PROPOLIS – Tool Summary

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Add details of authors and organisation, indicating their origin in academia, industry, government or non-governmental organisation.

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Info

Date:
2000 - 2004

Place of origin:
EU (Finland, Germany, UK, Italy, Spain, Belgium)

Homepage:
http://www1.wspgroup.fi/lt/propolis/

References:

- Lautso, K., 2004. The Propolis Approach to Urban Sustainability - Theory and Results From Seven European Case Cities. In *European Transport Conference 2004*. European Transport Conference.
- Lautso, K. et al., 2004. *PROPOLIS Planning and research of policies for land use and transport for increasing urban sustainability*, Helsinki, Finland: European Commission.
- Lautso, K., 2005. *PROPOLIS web site*. Available at: http://www.ltcon.fi/propolis [Accessed August 27, 2009]

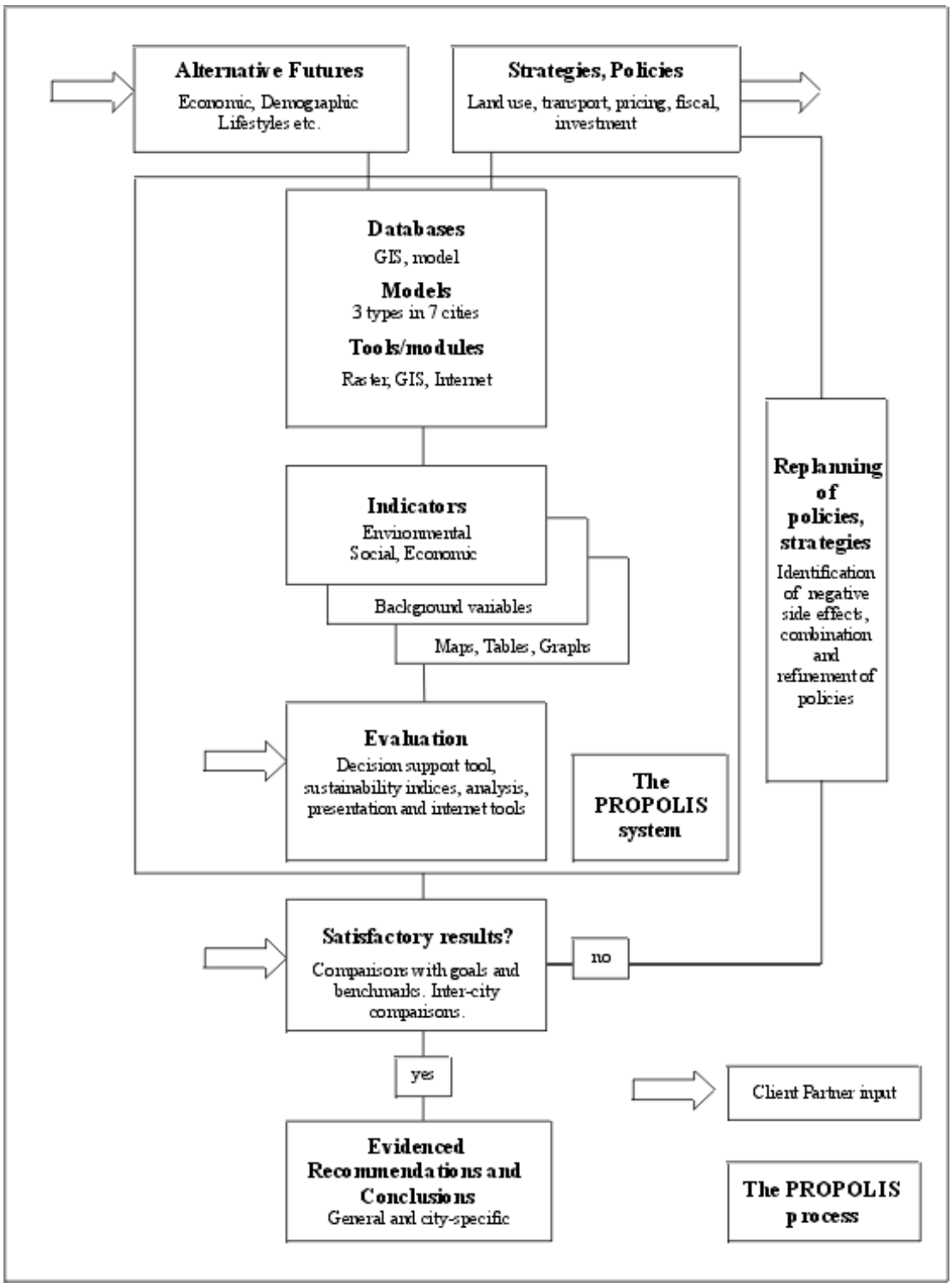
Latest use:
2004 in the project's case studies

