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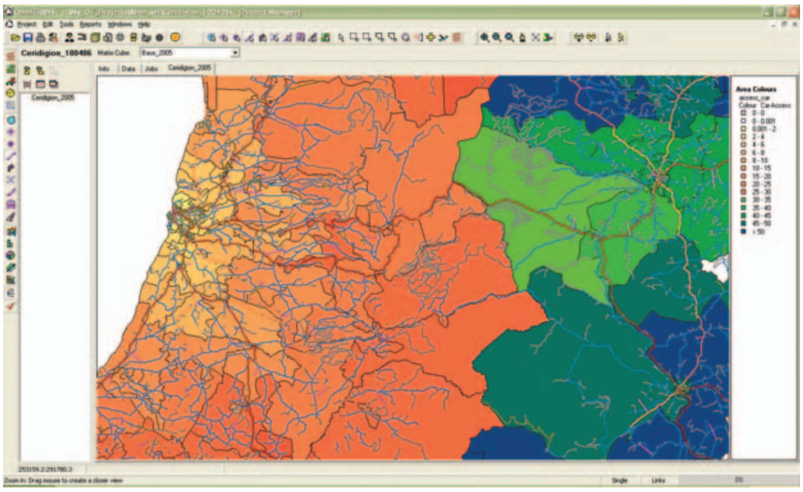
➤ The implications of travel time invariance ➤ Where engineers fear to tread ➤

OmniTRANS – offering the best of both worlds

Software, first developed in the Netherlands, is providing an imaginative new approach.



Example of accessibility analysis: travel times by car in the am peak from the town centre to the surrounding region

The UK transport modelling community faces many new challenges which somehow have to be expressed within a modelling structure. Innovators who want to think afresh should be aware of OmniTRANS, a recent introduction to the UK transport modelling scene. It was originally developed in the Netherlands, a country known for facing difficult transport problems with an imaginative and radical approach to finding solutions.

OmniTRANS is being distributed in the UK by transport planning consultants, Minnerva. Martin Bach of Minnerva says that what makes OmniTRANS particularly appealing is that it can be different things to different people. That helps differentiate it from other software in its class, especially the established packages which, by and large, can be used by only by 'the expert'.

He says OmniTRANS offers the best of both worlds through its very intuitive interface. 'The "expert" can build detailed models and deliver them to the end-user in a form that allows them to explore and interact with their data and model in a way that perhaps has previously been denied. On the other hand, the inexperienced yet inquisitive planner can soon be productive and build useful analytical applications for themselves.'

Does this mean that OmniTRANS is 'simplistic? Not at all, he says. 'It offers an immensely rich and flexible development environment in which the software is used as if it were a toolbox. There are very few constraints over the type, form or structure of model that can be devised. This has been enabled through the provision of excellent data management environment, an exhaustive set of functional modelling 'classes' (to use the jargon) and 'Plug in' technology (for the really advanced user), all of which are bound together by the Open Source Object Oriented programming language called Ruby (www.rubycentral.com). This is used as the OmniTRANS scripting language ensuring a fully functional programming language at the heart of the package.'

Data Management

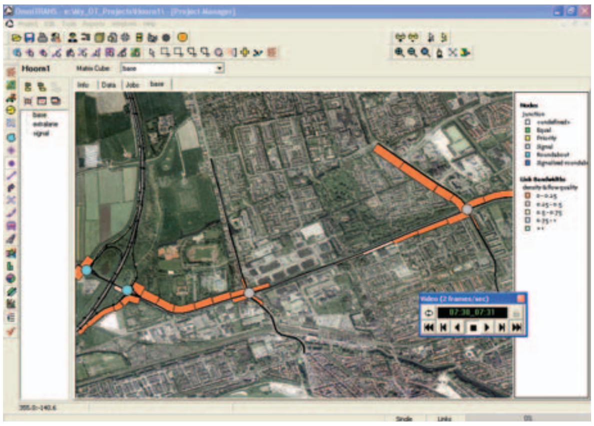
Sounds grand, but what does this mean in practice? Martin explains that OmniTRANS uses a very elegant data model designed to simplify the management and processing of complex and voluminous 'transport centric' data. This provides a straightforward way of dealing with network, matrix and zonal data which are at the heart of any model and makes OmniTRANS an excellent addition to any planner's toolkit.

In general, data is structured over the four natural modelling transport modelling 'dimensions': Purpose, Mode, Time and User Segmentation. Networks support two of these, mode and time, so a single network structure can be both multi-modal (highway, public transport, cycle and walk, etc) and multi-temporal (by time of day, forecast year etc). This avoids the need for multiple network files which are prevalent in many current models.

Demand (matrix) data extends to all four so that any journey purpose and any form of segmentation in the data can be handled with ease. This is now particularly relevant for UK TIF- based projects where analysis of the impact of proposals of different user segments in the population is called for.

Networks and matrix data are then combined with zonal land use and census- based data to create variants. These form the basic unit of analysis. Subvariants are created at the click of a button and can be amended to introduce a variation in the data or modelling process. The variants can then be compared. This is the objective of most analyses.

Martin adds that the better the data provided, the better the model will be. 'Model builders are often denied the luxury of exploring data because of the difficultly of so doing. The data handling and visualisation tools provided by OmniTRANS, which are of immense value in their own right, address this issue. They allow comprehensive sets of transport data to be understood, manipulated and validated before modelling takes place, but within the framework that will be used to build the model. This offers many synergies and productivity gains, particularly minimising data transfer between various software tools, thereby removing inconsistencies, and ultimately improving the quality of the data to be used in the modelling process.'



