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PRACTICAL APPLICATIONS FOR THEORETICAL RESULTS

Set-up of an innovation program for the Dutch strategic transport models

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ABSTRACT

To support mobility policy development the government uses strategic transport models to estimate the impacts of different policies. Since the impact of the selected policies can be large, the quality of the strategic transport models is an important issue. To guarantee this quality in the future an innovation process will be designed that on the one hand addresses the required stability and quality of the models, and on the other hand encourages the use of new theoretical concepts and areas of interest. In this abstract we present the current setup of this process, completed with a short description of the desired content of the models.

KEYWORDS

Strategic transport models, policy, innovation process, roadmap strategic models

INTRODUCTION

Strategic transport models estimate mobility and traffic flows in the future under various scenarios for future development, with prediction horizons of 10 to 40 years. Based on the expected growth of the population and the economy the future travel demand is estimated and the corresponding traffic in terms of the use of transport networks

The government uses strategic transport models to simulate traffic flows on future traffic networks, to determine the effects of building new roads or adding lanes to existing roads, to determine funding levels for ports, or to estimate the required size of a new lock. The output of the model forms an important aspect in the setting of the strategic mobility policy.

For all those different aspects, different modeling methods can be used. However, currently only one set of models is predominantly deployed: the NRM/LMS, the Dutch Regional Model/National Model System (1). This year, a new version of the models NRM/LMS2010 is produced which will be used during the upcoming years. While this model set is fully functional, the developments for the next generation of models will be started. Simultaneously with designing the next generation of models, the innovation process for strategic models will

be redesigned. This should guarantee that the next generation of models has a good quality, but also that this set of models will be up-dated and extended continuously with new theoretical results. Compared to the current innovation procedure, the newly developed innovation process should be able to use the innovative skills of private companies, to provide a focus for applied research projects, and to improve the coupling between political questions and available methods. An innovation approach has been formulated by the FHWA in their Transport Model Improvement Program (2). This program however is based on the situation in the USA, while the approach that we will develop should be specific for the Dutch situation.
In this abstract we describe the intermediate results of the project that should result in the description of the innovation process, contents, and form for the next generation models.
We first describe the proposed innovation process, which includes the description of different stages of models, the process of selecting and developing the desired models. Next we focus on the content of the models, considering the interesting topics for passenger transport and freight transport. Finally, some recommendations are presented.

INNOVATION PROCESS

The innovation process describes how a set of models is developed, how the desired content is determined, and how the quality of the results is monitored. Different parties are involved in the process: politicians who need the models to answer their questions, researchers who develop models out of interest, and private companies who develop models to gain profits.
We will first introduce general stages of model development, and next we present the innovation process that we propose, which should allow different parties to work together to obtain a set of models that is useful for the Dutch government.

Stages of model development

In Figure 1 an overview of different stages of model development is presented.

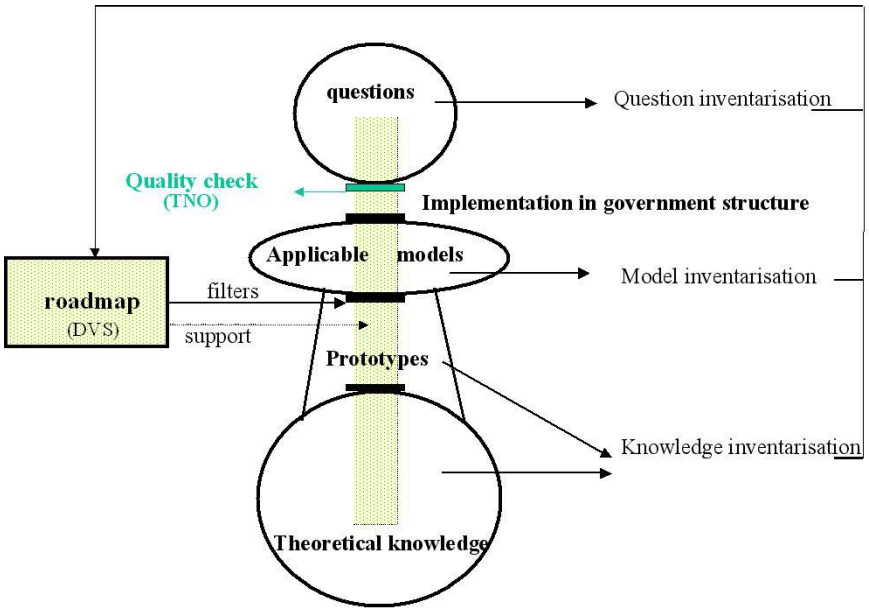


Figure 1: Stages of model development

The lower circle shows the theoretical research that is done in the area of interest. This research is done by universities and research institutes, and results in papers that theoretically

describe the models. Based on these theoretical results, prototypes are developed, presented by the 'triangle' above the theoretical circle. Prototypes are used to test the models on small networks, of ten programmed in test environments. The development of prototypes is finished when the effectiveness of the developed models is shown for a small network. At this moment the interest of the research community stops. The model enters the next stage: developing a widely applicable model. This means that the software of the prototype is converted into a fast and stable software package, and that the possibility to simulate larger networks is included. This is depicted as the horizontal ellipse in Figure 1. Above this ellipse, a small connection shows the process of implementing an applicable model in the structure required for governmental models. This means that the model should be included in the set of instruments of the government. When all this is done, the model can be used to answer the questions of politicians.