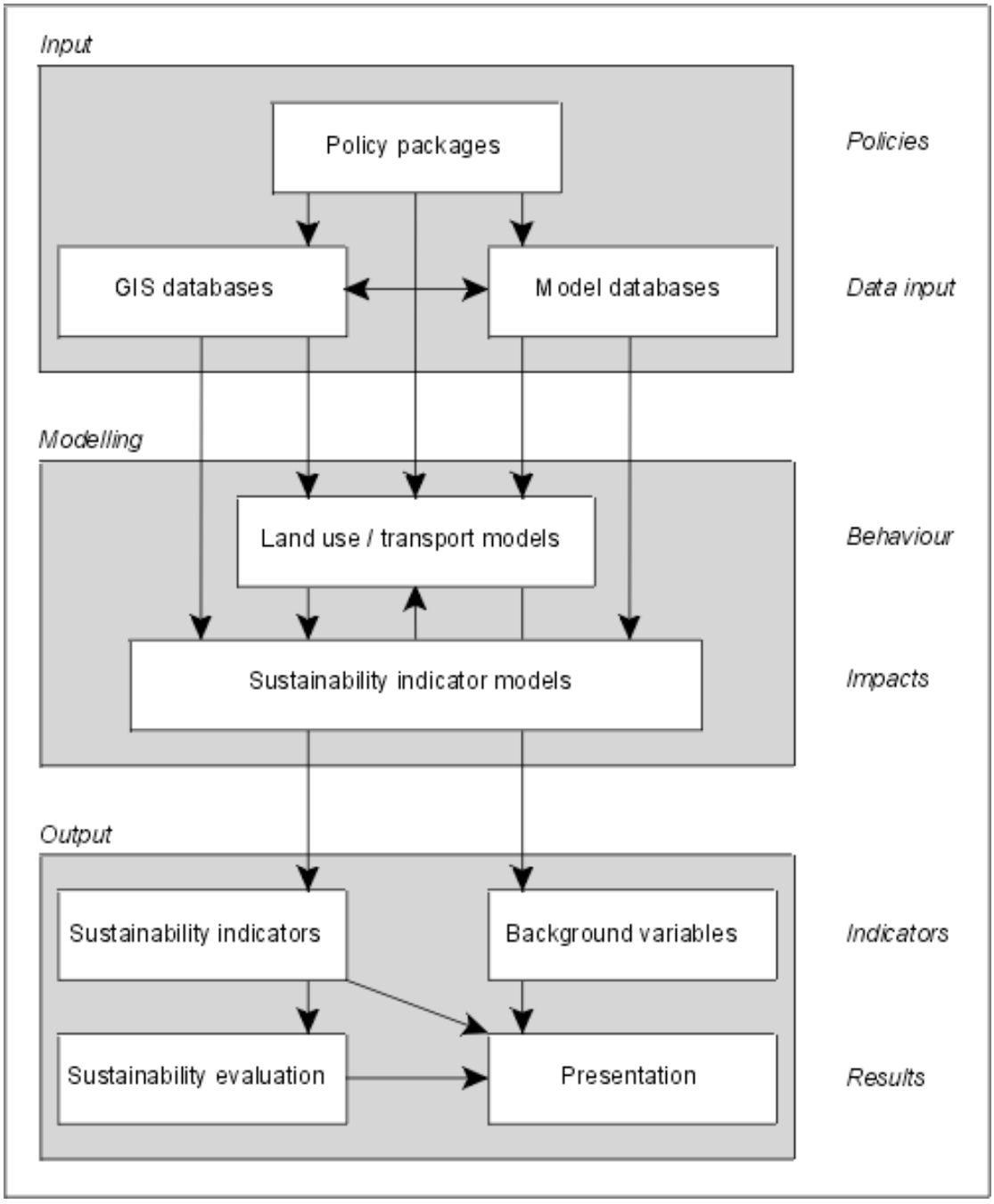
Download:
None

Description

"The objective of PROPOLIS was to research, develop and test integrated land use and trans- port policies, tools and comprehensive assessment methodologies in order to find sustainable long-term urban strategies and to demonstrate their effects in European cities. A set of indicators was developed for measuring the environmental, social and economic dimensions of urban sustainability. Values for these indicators were calculated using advanced urban land use and transport models and new GIS and Internet based modules developed during the project. A decision support tool was used to evaluate the sets of indicator values in order to arrive at single aggregate environmental, social and economic indices describing the alternative policy options. To include the long-term land use effects, a time horizon of 20 years was used. In close contact with Client-Partners and international

