such models seek to simultaneously account for both inter-area and within-area differences in noise annoyance and generate one general model that adapt a general exposure-effect relationships to the type of urban area it is applied to, while still making full use of information on noise exposure and modifying factors.

Changes in noise annoyance may be the result of changes in attitudes, the type of noise abatement efforts implemented, expectations of noise reductions and urban socio-dynamic processes triggered by changes in the environmental quality of urban areas. A project to establish suitable measurement instruments for attitudes has therefore been proposed. By controlling for possible modifying factors it should be possible to extract information that show the more causal relationships between noise exposure and noise annoyance and assess the efficacy of the noise abatement policies of the Norwegian authorities, and whether some policies are more effective than others in reducing noise annoyance.