Project presentation SHAPES

Objectives

The main objective is to analyze the risks and benefits of a modal shift from passenger cars to cycling. In this way SHAPES will enable policy makers to make clear and science-based choices related to commuter cycling and transport modal shift in cities.

Therefore SHAPES has defined a number of specific objectives:

- **To evaluate the exposure to air pollution for cyclists compared to car users**
- **To evaluate the physical condition of cyclists compared to car users**
- **To implement an on-line injury registration system for minor injuries in commuter cyclists**
- **To develop a spatial analysis for accident risks**
- **To integrate these risks into a common framework, to evaluate costs and benefits**
- **To develop a spatial analysis of trajectory choice and methodology for infrastructure development in the three Belgian regions**
- **To propose policy options that contribute to safer and healthier cycling and to lower emissions and social security costs in the long term**

Methodology

To achieve these goals a project in two phases is proposed:

In Phase 1 we perform a statistical and geographical analysis of accident data to identify the causes of accidents with cyclists and the correlated spatial attributes. This knowledge will be used to choose urban and suburban commuter trajectories. A set of relationships between exercise and improved health will be derived for different groups in the population and applied to the car drivers and cyclists in each of the case studies. Spatial attributes such as slope will be included to build a model predicting the exposure to air pollution for each of the transport modes. Phase 1 is also devoted to the preparation of a measurement campaigns and the collection of new injury data using an on-line registration system.

Phase 2 is largely devoted to the measurement campaigns that will determine the links between activity level, exposure and physical health. Breathing rate, exercise and exposure to NOx, PM and CO will be measured simultaneously for both drivers and cyclists. Special attention is paid to spatial variations in behavior and links with infrastructure. The models developed in Phase 1 will be calibrated and validated using the results from these measurements and complemented with the new injury data. It will then be used to extrapolate the likely impacts of promoting commuter cycling through the provision of specifically targeted infrastructure in each region. All health impacts from each risk category will be associated with a cost for medical care that can be worked out based on data provided by the national public health insurance. These costs are then used to develop a cost-benefit framework for decision support.

Interaction between the different partners SHAPES is not a continuation of any SPSDI or II project, but there is a clear logic in the succession of research topics covered and their relevance to policy makers at different levels. SHAPES builds further on the conclusions of quite a number of transport-related projects under the SPSD I and SPSD II programs but is founded on expertise obtained by the VUB outside of the federal science policy program (e.g. the Flemish Commuter Cycling project) and the European ETOUR project (Electric Two wheelers on Urban roads).

VITO participated in the SPSDI project "External costs of transport" which translated the European ExternE methodology to the Belgian context. This provided policy makers with information on the environmental differences between technologies and transport modes. This resulted in two SPSDII projects on new technologies (SUSATRANS) and promising transport modes (MOPSEA) increasing the understanding of national and European policy instruments. Under SPSDII, "Mobilee" looked at local environmental impacts and contributed to the integration of mobility and environmental policy at the local level.

UCL also participated in SPSDI and II for developing new tools in terms of spatial analysis of road accidents in Belgium as well as in understanding trip distribution and modal choices (Samba project). Moreover, the UCL team conducts other researches financed by FNRS on spatial econometrics and health problems.

SHAPES acknowledges that

- all major technological innovations have entered the mainstream car market.
- the remaining "relaxed" targets for CO2 prove very hard to comply with
- exposure to traffic related air pollution is most important on the road
- results cannot be extrapolated to other sites unless spatial factors are taken into account

Building on that experience it was decided to include an expert GIS team in this proposal (UCL) to ensure that results from SHAPES can be used throughout the country while taking into account the need to include local spatial constraints. The Department of Geography of the UCL is well known for its expertise in GIS especially in the domain of modal split (SPSDII, SAMBA) and road accident analysis.
SHAPES is therefore an integration of three lines of research and focuses on a specific transport mode that has the potential to contribute to several environmental targets while fulfilling a number of other policy targets as well.

Expected results and/or Products

SHAPES will build an integrated framework to evaluate the costs and benefits of commuter cycling. The outcome of the project will be a distinct set of policy options that can be used to promote a modal shift to cycling and substantially improve public health in a cost-efficient manner while taking in account the physical capabilities of different groups and spatial constraints in different regions.

The results will be useful:

- for individuals considering to give up sedentary transport in favor of cycling by providing clear insights in the individual health benefits such as a decreased risk for cardiovascular disease, hypertension, obesity, a better overall physical condition and risks encountered.
- for policy makers promoting cycling to prevent chronic diseases in an aging population, to reduce air pollution by cars and to reduce CO2 emissions by highlighting non-marginal changes (e.g. infrastructure)