networks the system was used to systematically test and analyse policy options in 7 European cities using three different types of land use and transport models.
The main innovation of the project is the integrated and comprehensive but still transparent approach undertaken. Secondly, the approach applied has also produced innovative policy recommendations based on the system's ability to forecast the indicator values into the future and to take into account the long-term land use effects."




Input
Policy packages
GIS databases
Model databases
Policies
Data input
Modelling
Land use / transport models
Sustainability indicator models
Behaviour
Impacts
Output
Sustainability indicators
Background variables
Sustainability evaluation
Presentation
Indicators
Results

Key Theoretical Background

Other studies have discussed what the above dimensions mean in an urban context: European Environment Agency, 1995, Europe's Environment: The Dobris Assessment.

SUD Framework

"Sustainable development is usually viewed as consisting of three dimensions:

- Environmental and ecological
- Socio-cultural
- Economic

PROPOLIS will build on this theory, although problems with detailed interpretation of the above dimensions exist."
Chapter 1.3 in the PROPOLIS final report is devoted to expand this topic.
"Indicators will be used to measure the above three dimensions of urban sustainability. There is a huge amount of literature concerning urban sustainability indicators and the problems that one is likely to face when using them.
Special demands that the PROPOLIS indicators have to fulfil include:

- They should measure relevant aspects (without overlapping) of sustainability and have a sound theoretical background.
- Indicators are used for policy testing. Therefore, the project has to be able to forecast the indicator values into the future. This is an essential difference compared with monitoring indicators.
- The indicators, to be relevant in PROPOLIS context, should be policy sensitive."

Input

"Inputs to the modelling system are policy packages, GIS databases and model data- bases. Policy packages to be tested are transformed to 'model language' by changing some of the model parameters or the model database. GIS databases contain spatial data on zonal boundaries, road and public transport networks, land use categories etc. All land use transport models used are fully GIS-based, i.e. each model zone and each model link is represented in the GIS database."