Example of an animated dynamic output showing the state of the network at 0730.

Modelling Functionality

OmniTRANS also offers considerable modelling functionality; either through the use of the extensive set of 'built in' classes that deal with demand and choice modelling, matrix estimation, highway and public transport assignment, or through the use of user written classes which supplement the basic set when something special is needed. Martin says this means that for many applications, if what is offered as standard does not suffice, the user can use Ruby to develop additional functionality and integrate this into the OmniTRANS architecture, rather than make hopeful requests to the software vendor to enhance their package.

Although space does not permit a thorough review of the modelling classes available, two OmniTRANS modelling features of are worthy of special mention. These relate to Macroscopic Dynamic Modelling (known as MaDAM) and a newly-added Public Transport assignment capability.

Macroscopic Dynamic Assignment (MaDAM)

Currently there is much interest within the profession in dynamic assignment and micro-simulation, and hitherto such models have been distinctly separate from the conventional static highway assignment models. Consequently they can be expensive to establish and require a further package' to implement.

MaDAM deals with this by taking the same network and demand data used in the static modelling and, using principles of Fluid Mechanics, it tracks the behaviour of traffic as it 'flows' through the network. It does this by considering the speeds and densities of vehicles per link segment per time slice (say 1 second), and seeing how much traffic can progress to the next segment given upstream and downstream conditions. The methodology correctly processes blocking back, weaving and merging; behaviour that is difficult to represent in static models.

A prime output from the model is a 'video' type presentation with the state of the network presented as 'animated' bandwidths for aggregated time slices (say five minutes). It illustrates where and how queues start to form, how blocking works back upstream and how queues interact. This is done with full junction modelling.

Typical applications of MaDAM include understanding the effects of implementing traffic control measures, traffic incidents, event traffic discharge (eg from stadia) and more commonly, the rapid forecast of short term traffic conditions using real time data. This is then used to implement traffic management plans to deal with the short term forecast travel patterns.

OmniTRANS makes the transition from static to dynamic modelling a natural step, and the ability to start with a static model before addressing the complexities of dynamic modelling offers many practical benefits.

Public Transport Modelling

A new feature is the incorporation of the Zenith Public Transport assignment methodology developed by Veitch Lister Consulting Pty Ltd (Melbourne, Australia). A multi-routing assignment model, it takes an innovative approach to modelling transit system access and egress, recognising the use of non-transit modes.

For example, the model allows for car drivers to find a set of candidate 'transit boarding stops' given specific criteria. This deals efficiently with the 'park-and-ride problem' that is so often difficult to model. Interestingly in terms of travel demand, car drivers who are making a multi-modal trip are seen to be part of the public transport system and not something awkward to deal with. Similarly, people who start their trips by walking are allowed to find a reasonable set of boarding stops – say within a 500 metre radius of their starting point. These criteria can differ by zone, so the model can be 'fine tuned' to reflect differences in network wide behaviour.

The Zenith Public Transport methodology has been applied for many years with great success in many major Australian cities and introducing this proven functionality to OmniTRANS will provide a very positive benefit for users.

To find out more about OmniTRANS please contact:
- **In the UK and Ireland: Minnerva (mbach@minnerva.co.uk +44 (0) 20 8559 2222)**
- **Outside the UK and Ireland: OmniTRANS International (jmorris@omnitrans.nl +31 (0) 570 666 832)**

A free fully functional 25 zone demonstration copy of OmniTRANS can be downloaded from the OmniTRANS web site: www.omnitrans-international.co

Joined-up Modelling

In summary, Martin Bach says that OmniTRANS provides a 'one-stop' platform for building multi-modal models, as well as an ideal environment for adding specific modelling functionality. The practical result of this, he says, is that it is no longer necessary to have two or more packages 'bolted' together as is so often seen in the UK: perhaps one to do highway assignment and the other public transport assignment. 'Such package linking is extremely inefficient, especially as it has to cope with inconsistencies in data structures across the various software platforms. Of course, it also requires expertise and familiarity with using the various packages.'

He adds that the one-stop approach also makes OmniTRANS well placed to face the challenges of Variable Demand Modelling which is of current interest to UK modellers in that it has all of the components required to address this problem and variable demand models can be contained within this single, consistent modelling environment.

A prime example of enhancing functionality, he says, is shown by the way in which OmniTRANS is used to undertake accessibility modelling. The transport data model contains all of the prime requirements for calculating accessibility indices although not all users are necessarily familiar with the specification of such a model. A 'plug-in', specially developed by Minnerva, makes it easy to specify an accessibility analysis by providing a focussed user interface that binds together the data and inherent functionality provided in OmniTRANS without the user having to specify and construct an accessibility model themselves.

If the transport model does not exist yet, then the converse is true; that is, once the data has been established for an accessibility model in its own right it is a small step to use that data to build a transport model. This is very efficient and productive and minimises the gulf between these two closely related areas of analysis.

He concludes that the potential of the plug-in technology is very exciting. 'It can provide a specific user interface and the potential removal from view of those parts of OmniTRANS that are not relevant to the application, whilst offering the additional functionality that addresses the specific requirements. In the Netherlands this technology has been used to great success in providing a wide range specialised traffic modelling applications for the Dutch Government.'