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TRANS-POL: A mediator between transportation models and decision makers' policies

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Abstract

TRANS-POL is a Decision Support System (DSS) specifically developed for the transport policy sector, which is capable of presenting the impacts from the implementation of transport policies and projects. It is developed to build intelligent translators between end users' questions and sophisticated transport model outputs. Hence, it links Expert Systems (ES) and DSS with advanced transportation models so that functionality between them is achieved. TRANS-POL comprises a set of basic tools that facilitate navigation by transport and computer experts and policy makers through all the available system resources (databases, maps, transport models etc.) and complementary tools such as desktop mapping, GIS, database management and multicriteria evaluation for transportation infrastructure projects. TRANS-POL application to example cases has proven its functionality and use. The added value of TRANS-POL is that it provides a medium for bringing together all kinds of transport models and databases, making them available to a wider audience in a user friendly environment.

Keywords: Decision Support System; Expert system; Transportation models; Transportation decision makers; Transport policy

1. Introduction

With the progress of computer systems, a new kind of software tools is being developed to facilitate the decision-making process, namely the Decision Support systems (DSS), initially called support systems [9]. They aim at providing the requested information in a user friendly manner, through the application of models and/or the assistance of an expert system that satisfy the needs of the user. In this context, it is always important to remember that a Policy Support System is a kind of Decision Support System (DSS), which comprises a software system, under the direct control of decision makers. It assists them but it does not replace them in decision making. Therefore, the development of such a Decision Support System is addressed to people, and it is not another computer-

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related advancement. Although computers and software play an integral role in the DSS world, the study of DSS related to transport policy issues is about how people think and make decisions. The definition and implementation of a DSS must integrate future users as much as possible, since for them, a DSS represents both a challenge and an opportunity to improve their working processes.

The literature on Decision Support Systems is quite rich, providing a sound basis for the methodologies employed and the mathematics involved [6,12]. There are numerous systems covering several disciplines, policy contexts and users' needs for specific application environments [2,4,19]. The following are good examples of developed tools for policy issues: WATERSHEDSS (WATER, Soil, and Hydro-Environmental Decision Support System), which is designed to help watershed managers and land treatment personnel identify their water quality problems and select appropriate best management practices [18]; the Environmental Decision Support System (EDSS), which assists in solving environmental problems with the provision of an advanced modelling and analysis system for environmental scientists, engineers, policy makers, and educators [7]; the Spatial Decision Support System for Urban/Wild land Interface Fire Hazards, which assists planners and decision makers to better manage and formulate policy that would help reduce the risk of a firestorm [21]; the Integrated Planning Decision Support System (IPDSS), which is designed as a Decision Support System (DSS) to assist governments and communities in evaluation of geological hazards, vulnerability, and risk; in addition, it assists urban planners in organizing, analyzing, modifying, and re-evaluating existing or needed spatial information within land-use planning activities [10]. On the other hand, the development of spatial Decision Support Systems (SDSS) is now possible [4], as well as planning support systems (PSS), and thus, future developments are anticipated in decentralised decision making [13].

The paper presents TRANS-POL, a DSS specifically developed for the transport policy sector, to provide policy support information which can be generated in-house. This gained broad support from consultancy, academia and the European Commission itself. The research effort aims to improve information provision in a highly complex decision-making arena: complex by its substance, its network of actors and the limited level of information available, despite the research efforts. TRANS-POL is developed as an integral part of the "BRIDGES," a research project funded by the European Commission's 4th Framework Programme of Research and Development [23]. The final product of BRIDGES is a set of software tools and data formats designed to provide necessary backing for an ETIS (European Transport Policy Information System). ETIS is an information system of integrated policy tools to support policy analysis and policy making. When finalized, it will comprise four elements: a data element; an analytical modelling element; GIS and a final element interfacing users with the above elements [11]. On the other hand, BRIDGES was designed as a set of "open," highly interconnected tools: communication systems, data models and protocols, specialized transport routines, applications to build intelligent user interfaces, transport software routines and stand alone applications. The transformation of such an open "information and modelling" system into a "Decision Support System" requires intelligent intermediation between the system outputs and the end user requirements, which is to be provided by the elaborated TRANS-POL [22].

To summarize the problem statement: since there are all kinds of models, simple and complex, but rather sophisticated for a non-expert user to understand all their intricacies, the presented DSS provides a set of tools for making those models widely available, yet in a controlled manner. The added value of TRANS-POL is that it provides a medium for bringing together all kinds of transport models and databases, making them available to a wider audience in a user friendly environment.

In the following, the paper presents thoroughly the issues related to TRANS-POL architecture and implementation. Firstly, the TRANS-POL objectives and the areas chosen for the solution of the problem are presented. Then the overall architecture of the TRANS-POL system is explained. Furthermore, the building up of the DSS templates and their connection to data sources, knowledge sources, models and solvers is presented, as well as the contents of the "meta" database used to guide the system through execution. Finally, the use of the system is described in an example case. Hence, the added value of the system