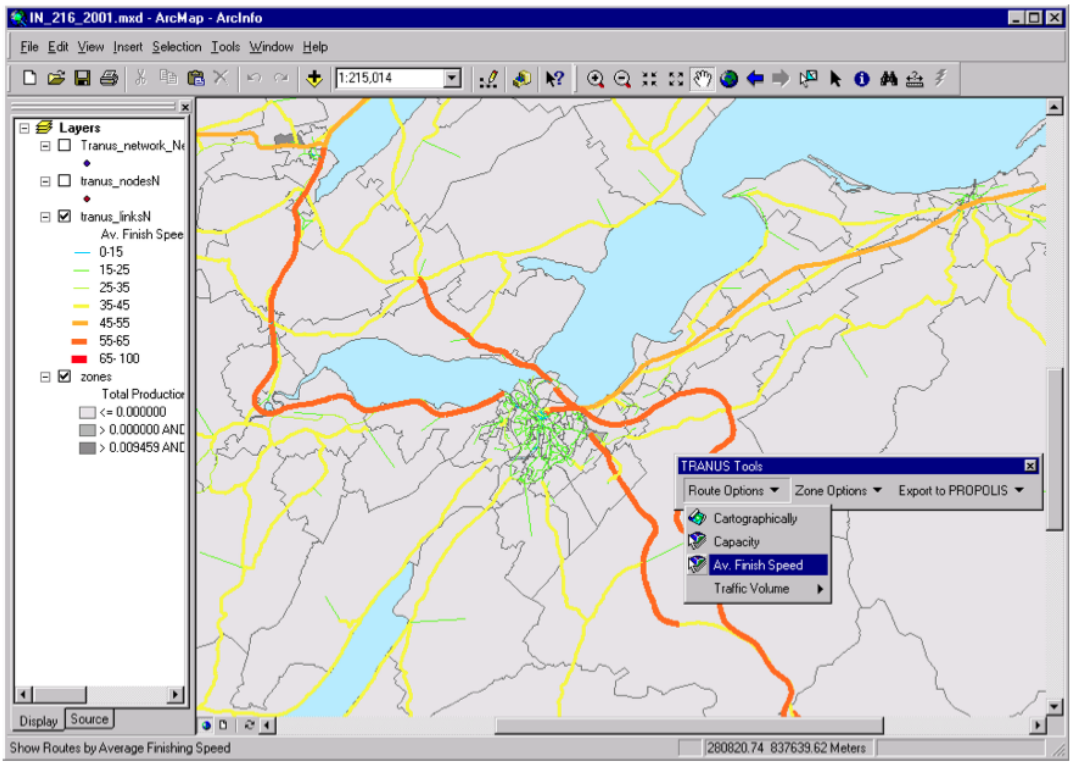


Figure 3.14 TRANUS GIS interface, predicted average speeds.

Methods

"In the modelling part, land use transport models are the driving engines of the system. In PROPOLIS there are three different land-use transport models, each somehow different with respect to theory, issues modelled and output generated. The land use transport models simulate the effects of the policies in terms of changing zonal activities such as population or employment and changing mobility pattern that result in different modal splits and different link loads.

A range of indicator modules receives the output of the land use transport models and calculates raw values of sustainability indicators.

Raster

The Raster module provides indicators for the environmental and social component of sustainability by introducing a disaggregate raster-based representation of space for those indicators that require a higher spatial resolution. In the Raster module the land use pattern within the zones is disaggregated to 100m x 100m raster cells using GIS information in order to permit the calculation of air quality, noise intrusion and other environmental indicators by raster cells. As the resident population of each raster cell is known the percentage of population by zone and socio-economic group affected by environmental impacts can be calculated."

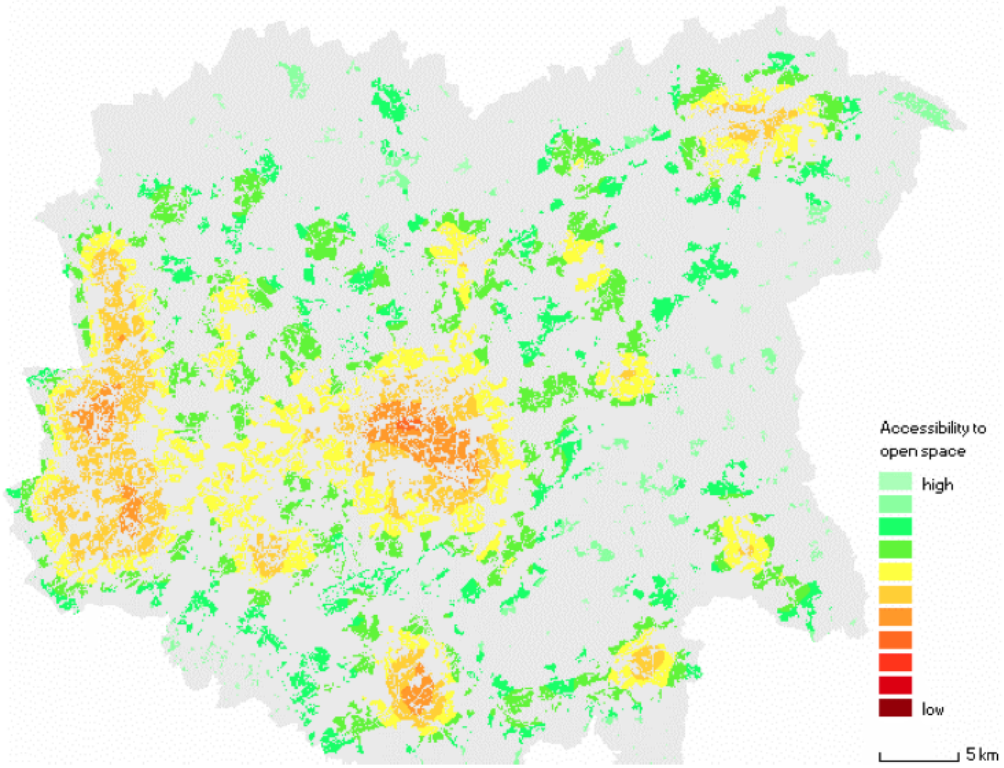


Figure 3.23 Raster Module, accessibility of residential areas to open space in the Dortmund region.

