

TRANSPORT MODELLING



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Modelling techniques

Fitting the pieces together

Transport modelling is being asked to answer an ever-broader range of questions, so integrating various purpose-specific software modules effectively is becoming a key issue

“We all know that computing power has changed beyond belief in the past 50 years and we now have a richer seam of digital data to exploit, which means that we can now build bigger and more complex models,” say Martin Bach, a director at consultant Minnerva. “So we now have great outputs to look at, which means that we’ve never had it so good. Or have we? Could things be even better?”

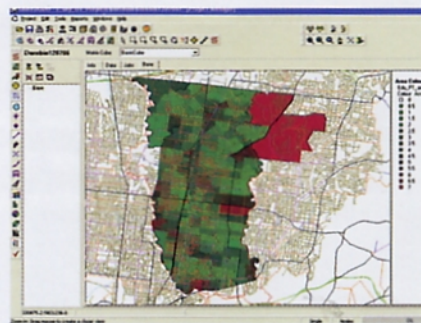
“Despite these positive developments, it could be argued that what we have is a relatively restricted but disparate set of tools at our disposal,” Bach explains. Specialist modelling software supplemented by peripheral generic packages such as spreadsheets, databases and GIS are, he says, often used inappropriately to process transport-centric data in a transport-bereft analytical context. “Data does not move easily around this software merry-go-round and usually needs to be manipulated to pass from package to package – an opportunity for error to creep into the process,” Bach notes. “Moreover, the skill set required to handle this range of tools becomes evermore demanding. The transport modeller either acquires a multiplicity of skills to flit across this spectrum of software or continues to use the software he knows, even though it may not be the most efficient tool for the job.” Allied to this, he observes, there is such a huge amount of committed investment in existing models and the knowledge acquired to build and run them that change is hard to initiate,

even if the modeller wants to progress and take advantage of the newer tools on the market that might address some of these issues, because the perceived risk of change is high.

To complicate matters further, the Minnerva director notes that some software packages have become ‘exemplars’ for a specific area of modelling, with the result that many models are combinations of what are basically incompatible pieces of software, with data being transformed and transferred back and forth between the various components.

“There are several complex and interwoven issues interacting here and it is useful to look at some of the major themes separately but within the context of asking the questions: Can we be more efficient and productive? Can we use data more effectively? Can we, and how do we, build better and more consistent models? And where does the motivation for change lie?” Bach suggests. “On a project-by-project basis there may be little interest for client or consultant to consider the big picture and to expend more than is necessary to get the job-in-hand done as cheaply as possible. There is little merit in taking a broader view and thinking about data as being a reusable resource or to take what might be considered to be a commercial risk and use alternative (better) software for the job.”

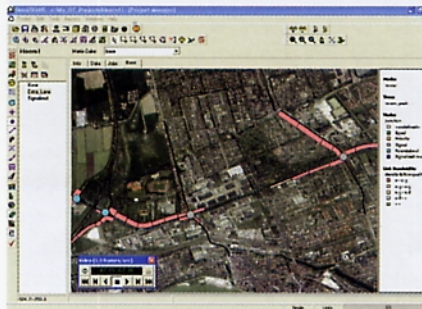
Taking a closer look at the data used by modellers, Bach explains that essentially there are two broad sets – one for network description and the other for



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travel demand – but both are expensive to acquire and both represent a valuable resource. “The value comes from being able to share and reuse these resources in a consistent manner but our modelling tools, by and large, do not communicate with each other too well in this respect, especially with network descriptions,” he says. “Although link-based data migrates relatively easily, we might also unnecessarily transfer the coding ‘tricks’ needed to overcome a package’s idiosyncrasies and each package takes a different view on how traffic turn, junction, count and public transport data is defined and structured, so the interchange of network data across the platforms is not as fluid as we might like.”

So could data standards help in the movement of data and so improve matters? “Well – yes and no,” he claims. “Standards tend to be imposed from outside as we start to use datasets generated by third parties for purposes other



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than transport modelling. Good examples exist with the Ordnance Surveys Integrated Transport Network and the NAVTEQ datasets that provide link-based network descriptions but these are not entirely problem-free from the perspective of transport modelling and have to be processed to match the data structures of the host modelling package. We

also see various standards for public transport service data where a common data interchange has been developed to meet various public transport information systems and registration needs. The Association of Transport Coordinating Officers Common Interchange Format (ATCO.CIF) and TransXChange standards provide the yardstick but, as with the network data, these are not easy datasets to work with. Nevertheless, they are a step in the right direction."

Perversely, Bach notes that some of these digital data sets are putting pressure on the modelling software. "Their improved description of the real world exposes weaknesses in the generalisations in the data models and capabilities of software – the scope of junction modelling provides a good example," he explains. "The problems are mostly with the 'Cinderella' data items that we use – again we can point the finger at junc-

tion data. There is no consistent specification for this yet it is used by a wide range of modelling software from individual junction design packages through static and dynamic models to micro-simulation software. It is hard to see where the development of standards for data of this nature will arise and so facilitate data exchange."

"If data is not to move around the software, can we do all we need with fewer packages, or indeed a single package, and so avoid these problems?" he asks rhetorically. "The obvious answer is only if the package provides the necessary functional scope. Whilst no such all-embracing piece of software exists – yet – we are seeing the 'newer' packages whose design and architecture understands the importance of the separation between data and process responding to this challenge; that of offering a broader set of analytical capa-

bility within a single framework."

There are immediate and significant benefits, he claims, such as fewer packages for the modeller to master and greater utility put on the data that is used for a wider range of analytical purposes. This, in turn, leads to improved consistency in outputs and negates the problems of data transfer. "OmniTRANS is one package where the handling and management of data is as important as the modelling that uses it," Bach says. "The software delivers a single umbrella environment offering a wide range of modelling functionality using a single, common data set. It embraces multimodal modelling and dynamic highway assignment, so immediately there is a choice of what might be seen as disparate modelling processes functioning within a unified environment. It also provides a GIS capability in the interface allowing for data to be processed and

analysed within the context of the transport model. The toolset starts to converge."

"OmniTRANS allows users to develop their own functionality and add it to the framework," Bach adds. "Consequently we at Minnerva have introduced capabilities of particular interest to UK modellers – for example, the geocoding of survey data, the implementation validation of roadside interview survey data and recently, support for the implementation of Variable Demand Modelling. Previously such tasks were done in other software so there is nothing new there but handled within the unified OmniTRANS data environment the process is more efficient and the data consistent." Bach also recognises that accessibility modelling requires precisely the same data as the transport model. "We do this in OmniTRANS using a 'plug-in' that has been developed

that makes it easy to specify the type of analysis required and its implementation," he explains. "There is no difference between running a transport model or an accessibility model – there is just a different viewpoint on the same data."

"Some of the other software packages are taking the same approach and it is probably these commercial initiatives that are going to help improve the transport modeller's lot, although this should not preclude advances in developing data standards," he says. "But we come back to one of the issues raised earlier: how do we overcome the perceived risk factor in moving to the unknown? There is no easy answer. As the old saying goes 'it's the pioneers that get the arrows and the settlers that get the land'. It needs some brave souls to be innovative, take the risk and demonstrate that actually, life is not so bad in the new world but, fortunately, we do have some pioneers amongst us."