Structured innovation process

The innovation process as described above will run autonomously. However, the between the developed models and the political questions should be Figure (1) also introduces the structural innovation process that we propose, consisting of three yearly investigations and a roadmap. These investigations consider the theoretical results and prototypes, the widely applicable models, and the demands of the politicians. The demands are compared with the applicable models and prototypes, leading to the so called 'roadmaps' which describe the required functionalities. These functionalities are projected on the stages of model development, as the coloured vertical block in Figure 1. This block illustrates which parts of the work done in the different stages are of interest for the Dutch government. This means that the government will encourage the work in these areas, which should finally lead to models that have the functionalities described in the roadmaps. In this way the innovative possibilities of private companies and research institutes can be used to develop a set of instruments that can be used to answer political questions.

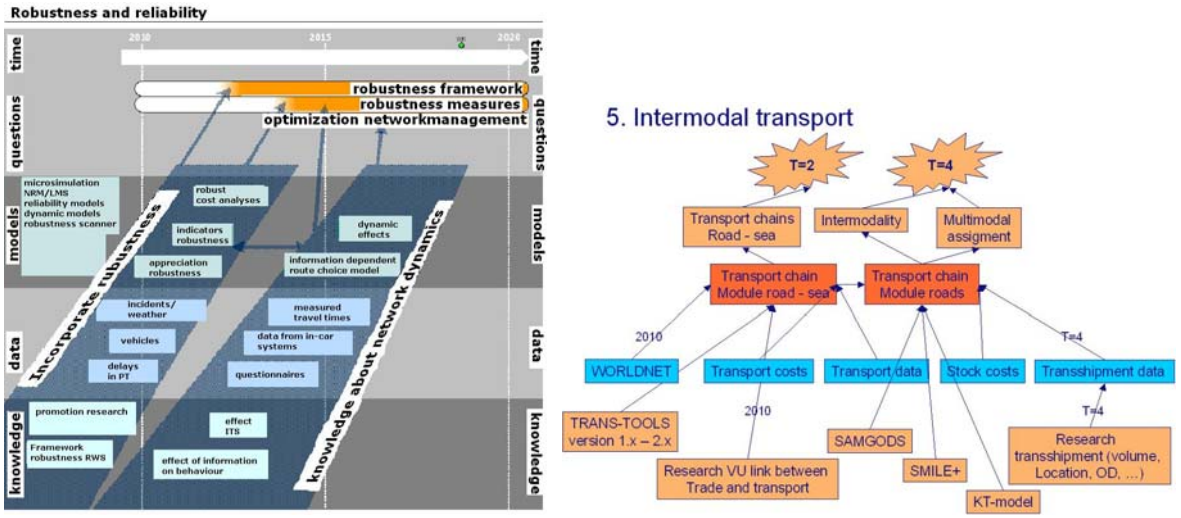
CONTENT OF THE MODELS

During the last two years, the innovation process as described above is started. Three investigations are made, and the first roadmaps are formulated. In this section we first give a general description of the set-up of the roadmaps, and then shortly present the roadmaps for passenger transport and freight transport.

Each roadmap consists of several topics. For each of these topics, four different aspects are considered: knowledge, data, applicable models, and political questions. The aspect knowledge considers theoretical knowledge that is required for the specific topic. This knowledge can be obtained by e.g. theoretical research or data analysis. The aspect data described which data should be gathered or is already available. The aspect applicable models describes on a functional level which models should be developed. The input, output, and level of detail should be described. The last aspect formulates the political questions that should be answered with the models.

The roadmap for passenger transport (3) consists of nine topics: build and exploit, maintenance and replacement of infrastructure, tax policy, robustness and reliability, sustainability and environmental impact, agglomeration forming, and demographic ageing and recreation transport. Within each topic two or three main directions are formulated. For each of these directions all four aspects (knowledge, data, models, questions) are considered, see Figure 2a. As illustration examples of required knowledge, data, etc. are mentioned in de

rectangular boxes. However, the presented boxes show only possibilities, and the exact content of each of the different aspects should still be determined.



a. Robustness and reliability b. intermodel transport

Figure 2: Topics described in the roadmaps passenger transport and freight transport

The roadmap for freight transport (4) considers fourteen topics: transport means, coupling between economics and transport, international trade, logistics, intermodal transport, port competition, reliability of travel times, air transport, departure time choice, iterative congestion, fleet description, route choice, dangerous goods, and pipeline transport. Similar to the roadmap for passenger transport, each topic is described by the required knowledge, data, model functionalities, and political function. In Figure 2b the set-up for intermodal transport is shown as example.

RECOMMENDATIONS

In the Netherlands, the government utilizes strategic transport models to help determine suitable mobility policies. To ensure future innovation of these transport models an innovation program is proposed, which should enable the development of new models by different organizations, varying from software companies to research institutes. The core of this program consists of two roadmaps that describe the knowledge, data, and model functionalities that are required to answer political questions. The program further describes the process that should lead to the development of these aspects. The current challenge for different parties is to determine their area of interest in the whole process. In that way they could take up the challenge to develop models that are politically relevant.

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