"There have been discussions about the benefits and disbenefits of cost benefit and multicriteria analysis for years and the discussion continues. PROPOLIS will use both methods. The economic index value for one component of sustainability will be based on cost benefit analysis but the environmental and social dimensions of sustainability are measured using multicriteria analysis. The assessment will take place using an existing decision support tool developed for urban context. The tool will be enhanced to meet the needs of group decision making, coping with uncertainty and citizen's involvement through internet application."

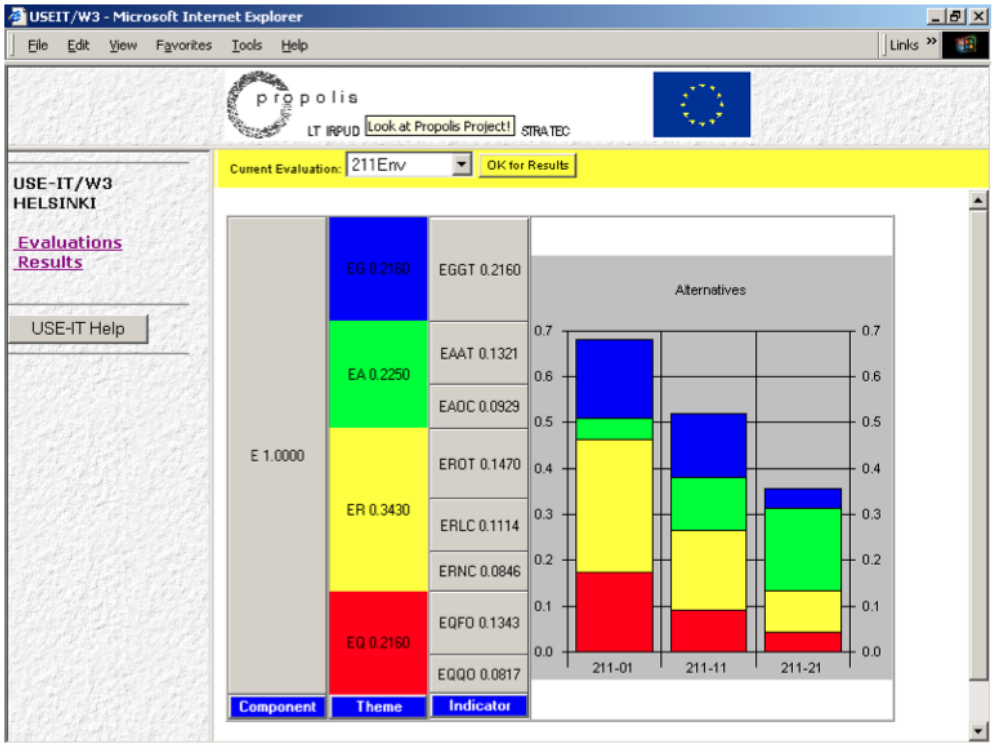


Figure 3.28 The USE-IT Decision Support Module, result screen.

"The sets of indicator values as such do not solve the problem whether policy A is more sustainable than policy B. This problem is approached with the evaluation tool where each indicator is evaluated through an analytical process where the Client-Partners play an important role.
The evaluated indicators are finally summarised to indices separately for the environmental, social and economic components of sustainability.
The process calls for an extreme aggregation of data, from single indicators, partly derived already from 100 m x 100 m raster cells (tens of thousands per city), via important themes to the final three indices of sustainability. However, the transparency is maintained and it is possible to go from the index level beck to indicator, super-zone, zone or 100m x 100m raster cell level to see how the policy affects, for instance, noise or accessibility in that cell."
"The assessment of sustainability takes place in the USE-IT module, where the indicator values are weighted and the importance of change is valued. The weighting and valuing process results in a single sustainability index for each dimension of sustain- ability. This index summarises a vast amount of data from e.g. the 100m x 100m raster cells. The module also makes the comparisons between policies easy and illustrative and can be operated through Internet, in case public involvement is needed."

Output

"The system has to be transparent and, therefore, additional disaggregated information is needed. This data is also needed for better understanding of the effects of policies.
The output from the presentation module will include:

- maps showing the movements of households and working places,
- maps showing the raster based indicator values by raster cell
- tables showing the values of background variables
- etc.

Background variables include important data that are not used as indicators but help to understand the effects of a policy option. Such data may include the modal split or households or employment / zone."

"A strong focus on clear, graphical presentation of data runs throughout the tools developed in PROPOLIS. The model-specific tools use GIS and three-dimensional mapping techniques to show spatial variations and highlight patterns and trends in background variables. The fine resolution mapping in the Raster module pinpoints very localised effects and interactions whereas the Analysis and Presentation Tool fa- cilitates rapid comparison between policies and between cities. The focus on graphical presentation helps to maximise productivity and to promote understanding throughout the PROPOLIS modelling and analysis process."

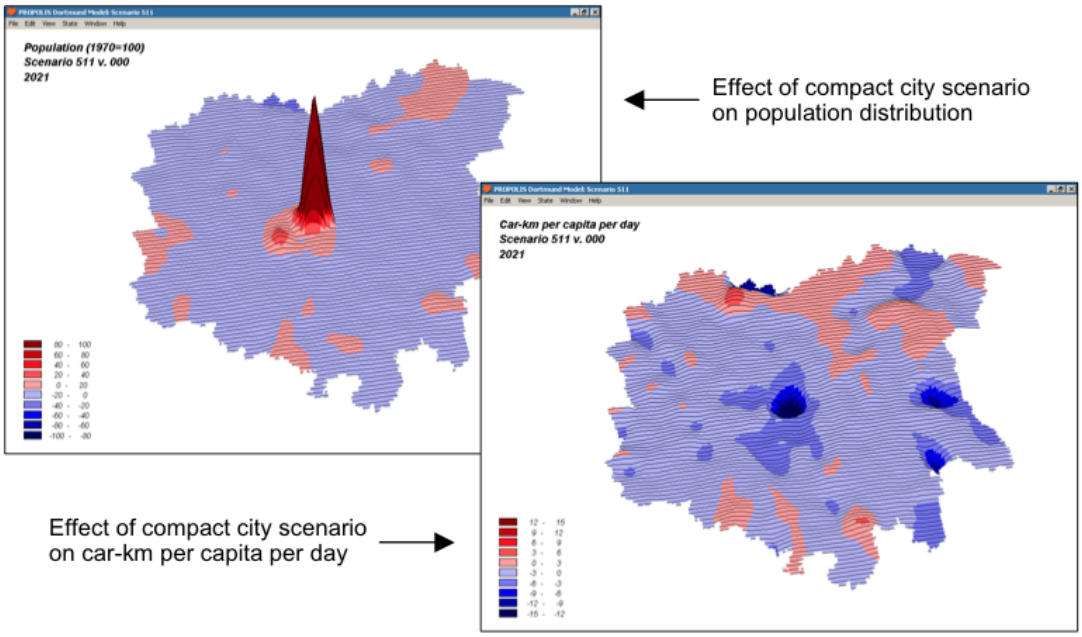


Figure 3.19 Contour plots of scenarios for the Dortmund region

Figure 3.15 Three Dimensional Representation of Inverness

PROPOLIS – Tool Review

General

Background
Very serious academic work, everything is very transparent, referenced and the process clearly explained. Excellent for verification, validation, learning and most importantly adoption.
Although the principles are holistic, the set of indicators is very specifically selected for their relevance to Land Use Transport planning and policy making, thus they need to have a direct causal link between transport and land use planning decisions and sustainability impacts. It lacks the level of detail necessary for urban design, and many aspects that are more relevant to urban form and design parameters.

Application (Scale and Design Phase)
Whole city, not the neighbourhood scale.

Sustainability Principles
Sound and well founded in universally accepted policy, acknowledging the complexities of it.

Assessment Criteria
Don't really exist… they are compounded with the indicators, as there is (almost) a 1 to 1 relationship. However one can argue that what they call indicators are really criteria that could be measured in many different ways, with different indicators that were not necessarily related to transport.

Indicators and Calculation Methods
Because a GIS is used in many of the indicators there is a spatial dimension added throughout. It's interesting the GINI index for spatial distribution equity of different socio-economic groups.
Of course they have all been biased to the relevant aspects of the model and the policy being tested, which is transport related. But even this is clearly acknowledged and explained.

Output
The output is varied and there was an explicit concern with the audience and to provide various levels of aggregation and detail. Also various types of output for different purposes. Has a wealth of maps thanks to the use of GIS.